EFOMP
EUROPEAN FEDERATION OF ORGANISATIONS FOR MEDICAL PHYSICS
Quarterly Newsletter

European Medical Physics News

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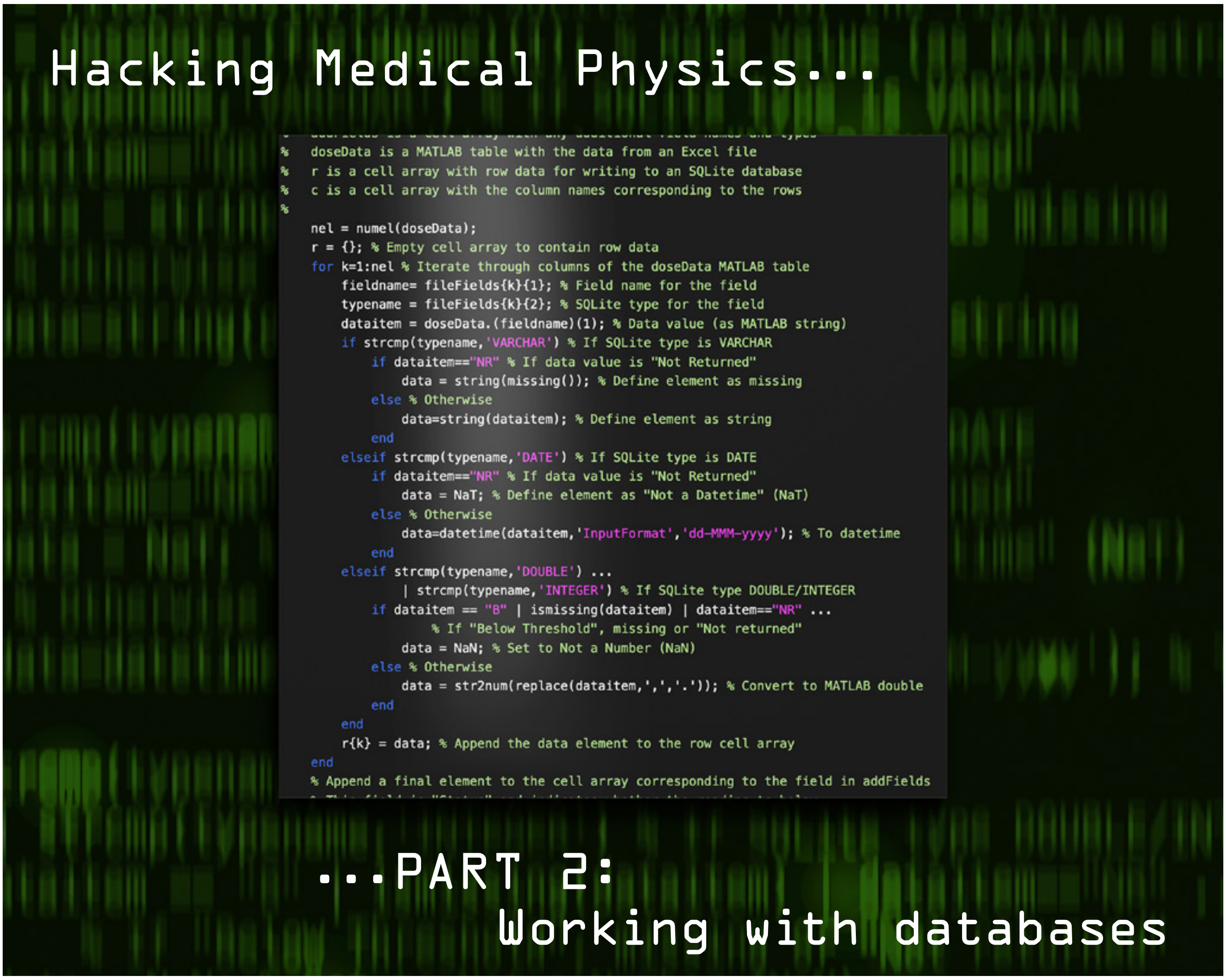

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Front page graphic: code associated with the article "Hacking Medical Physics" by Jonas Andersson and Gavin Poludniowski, which can be found on page 36 of the newsletter; the code can be downloaded from Github.

EDITORIAL

Welcome to the Spring 2022 issue of European Medical Physics News, the quarterly newsletter of EFOMP.

Spring is usually a time of great hope, with seasonal flowers starting to appear, despite the occasional chilly weather. There are signs that the COVID pandemic, which has affected all of us for the last two years, might be finally on the wane, with restrictions being lifted gradually. Unfortunately, events in Eastern Europe have taken a huge step for the worse over recent weeks and days, and we offer our sincerest sympathy and support to our colleagues in Ukraine as they endure the deplorable invasion of their country.

This issue's front cover shows a fragment of code that has been made available online by Jonas Andersson and Gavin Poludniowski, authors of the "Hacking Medical Physics" series of articles, the second part of which appears within. This very informative article provides many practical hints on getting to grip with databases and using them in a Medical Physics environment. The newsletter includes the third article by Prof. Jim Malone in his "Art to Challenge and Inspire" series, this time on a thought-provoking painting entitled "Blotter", by Peter Doig. Meanwhile, Danielle Dobbe-Kalkman continues her "Meet the Prof" series with an illuminating interview with not one but two seasoned Medical Physics educators, namely Prof. Slavik Tabakov and Dr. Vassilka Tabakova.

The newsletter includes regular features, including a medical physics book review, reports of recent meetings and an overview of recent papers published in Physica Medica by the journal's Editor-in-Chief, Iuliana Toma-Dasu, as well as articles by EFOMP's President and Secretary General. With the first in-person medical physics conference for over two years, ECMP 2022, in our minds, you will find an article from Paddy Gilligan updating us on preparations for the August congress, while Naomi McElroy writes about everything that Dublin, the conference city, has to offer. This time, the Medical Physicists' hobby article is about collecting and growing orchids. As always, articles from EFOMP Company Members are always appreciated by our readership, and in this issue you can find 13 such contributions. Last, but not least in this issue, AURORA's comic strip featuring Lev the Lion makes a welcome return.

Finally, I must mention that this issue marks my last as Editor-in-Chief. I have greatly enjoyed editing EMP News over the last couple of years and I am very happy that the newsletter has continued to flourish during that time. Production and development of EMP News would not have been possible without the help of the highly dedicated editorial team, comprising members of EFOMP's Communications and Publications Committee. I wish Mohamed Metwaly all the best as he takes over as Chair of the committee and as Editor-in-Chief of the newsletter!

I hope you will enjoy reading this issue of European Medical Physics News!

David Lurie and the Editorial Team
(pubcommittee@efomp.org)
February 2022

David Lurie is an Emeritus Professor at the University of Aberdeen, UK. Prior to his retirement in October 2021, he held a Chair in Biomedical Physics, having researched and taught MRI Physics at the University of Aberdeen since 1983. Prof. Lurie was awarded the Academic Gold Medal of IPEM in 2017 and was named as a Senior Fellow of ISMRM in 2021. He was Chair of the Communications and Publications Committee of EFOMP from January 2020 until February 2022.

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To contact the Committee, send an email to pubcommittee@efomp.org.

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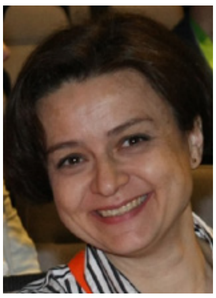

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EFOMP President's Message

EFOMP President Paddy Gilligan writes about the organisation's recent activities, as well as important issues for Medical Physicists

Dear Medical Physicist colleagues, friends and volunteers. I am always honoured to mark the changing of the seasons with another EMP news!

Ukrainian Association of Medical Physicists
As news of the invasion of Ukraine and the deplorable horror visited on its citizens becomes apparent, our thoughts are with our national member organisation, the Ukrainian Association of Medical Physicists and the wider medical physics community in that country. Initial communications from our colleagues show they will endeavour to keep working for patient benefits, although some services such as radiotherapy have been impacted. We hope that our colleagues can stay safe and that the hospitals and clinics where they work will be spared from attack in line with the Geneva conventions. We also hope that the crisis will pass quickly and peace will return. Medical Physics is a healing activity, warfare is not!

Springtime
Nature remains inevitable. Spring is here at last and the green buds of progress are beginning to appear, in spite of all the existential threats we have suffered. Although recent terrible events conspire to stoke fear and divide, our goal to use our energies to help patients and staff remains the focus of medical physicists, wherever we are in our 36 National Member Organisation countries. The voluntary nature of EFOMP has meant that we are in a strong position coming out of Covid both in terms of finance, output and plans for the future. We appreciate the gifts of the volunteers' time and the creative energies of all of those who help, organise, write and teach to benefit medical physics and patient welfare in a European context.

Recognition of the Medical Physics title and qualification in the European Economic area
We can finally feel that we are coming together rather than pulling apart. Identity and mobility are key parts of our success as Medical Physicists in Europe. Our identity is protected and enhanced by harmonisation of training standards and use of regulatory mechanisms already in place. I am pleased that as I write this that, through Csilla Pesznyák, Hungary are the eighth National Member Organisation to submit their national registration scheme (NRS) for medical physics experts to the Professional Matters Committee for approval (see Table 1, below). We are also aware that other NMOs are on the cusp of submission and we hope to reach the approval of one third of member states by May 2022, as outlined as a requirement for establishment of a common training platform under EU directive 55/13 which is the update on directive 2005/36/EC. This directive provides for automatic recognition for a limited number of professions based on harmonised minimum training requirements (sectoral professions), a general system for the recognition of evidence of training and automatic recognition of professional experience. The requirements of the common training platform are listed in the directive:

" A common training framework shall comply with the following conditions:

(a) the common training framework enables more professionals to move across Member States;

(b) the profession to which the common training framework applies is regulated, or the education and training leading to the profession is regulated in at least one third of the Member States;

(c) the common set of knowledge, skills and competences combines the knowledge, skills and competences required in the systems of education and training applicable in at least one third of the Member States; it shall be irrelevant whether the knowledge, skills and competences have been acquired as part of a general training course at a university or higher education institution or as part of a vocational training course;

(d) the common training framework shall be based on levels of the EQF, as defined in Annex II of the Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning;

(e) the profession concerned is neither covered by another common training framework nor subject to automatic recognition under Chapter III of Title III."

Representative professional organisations at Union level, as well as national professional organisations or competent authorities from at least one third of the Member States, may submit to the Commission suggestions for common training frameworks which meet the conditions laid down in paragraph 2. The work done by EFOMP volunteers and the clinical societies (ESTRO, EANM, and ESR) on updating the core curricula will be invaluable in ensuring that these standards are relevant for modern patient care.

Country	Approval
Germany	2019
Netherlands	2019
France	2020
Austria	2020
Ireland	2021
Greece	2021
Poland	2021
Hungary	Pending

Table 1: NRS approval status

We have already begun the next steps post the achievement of nine approved EU based national registration schemes. This preparation of the submission to the Commission will form key deliverables for the European Matters, Professional Matters, and Education and Training committees for the next two years. The approval of nine national registration schemes is only the start of the process, and *we implore those national member organisations who have not sent their scheme for approval to date to prioritise the submission of their schemes.* The greater the number of approved NRSs, the stronger will be the submission to the Commission. Ultimately having an approved NRS in a member state will facilitate easier inward and outward mobility for their physicists. The actions outlined above will be in concert with other actions by these committees such as working toward recognition of the title Medical Physicist through ESCO and existing ISCO classifications: ESCO - Occupations - European Commission (europa.eu).

"Giorraíonn Beirt bóthar", two shorten the road

Recently radiotherapists underwent a similar journey and we hope to learn from their experience and the professional matters committee have initiated contact with this profession. We have also sought advice from those who implement directive 55/13 in our own country. We are also aware that EUTERPE are about to embark on a similar journey for radiation protection experts. There is an Irish language expression “giorraíonn beirt bóthar”, which means “two shorten the road”. I am strongly of the belief that the expression is appropriate here.

Scientific Committee and ESMPE Chair Brendan McClean and EFOMP treasurer and Local School organiser, Jaroslav Ptacek, on their way to the Radiation Shielding in Medical Installations ESMPE School, Charles Bridge, Prague, February 10, 2022.

The success of the Prague shielding workshop, recent successful grant applications and awards by the projects committees, some with the help of the newly formed SIG, exciting news from the early careers survey, the strong competitive bids for ECMP 2024, new working groups, and many other initiatives, form part of the cogs of EFOMP's fabric of medical physics advancement and point to another very successful year of which the highlight will be coming face-to-face in Dublin in August at ECMP 2022. So please book your travel and accommodation and register as soon as you can!

Yours,

Assoc. Prof. Paddy Giiligan, President of EFOMP

EFOMP COMPANY MEMBER ARTICLE

Standard Imaging: How accurate is your patient plan delivery?

Ensuring that the desired dose is delivered to the prescribed location for each patient requires a well thought out QA programme. Use of pre-treatment QA often requires a disproportionate amount of physics time and resources relative to the number of failures found, and traditional array-based pre-treatment QA methods have been shown to provide low sensitivity to error detection [1]. Additional methods must be considered if we are truly to provide complete QA for all patients. Independent in vivo verification of the plan during delivery is a significant step toward ensuring dose is delivered as prescribed. How does your clinic determine whether plans are delivered accurately during each and every fraction?

Independent automated methods using integrated EPID panels are one solution. The latest release of Adaptivo™ provides improved workflow for daily treatment evaluation. Adaptivo compares exit dosimetry measurements to predicted images to evaluate both accuracy and consistency of delivery. The predicted image is generated based on the plan, planning CT, and a LINAC specific beam model. This provides an independent assessment both that the correct plan is being delivered and that the correct patient setup and alignment occurred each day. Incorrect patient setup on day 1 which is corrected in subsequent fractions is shown in Figure 1.

Adaptivo was designed by clinical physicists with clinical evaluation in mind. Traditional gamma analysis provides no information concerning whether delivery is hotter or cooler than planned. Adaptivo's hot/cold gamma analysis (Fig 1) is the default view because of the added clinical information it provides. The traditional gamma is given a sign based on if the measured value is hotter (positive/red) or cooler (negative/blue) for ease in evaluation and troubleshooting. Hot/cold gamma is calculated via post-processing of the gamma index map using the following the equation:

$$\Gamma_{signed}=\Gamma*[2*H(D_{meas}-D_{pred})-1]$$

where H is the Heaviside function.

In addition to confirmation of the patient plan delivery and alignment, weekly average alerts are a mechanism to trigger replanning conversations between the radiation oncologist and medical physicist. Daily differences either due to setup or variable anatomy such as bladder or bowel changes need to be differentiated from longer term changes such as tumor shrinkage or weight loss. Adaptivo facilitates review using weekly average data alerts and treatment delivery trends of the gamma pass rates. In the example shown in Figure 1, replanning triggered by the automatic alerts on the Adaptivo dashboard (Figure 2a) and backed up with trend data (Figure 2b) resulted in improved treatment. In this example, Adaptivo alerts helped facilitate significant reduction in the treatment volume, an increase in tumor dose, and a reduction in dose to normal tissue (Data courtesy of Brian Pomije, MS, DABR Radiation Therapy Physicist, GenesisCare – August 2020).

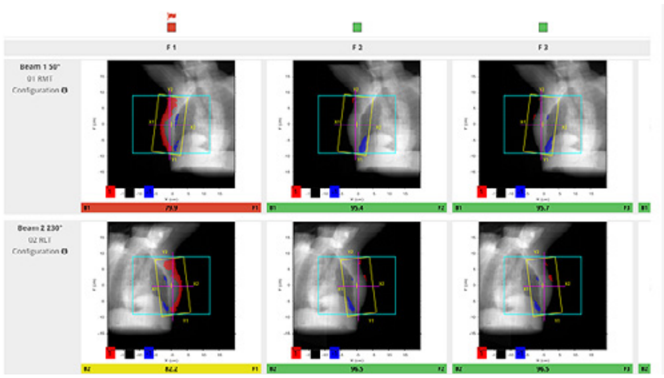


Figure 1: Incorrect setup of a breast plan during fraction 1 which is corrected on subsequent treatment days due to alert from Adaptivo. Analysis shown is 5%/3mm hot/cold gamma analysis with an alert threshold at 90% and failure threshold at 80%.

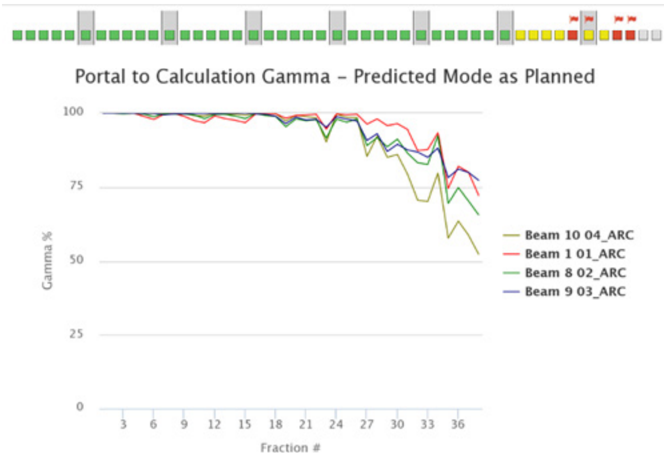


Figure 2: (a) Above - Adaptivo's dashboard provides a daily pass/alert/fail indication and weekly averages highlighted in grey for 38 delivered fractions. (b) Below - Gamma analysis trends for each beam/arc support timing of replanning.

We are "Very satisfied at CHR Metz-Thionville with the results of our in-vivo transit dosimetry solution Adaptivo ... Predicted images are automatically compared with EPID acquisitions showing that even our highly modulated VMAT beams are delivered with accuracy" – Paul Retif, Ph.D, Chief Medical Physicist (Figure 3).

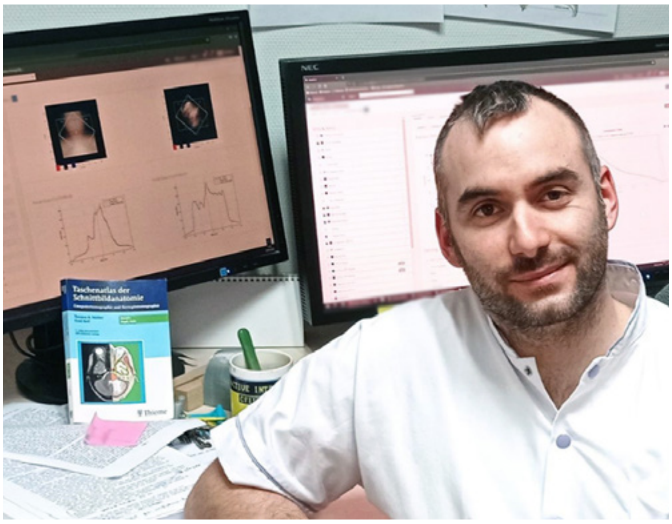
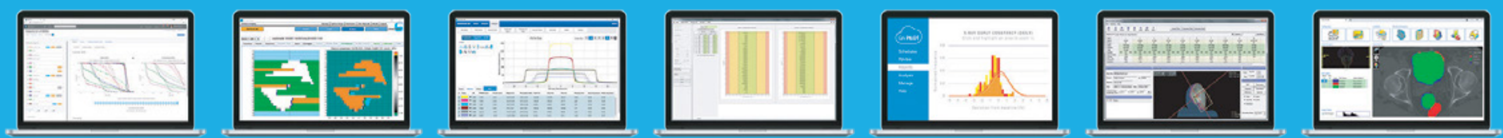


Figure 3: Paul Retif using Adaptivo to review beam specific gamma and profile comparisons to ensure accuracy.

Mary Napolitano, PhD is Product Manager for patient QA solutions at Standard Imaging. She obtained her graduate degrees at Georgia Institute of Technology and her bachelor's degree in Nuclear Engineering from the University of Cincinnati. Prior to Standard Imaging, Mary has worked for multiple vendors in the radiation oncology domain.

Reference
[1] Kry SF, Molineu A, Kerns JR, et al. Institutional patient-specific IMRT QA does not predict unacceptable plan delivery. Int J Radiat Oncol Biol Phys. 2014; 90: 1195– 1201. DOI: 10.1016/j.ijrobp.2014.08.334



EFOMP Secretary General's report (December 2021 – February 2022)

In this article you will find an update on the institutional matters of our organization during the last three months

EFOMP Governing Committee Elections 2021 – Results of the electronic postal ballot

The postal ballot on 4 Vice-Chair and one Chair positions ended on Monday, 29 November 2021. Elected Vice-Chairs took their offices from the 1st of January 2022 and the Chair of the Communications and Publications committee on the 1st of March 2022.

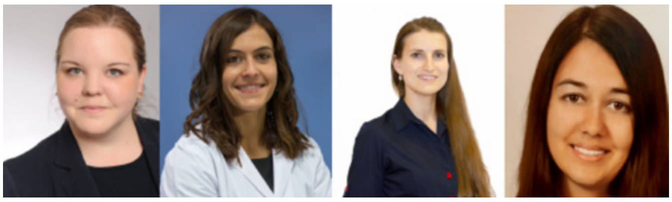
Position	Name	NMO/Country
Communications & Publications committee chair	Mohamed Metwaly	UK
Education & Training committee vice-chair	Veronica Rossetti	Italy
European Matters committee vice-chair	Michele Stasi	Italy
Professional Matters committee chair	Brenda Byrne	Ireland
Science committee vice - chair	Eeva Boman	Finland

The EFOMP Governing Committee is very pleased to welcome Jurgita Laurikaitienė (Lithuania) as the new Internet Manager. The Governing committee would like to take this opportunity to express its sincere thanks to David Lurie, Yolanda Prezado, Oscar Casar, Adriaan Lammertsma, Ad Maas and Emer Kenny for their support and contributions to EFOMP over their tenure.

New officers and Internet Manager (left to right): Veronica Rossetti, Mohamed Metwaly, Eeva Boman, Michele Stasi, Brenda Byrne, Jurgita Laurikaitiene

EFOMP Committees, new committee members and roles

We welcome Ailine Lange (Germany), Leticia Irazola (Spain), Katrīna Čaikovska (Latvia), Maya Shariff (Germany) as new members of the Communications and Publications and Projects Committees.



New EFOMP committee members

National Member Organisations Presidents can nominate colleagues interested to join EFOMP committees by sending a nomination email to: secretary@efomp.org

Affiliated Societies – EFOMP representatives

New EFOMP representatives

ICRP - International Commission on Radiological Protection

EFOMP applied in December 2021 for the ICRP "Special Liaison Organization Status" in order to be more closely involved in ICRP's work. Through this arrangement, EFOMP can provide experts that will support ICRP work, where necessary, provide feedback to the commission on new drafts, liaise with other scientific societies and regulatory bodies to achieve effective, uniform and rapid transposition of the new recommendations and promote the training necessary to achieve adoption of the recommendations. EFOMP has been granted Special Liaison Organisation status with ICRP and as primary point of contact with ICRP, EFOMP nominated Lorenzo Nicola Mazzoni (Italy), member of EFOMP's European Matters committee.

EUTERP - Training and Education in Radiation Protection

A number of EUTERP Board members concluded their tenure at the end of 2021. Following a successful call for nominations and elections a new board was formed. Julie Lucey (Ireland) is the new EFOMP representative. We are especially grateful to Penelope Allisy Roberts for being the EUTERP secretary for many years and for her contributions in radiation protection professional training.

Publications

Medical Physics International - EFOMP edition
The issue of Medical Physics International (2021, vol.9, No.2) is focused on the history and professional development in the EFOMP region. The issue includes papers related to the education and specialized training, certification and professional recognition, employment opportunities and collaborations, future challenges in Denmark, France, Hungary, Lithuania, Malta, Norway, Poland, Spain, Serbia, Sweden, Ukraine and in the EFOMP region.

Abstracts book of the European Congress of Medical Physics 2020/2021

The supplement issue of the European Journal of Medical Physics containing the abstracts of the 3rd European Congress of Medical Physics will be freely available for 6 months in Science Direct: https://www.sciencedirect.com/journal/physica-medica/vol/92/suppl/S

EFOMP educational events

Visit the EFOMP e-learning platform, which contains schools and webinars.

The latest EFOMP School on Radiation Shielding in Medical Installations took place as a hybrid event in Prague and online. The school covered design and shielding calculation approaches for modern facilities as well as practical information and case studies.

Video recordings of the lectures below will be uploaded inside the e-learning platform:

- Day 1: Diagnostic Shielding (David Sutton, Colin Martin, Paddy Gilligan)
- Day 2: Nuclear Medicine and PET/CT (Brenda Byrne, Ana Millan, Susan Maguire)
- Day 2: Radiation Therapy (photon and proton), HDR and PDR Brachytherapy, γ knife Tomotherapy, Halcyon, Cyberknife, MRI Linac facilities (Pat Horton, Joern Meissner)
- Day 3: Shielding surveys and case studies (Brendan McClean, Paddy Gilligan)

EFOMP School on Radiation Shielding in Medical Installations

I am closing this update, looking forward to meeting you in Dublin this summer for ECMP 2022!

I also hope to meet our Ukrainian colleagues and friends who are suffering from the recent crisis in their country. EFOMP's thoughts have been with our National Member Organisation (NMO) and the whole Medical Physics community in Ukraine, during this time. Our colleagues continued to deliver care to people with health issues although some radiation oncology treatments have been inte rupted to ensure a safe environment. The majority of Medical Physicists in Ukraine work in hospitals and provide services in the radiation oncology specialty, whereas a smaller number work in diagnostic radiology and nuclear medicine departments. EFOMP strongly condemns the brutal savagery and unjustified Russian invasion of the sovereign state of Ukraine. EFOMP wholeheartedly condemns the criminal targeting of civilian areas, including hospitals and the infrastructure where our medical physics colleagues help treat and diagnose patients. We are also very aware and appalled at the radiation risk and effect on public health associated with military action in the vicinity of nuclear power stations. All EFOMP members' supportive messages have been conveyed to our Ukrainian NMO, hoping everything will soon return to 'normal' and that the services will be restored swiftly.

Efi Koutsouveli works as a Medical Physics Expert in the Medical Physics department of Hygeia Hospital, Athens, Greece. Her professional focus is on radiotherapy units (external radiotherapy & brachytherapy). Her special interest is in Hospital Quality Management Systems and Oncology Information Systems. She is currently the Treasurer of the Hellenic Association of Medical Physicists (HAMP) and EFOMP's Secretary General. In 2019, she received the IOMP-IDMP award for promoting medical physics to a larger audience. Email: secretary@efomp.org

Introducing Mohamed Metwaly

Dr. Mohamed Metwaly was recently appointed as Vice Chair of EFOMP's Communications and Publications Committee; he will become Chair of the committee in March 2022

I am currently a lead consultant clinical scientist in the NHS and a registered medical physics expert in the RPA2000 register, with the main role of leading the radiotherapy dosimetry and imaging quality assurance services in radiotherapy physics at United Lincolnshire Hospitals NHS trust, UK.

I have over 25 years of expertise in radiotherapy physics, including machine installation, dosimetry, and quality assurance (QA) protocol design, and implementation of advanced radiotherapy techniques and patient motion-management technologies.

Since I started my career in 1996, I was heavily involved in the procurement of new equipment and the set-up of new radiotherapy departments in the Egyptian military hospitals until I left the organisation in 2009, having achieved the post of chief radiotherapy physicist in Maadi Armed Forces Medical Compound, Cairo, Egypt. During this period, I was granted an MSc (in 1999) and a PhD (in 2008) in radiotherapy physics from Ain Shames University in Cairo. In 1998, I was one of the founders of the Egyptian Association of Medical Physics (EAMP), and I served as its general secretary from 2004 to 2010. In 2017, I was appointed as the vice president of the EAMP for external relationships and I still hold the post.

I migrated to Scotland in 2009, when I joined the Beatson West of Scotland Cancer Centre as a principal radiotherapy dosimetry physicist, with the main job being the acceptance and commissioning of newly installed machines and the routine QA process. At Beatson, I received extensive training in UK quality assurance and dosimetry techniques, as well as UK radiation regulations. I was also a part of many scientific research projects in the department, taught in the Medical Physics MSc course, and supervised a few MSc and PhD students at Glasgow University. In 2015, I moved to my current radiotherapy physics leadership post at Lincolnshire Hospitals NHS Trust, where I set up state-of-the-art dosimetry and imaging QA systems from scratch, along with the leadership of the installation and commissioning of the new machines and a Treatment Planning System.

Currently, I am active in a variety of independent professional, accreditation, and regulatory bodies in the UK. For example, I have been the Editor-in-Chief of the Institute of Physics and Engineering in Medicine [IPEM] Scientific Report Series since 2018, as a member of the Science Research and Innovation Committee (SRIC). This position's responsibilities include overseeing the IPEM report series and ensuring that publications are handled effectively, tracking delivery schedules and the independent revision process of manuscripts, and taking action to ensure that reports are reviewed and delivered on time. I have been a member of the scientific committees of the IPEM Medical Physics and Engineering Conference (MPEC) twice (in 2019 and 2020). I am one of the radiotherapy co-editors of a few IPEM scientific reports that are currently in progress, and I was appointed as an IPEM representative to EFOMP in 2021. Through these roles, I have been able to expand my professional network and communicate with people in the IPEM medical physics community about a wide range of topics, both scientific and professional, which has deepened my understanding of their interests and challenges.

I am also a medical physics expert in the Health Research Authority (HRA) since 2018, providing the ethics review and approval to undertake ionisation radiation exposure as part of a research programme or clinical trial. I have been a member of the technical assessment team for the BS70000 accreditation by the UK Accreditation Service (UKAS) since 2018. In addition, more recently, I was appointed as one of the specialist advisors at the Care Quality Commission (CQC). Each of these positions is dedicated to advocating for patient safety by investigating the implemented measures by the service provider in question and verifying their compliance with a certain policy, standard, or piece of legislation. Through communication with these organisations' decision makers, I share my thoughts on how regulations and practises could be improved to benefit both service users and providers. On the other hand, these professional interactions are an excellent opportunity to gain insights into how radiotherapy physics is practised around the country, which is a substantial advantage to my self-development.

I was elected chair of the Communications and Publications (CP) Committee shortly after beginning my role as EFOMP's IPEM representative. Accordingly, I am the Vice-Chair of the committee and will chair it from March 2022. This new feature, I believe, has elevated my profile to a new level, enabling me to observe and contribute to the advancement of the medical physics profession beyond the borders of the UK in Europe. Based on my prior and ongoing scientific and professional participation, I am confident in my ability to work with my colleagues in the CP Committee to successfully cascade the EFOMP signals among the European medical physics societies. My present editorial experience has equipped me with the necessary knowledge and abilities for managing and editing scientific articles in digital formats. Consequently, I am confident in my ability to engage with the Internet Manager and the other CP committee members to manage EFOMP publications, website development, social media, newsletters, and other projects, as well as the deployment of the new eLearning platform.

To conclude, I enjoy representing the medical physics community's public interests, and my upcoming role as chair of the EFOMP's CP committee provides me with an excellent opportunity to do so. As such, I am honoured and delighted to be the next chair of the CP Committee for EFOMP, and I hope to be up to the challenge.

Mohamed Metwaly

EFOMP COMPANY MEMBER ARTICLE

LAP's automated water phantom streamlines commissioning and QA of MR-Linac machines

The THALES 3D MR SCANNER from LAP is helping medical physicists to fast-track QA test routines on their MR-guided radiotherapy systems, while a new iteration of the phantom delivers similar workflow efficiencies on bore-type linacs

Following the full product launch in the spring of last year, the THALES 3D MR SCANNER has emerged as something of a game-changer in the radiation oncology clinic, providing a "gold-standard dose accuracy check" for medical physics teams tasked with overseeing the acceptance and ongoing verification of the new generation of MR-guided radiotherapy (MR/RT) systems.

"It's still early days, but we're really encouraged by the clinical response and uptake of the THALES 3D MR SCANNER within the MR/RT user community," explains Thierry Mertens, a physicist himself and LAP's business development manager for healthcare.

User-friendly QA: thanks to its lightweight design, LAP's THALES 3D MR SCANNER is easily transferred from the carriage system to the patient couch

Made to measure: The reference detector is put in place with the help of the positioning plate, after which the phantom can be moved into the MR-Linac

Developed by laser and radiotherapy QA specialist LAP, the THALES 3D MR SCANNER provides the radiotherapy physicist with a 3D and MR-compatible motorised water phantom that's tailored specifically for streamlined commissioning and QA of MR-Linac treatment machines. By necessity, the phantom is MR-conditional – i.e. all system components are made from non-ferromagnetic materials certified for use within the MRI scanner's magnetic field – while the automated set-up (which takes under 15 minutes to prepare) and predefined measurement sequences are intended to help the medical physics team save time and simplify their test routines.

Prioritizing workflow efficiency

The traction with early-adopting clinical sites in the US and EEA is doubly important. After all, it's feedback from these customers that will shape the development roadmap for the THALES 3D MR SCANNER in 2022 and beyond. Near term, it seems, product innovation is rooted in LAP's relentless focus on workflow efficiency. "We are enhancing the phantom's software functionality with this in mind – and specifically the introduction of a continuous scanning mode," notes Mertens. "In this way, radiotherapy physicists will be able to spend less time on their machine QA so that they can focus on other important tasks."

While the initial version of the phantom is optimised for the QA of ViewRay's MRIdian MR/RT system, Mertens and colleagues are working on a custom water phantom to support Elekta's Unity MR-Linac machine. The development work is already advanced, with LAP's product development engineers in collective exchange with Elekta Unity clinical end-users. "The voice of the radiotherapy clinical user is fundamental to our requirements-gathering and for understanding – at a granular level – how the MR-Linac is being put to work in a clinical context," Mertens adds.

Independent verification

At the clinical sharp-end, of course, it's the medical physicist who is ultimately accountable for safe and effective MR/RT treatment delivery. This is where independent QA and verification tools – like the THALES 3D MR SCANNER – really come into their own, providing rigorous beam data and beam model visualizations to verify that the delivered radiation as it applies to the patient is indeed correct.

"It's all about confidence and trust," adds Mertens. "The water phantom will give the medical physicist peace of mind, ensuring that their MR/RT system is calibrated accurately for the verification of delivered dose to the patient."

Beyond initial QA applications for MR/RT systems, LAP has released a version of the water phantom for the commissioning and QA of traditional bore-type linacs – specifically targeting clinical users of Varian's Halcyon image-guided radiotherapy system and ETHOS, the vendor's AI-enabled adaptive radiotherapy machine.

Read the full article including customer voices on the LAP website.

Moving the THALES 3D SCANNER into a Halcyon bore at a radiotherapy centre in Germany

Thierry Mertens: "It's all about confidence and trust."

Thierry Mertens has a PhD in Physics and has nearly 15 years of experience in medical physics and radiotherapy with the major commitment to develop inn ovative quality assurance solutions to support the medical end-users with their clinical tasks. As business development manager for LAP, Thierry has been instrumental with the development of the THALES 3D MR SCANNER.

Introducing Veronica Rossetti

In January 2022, Dr. Veronica Rossetti was appointed as Vice-Chair of EFOMP's Education and Training Committee

Considerate le vostra semenza:
fatti non foste a viver come bruti,
ma per seguir virtute e conoscenza.

Dante Alighieri
Divina Commedia,
Inferno, Canto XXVI

Consider ye the seed from which ye sprang:
Ye were not made to live like unto brutes,
But for pursuit of virtue and of knowledge.

English translation by H. W. Longfellow

(Think of your origin:
you were not created to live like beasts,
but to pursue virtue and knowledge.)

I applied for the position of Vice-Chair of the Education and Training Committee because, given my national experience in teaching, organising and delivering courses for medical physicists and other professions, I hope to be of service to the EFOMP physics community.

I started teaching the postgraduate course in Medical Physics at the Physics Department of the University of Turin in 2001, where I still teach. Over the years I have supervised several theses in medical physics and taught medical physics and radiation protection in different undergraduate courses for non-physics Healthcare Professions.

I have also contributed to the organisation of courses for physicians, radiographers, nurses and other professions at the hospital where I work. Way ahead of its time, we organised the first on-line course at the hospital in 2005.

Since I have always strongly believed that distance learning could complement the face-to-face one, in 2012 I designed and organised the first interactive on-line course in collaboration with the training office of my hospital, and in 2014, in collaboration with the University of Turin, I converted the National Congress of Medical Physics into an accredited CME course, with several possible educational paths.

For our NMO (Italian Association of Medical and Health Physics, AIFM), I have been responsible for e-learning since 2014 and a member of the Scientific Committee since 2016. In order for AIFM to become a national provider able to deliver CME/CPD courses also by e-learning modality, I managed the agreement between our Association and the University of Turin which, since 2016, has been collaborating with us in delivering courses for Medical Physicists by providing us with the Moodle platform and its expertise in the management of Online Training.

Every year we used to organise at least two or three asynchronous courses with online tutors on various topics, each attended by 250-500 Italian medical physicists, so, when the pandemic arrived and forced us to turn all our education and training into online projects, we were ready!

In 2020, a formal agreement was signed between EFOMP and AIFM, thanks to my personal initiative, to allow AIFM to use the material of EFOMP's e-learning platform for the purpose of AIFM courses, provided that the participants are also Individual Associate Members (IAMs) of EFOMP. Three AIFM-EFOMP courses with Italian CPD credits have already been organised. Thus, by providing high quality education recognised as continuing professional development, EFOMP has made itself known and increased the number of individual members. Also, thanks to my new role in the E&T Committee I will definitely continue my efforts in promoting EFOMP.

I have always firmly believed that education, culture and knowledge are a primary asset for all, and that it is a crime not to engage in the dissemination of knowing. Knowledge must be shared, otherwise it is of little use. So, I'm honoured and proud to collaborate with EFOMP in the education and training of Medical Physicists across Europe, and hope to be up to the task.

Veronica Rossetti is an Italian medical physicist working in Turin, Italy, in the Medical Physics department of the University Hospital Città della Salute e della Scienza. Her professional focus is diagnostic radiology imaging, dosimetry and radiation protection. She is Adjunct Professor at the School of Medicine of the University of Turin and she is also involved in educational programmes for medical physicists and other health professionals. She is a member of the Scientific Committee of the Italian Association of Medical Physics (AIFM) and of the Communications and Publications Committee of EFOMP.

EFOMP e-learning

EUROPEAN FEDERATION OF ORGANISATIONS FOR MEDICAL PHYSICS

EFOMP's e-learning platform was launched in January 2019. It contains a wealth of information, including video recordings and pdfs of lectures given during all recent editions of the European School for Medical Physics Experts (ESMPE), as well as complete recordings of the many webinars organised by EFOMP and aligned organisations during 2020 and 2021.

Access to the EFOMP e-Learning platform is provided to all Individual Associate Members (IAM) of EFOMP. Becoming an IAM is very simple – just complete an online registration form and pay a subscription fee of €15 (renewable annually). You will receive immediate access to the e-Learning platform.

Registration as an EFOMP IAM is available to anyone, in any location (including outside Europe) who is interested in continuing and supplementing their education and training in Medical Physics.

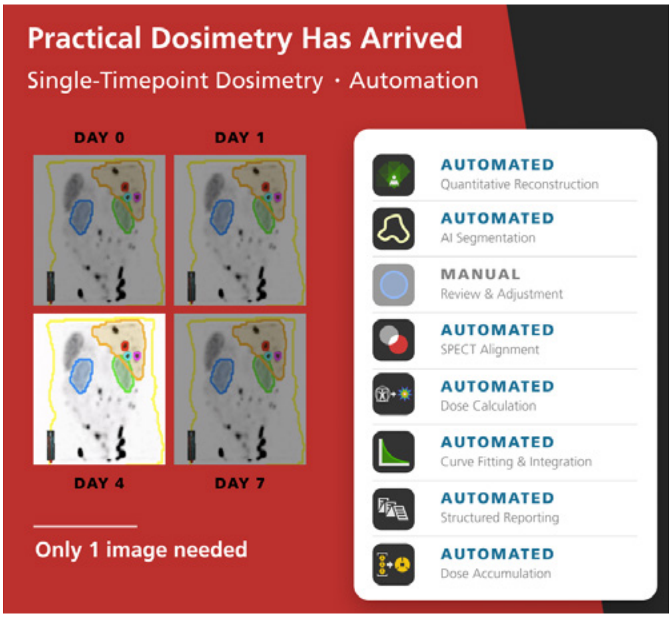
EFOMP COMPANY MEMBER ARTICLE

MIM Software Inc: Making Clinical Dosimetry Practical

New Molecular Radiotherapies promise to vastly expand the toolkit of oncologists in the treatment of cancer. These therapies provide a distinct advantage over other systemic therapies: their distribution can be seen and measured, and, therefore, personalized.

Absorbed dose has shown to be a useful biomarker of response to radiation therapies. As a result, it has significant potential use in clinical decision-making to achieve the best possible patient outcomes. But is it practical to access accurate patient-specific absorbed doses? The history of dosimetry for these therapies is fraught with tedious computations and over-simplifications.

MIM Software identified that a robust, validated, and maximally automated software platform could help Nuclear Medicine departments finally achieve reliable dosimetry for therapy patients. The company thus began developing its CE-marked dosimetry product, MIM SurePlan™ MRT, nearly five years ago.



Single-timepoint dosimetry with MIM SurePlan MRT

MIM Software was uniquely positioned to help advance the rapidly growing field of dosimetry for current and emerging Molecular Radiotherapies, having been in the business of providing advanced imaging software for more than 20 years.

As a privately held organization with no outside investment, the company is uniquely able to pursue development with a long-term plan for emerging areas compared to other companies with competing interests and that favour short-term returns.

MIM Software started in Radiology and Nuclear Medicine with a focus on diagnostic interpretation and therapy response, which led to the development of multiple products for Radiation Oncology focusing on image segmentation and image registration. All MIM Software products provide built-in exceptional flexibility in the form of customizable scripting and the ability to integrate with programs such as Python®, Java®, MATLAB®, and many others, which supports a very robust platform that blends clinical and research use. This combination allows users to rely on MIM Software clinically and to concurrently pursue broad research aims.

A high degree of flexibility is baked into MIM SurePlan MRT, with both clinical and research applications. Since its release, this platform has continually re-defined what a dosimetry solution is expected to do, recently becoming the only CE-marked product to offer AI-based segmentation tools and validated single-timepoint dosimetry with multiple techniques available.

Dosimetry Process

MIM SurePlan MRT automates the entire dosimetry process from reconstruction to curve fitting and integration

MIM Software has also shown that only 5 minutes of manual work are needed to generate accurate dosimetry with MIM SurePlan MRT, while maintaining significant flexibility for manual adjustments for those who want it.

As more institutions implement MIM SurePlan MRT, MIM Software is constantly developing and improving the solution.

In a scientific oral presentation at the 33rd Annual Congress of the European Association of Nuclear Medicine (EANM), MIM Software demonstrated a novel technique for automatic alignment between serial SPECT images, which keeps manual segmentation time to a minimum.

As dosimetry methods continue to develop, including through the efforts of the EFOMP Special Interest Group for Radionuclide Internal Dosimetry (SIG_FRID), MIM Software looks forward to working together to translate these techniques into a clinically accessible solution.

David Mirando is a Senior Clinical Engineer at MIM Software. David has worked on many dosimetry-related projects throughout his career. His deep technical knowledge has made him an invaluable resource for MIM Software's efforts to reduce the burden of patient-specific dosimetry and advance clinical dosimetry through automation and standardization.

UPCOMING MEETING

Update on 4th European Congress of Medical Physics – Multiple energies, Single patient focus

ecmp 4th Dublin 2022

Paddy Gilligan, Chair of the congress and President of EFOMP, updates the readership on preparations for ECMP 2022, which will take place in Dublin, Ireland, 17-20 August 2022

Among many initiatives, coffee-and-talk sessions are planned at the in-person ECMP 2022!

I am pleased to be writing this update article from the Radiation Shielding in Medical Installations European School for Medical Physics Experts in Prague. Although we ran this course in hybrid format, it was great to be back in person meeting up with friends and colleagues to learn and teach. The veil of the pandemic is beginning to lift over Europe, finally allowing us to plan our educational events in person. For the ECMP it meant that we could begin planning a congress that was truly face-to-face. Of course, we will always bear public safety in mind and know that the Covid story always requires contingency planning. Our scientific, European school of medical physics experts and congress planning committees have been busy curating a very exciting scientific event.

We had a strong abstract submission rate until the initial deadline date of the 10th of February, with 370 abstracts submitted. Due to uncertainty brought about by the pandemic we decided to extend the deadline for one month until March the 11th. These scientific submissions are the key to the future of medical physics. All accepted abstracts will be published in a supplement of EFOMP's journal, the European Journal of Medical Physics (EJMP), and additionally, EJMP will publish a Focus Issue with up to 40 full selected papers from among the conference contributions.

We are excited to announce our innovative DIY software/ phantom workshop where physicists will show off their in-hospital made phantoms/ software or other "maker projects". This is done with the ambition of sharing ideas, templates and actual software and will be delivered in an in-person exhibit style format. This has a separate submission path on the website, under the DIY-Fair. We would encourage you and your team to engage in the promotion of Cultural capital within our community.

The pre-congress schools are a key part of the events in Dublin, taking place on Wednesday 17th August. We have an exciting line up of three schools:

1. EFOMP protocol for quality control of Digital Breast Tomosynthesis

2. EFOMP protocol for quality control of PET/CT PET/MR scanners.

3. Adaptive Radiotherapy: Pros and Cons of In-room versus Out-of-Room Imaging.

These are extremely exciting topics and are exceptionally good value. For the first year we are delighted that EUTEMPE will also present a new format Atelier quality control workshop where participants will be asked to create tailor-made QC solutions and present them to the EUTEMPE hospital board.

The range of topics covered by the refresher courses is stunning, from open-source software, Monte Carlo modelling and particles in radiotherapy, to patient and environmental safety in nuclear medicine therapy. Among the many excellent sessions, you will find quantitative MRI, artificial intelligence, interventional and conebeam CT. We are in the process of finalizing the programme for even more refresher courses, with a focus on the practical work of medical physicists adapted to the latest technical advances on different imaging modalities and subspecialties. These courses feature many of Europe's and the world's leading experts in medical physics, all together at one great value in-person congress. There is also a special half registration rate of 100 euros for the first 50 applicants from low- and middle-income European countries; details are available on the congress page: ECMP 2022 | 4th European Congress of Medical Physics

With our partner organisations we are busy organizing joint sessions which will show the true role of medical physics as part of the multidisciplinary team. Quantitative MRI, automated QC in radiology, and out of field dose are early strong topics.

In Ireland and EFOMP we all miss our colleague Professor Wil van der Putten (RIP), originally from Eindhoven, who mentored many of us into medical physics and founded the MSc course in Medical Physics in Galway in 2002. Wil would have been pleased that the Dutch NMO (NVKF) have accepted the invitation to become the Welcome Nation of the congress. This involves two scientific sessions and one refresher course that I am sure will reflect the active and broad nature of the Dutch medical physics activities.

The role of medical physics in procurement and our strong links with our company members have led to a keen interest in our exhibition option.

This congress will have a special appeal for young medical physicists who are the future of the profession, with a special area for them to meet in the congress with themed coffee-and-talk special sessions.

Oh, did I forget to mention that with all this science you will need some time for extracurricular fun, a guaranteed certainty in Dublin's Fair City with musical, sporting and social events. Please get your band ready for our Eurofission song contest!

For more details on the scientific and social programme, please see our website and newsletters: ECMP 2022 | 4th European Congress of Medical Physics, Dublin City University, Dublin 2022

Paddy Gilligan, Chair of ECMP 2022 and President of EFOMP

UPCOMING MEETING

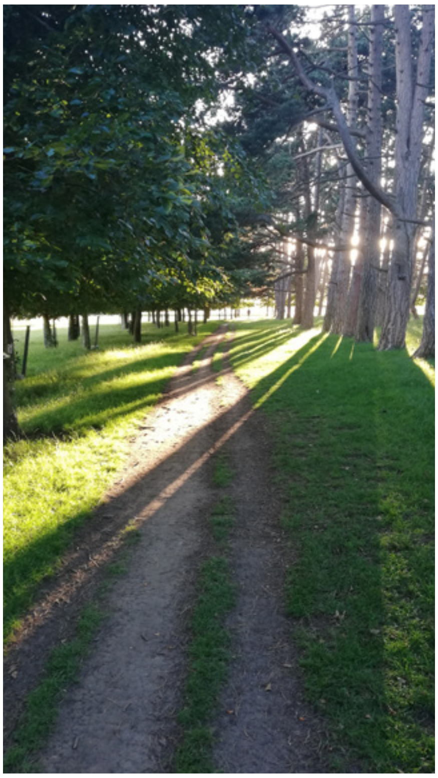
Can we tempt you to Dublin?

Naomi McElroy writes about the many reasons to visit the city of Dublin, before during and after the ECMP 2022 congress

I am a blow in to Dublin as they might say here in Ireland. But living not very far away when I was growing up meant that I had regular visits to the city. And then, once I started working in Medical Physics, I ended up moving here, so I hope to be able to shine a light on what this city has to offer to those of you tempted this way for the first in-person ECMP in 4 years! I am going to try to mention a little bit for everyone, so hopefully something will resound with you in this article featuring multiple ideas with a single Dublin focus.

The city itself, which has been ranked 7th in the best cities to visit in 2022 by Lonely Planet, was originally a Viking settlement but is now home to over 1.7 million people. It is a relatively compact city with easy-to-find green space, something which we all know a lot more about following the COVID pandemic and associated restrictions.

Deer in the Phoenix Park



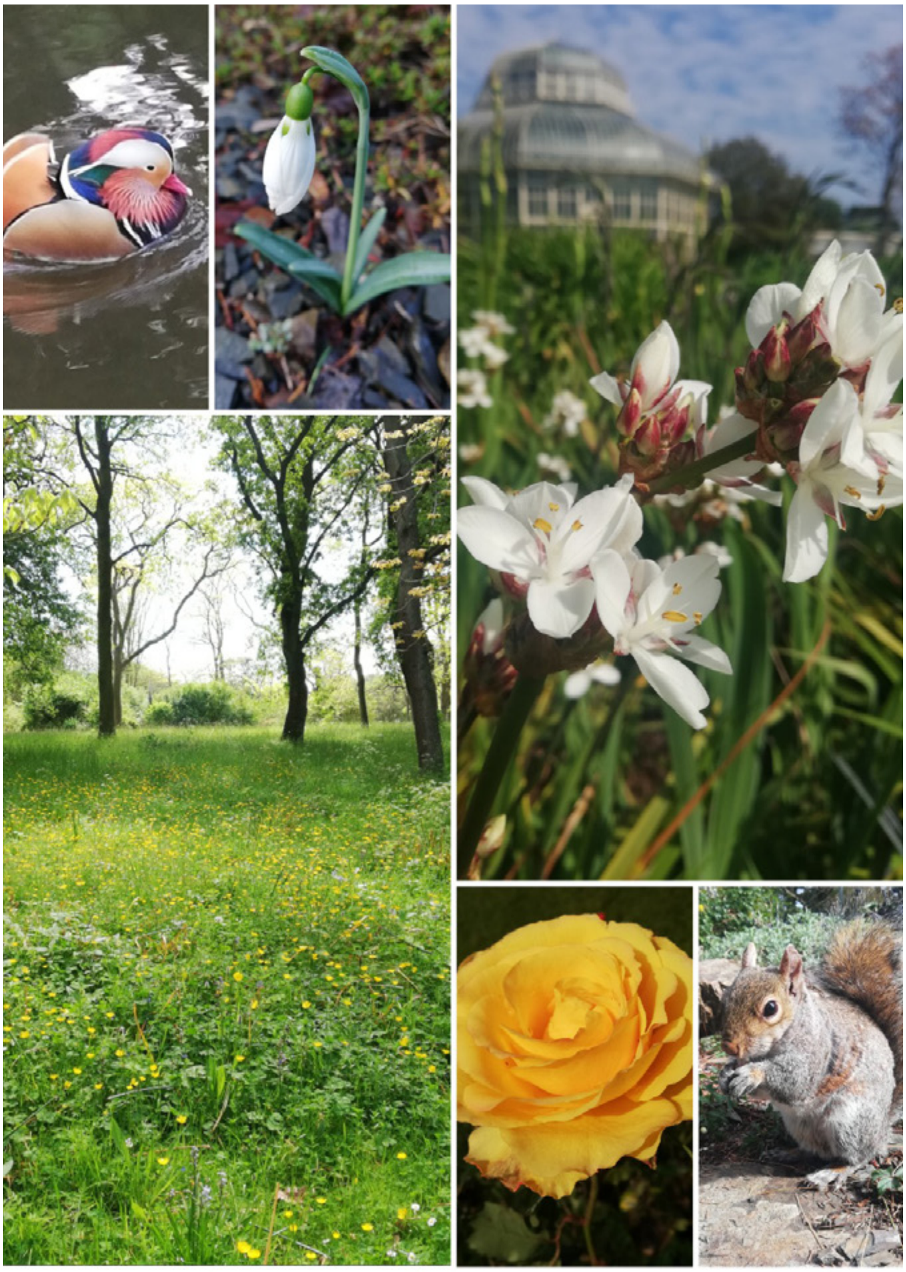
Sunshine through the trees

A pot of gold at the end of the rainbow?

So that is where I will start since Ireland is known for its many shades of green (I wonder if we could do a greenscale similar to a grayscale?!). The Phoenix park is one of the largest walled parks in Europe, and it is home to the President of Ireland, Dublin Zoo, children's playgrounds and a population of wild deer, among other attractions. In the city centre, Stephen's Green is probably the best known of the open spaces, but you might find more free space in the likes of the Iveagh Gardens, Merrion Square (also has a statue of Oscar Wilde and a playground themed on his short story of "The Selfish Giant") and Dublin Castle Gardens (right next to the Chester Beatty Library containing the tasty Silk Road Café). If you are looking for green areas near the congress venue then Griffith Park is just around the corner, with the National Botanic Gardens and Fairview park both a little further away. Of the places I have mentioned, I probably frequent the Phoenix park and the Botanic Gardens the most, and all are free to access.

National Botanic Gardens, Glasnevin

As mentioned in my previous article in the Winter edition of EFOMP newsletter, Ireland is known as the land of Saints and Scholars. Throwing a bit of focus in this direction, Trinity



A hint of what can be discovered within the gardens

Detail on Harry Clarke Stained Glass

IMMA Building

College is the most well-known of the Irish Universities and it houses the famous Book of Kells. This illuminated manuscript was created around 800AD and has fascinatingly detailed work. Once you have wandered through the exhibition and seen the page on display that day (yes, the page is turned daily) you go through to a bibliophile's dream – the Long room library which contains 200,000 old books, and is the rumoured inspiration for Hogwarts Library in the Harry Potter films. If libraries are your thing, then Marshes Library or the National Library might also be worth a visit. Marsh's library is situated beside St Patrick's Cathedral and dates from the early 1700s. Christ Church Cathedral is an old and impressive building and has the Dublinia attraction across the road, should you wish to discover more about medieval Dublin. The National Library has quiet reading rooms and an award-winning exhibition on the Life and Works of William Butler Yeats. Dublin was designated a UNESCO City of Literature in 2010 and 2022 sees the 100th anniversary of the publication of Ulysses by James Joyce. If this tome is a bit too overwhelming to read, Nora by Nuala O'Connor is the One Dublin, One Book choice for 2022. But you can follow the Ulysses route through Dublin as a walking tour to get a better insight to the City as landmarks referenced in the book still stand today.

There are plenty of other attractions if you are not a saint – although I reckon most people attending the ECMP 2022 could be considered scholars! Glasnevin Cemetery which joins on to the back of the Botanic

Gardens (there is a path between the two if you want to take the shortcut) is Ireland's largest burial place which offers an historical tour and an extra-ordinary lives exhibition. The National Museum of Ireland is another popular, free attraction with several themes: Decorative arts & history, Natural History and Archaeology. Each theme is in a different building within the capital and are a pleasant way to explore Ireland's cultural heritage.

The National Gallery of Ireland is also free to enter although tickets may need to be purchased for certain exhibitions. It will have an exhibition by the German artist Günter Schöllkopf celebrating James Joyce's Ulysses, which conveniently runs until 21st August 2022 – so you will be able to take it in if you have time to explore after the congress. I have to confess that my favourite works in the National Gallery are the stained glass pieces by Harry Clarke and "Hellelil and Hildebrand, the meeting on the Turret Stairs" by Frederic William Burton. The latter watercolour work has limited viewing times, so if you want to see it in person you need to plan your visit for either Thursday 11:30am-12:30pm or Sunday 2-3pm. If you like the Harry Clarke pieces, then you can find more in The Hugh Lane gallery (also free admission, and retains Francis Bacon's Studio relocated from London) or in the art deco fronted Bewley's Café on Grafton street.

For a more contemporary take on art, then the Irish Museum of Modern Art in Kilmainham has the installations you might be looking for, along with a large grounds. Nearby, you can also visit Kilmainham Gaol. An attraction for those looking to challenge body and mind are the popular escape rooms, of which there are a few located centrally in Dublin should you and some colleagues wish to test your lateral thinking and teamwork. As you walk around the city centre, keep an eye out for the statues and decorated utility boxes. A few other attractions worth considering, but not an exhaustive list, include the National Photographic Archive (free entry), the Little Museum of Dublin, the Irish Film Institute(IFI), EPIC – The Irish Emigration Museum Dublin, Powerscourt Townhouse & Shopping Centre (for its fascinating transformation, documented photographically along the walls in one section).

Dublin Statues

Ireland is known for its "Céad mile fáilte" or one thousand welcomes, and for a pint of the black stuff. It has a long history of producing Guinness (over 250 years) and with the right winds, I can smell the hops from my apartment, a 10-minute walk from the Guinness Storehouse. But if you are not a stout fan, there are plenty of whiskey distilleries about that can be visited – the Jameson Distillery is probably the best known, but there are also the Teeling Whiskey Distillery, Roe & Co Distillery and

Molly Malone

Phil Lynott (Thin Lizzy)

Oscar Wilde

the Pearse Lyons whiskey distillery all within very close proximity to the Guinness Storehouse. If you are keeping to the saints and scholars theme then a drink in the Church Bar on Jervis Street, or the Library bar in the Central Hotel Dublin could be a temptation for you! Templebar is the tourist hotspot in the city centre, but if you are looking to enjoy a good pint of Guinness then the old Victorian Long Hall Pub on George's Street is definitely a good choice, or you could try the Stag's Head, hidden down a lane off Dame Street, if you are looking for some traditional Irish music too.

For traditional Irish food then Irish stew, coddle, colcannon or an Irish Breakfast are all things to tick off the list, however those of us based in Dublin are lucky to have a wide variety of cuisine on offer to cater to most palates. Fancy dining is on offer at the Winding Stair which champions seasonal Irish produce. The Woollen Mills restaurant directly opposite the Ha'penny Bridge has the claim that James Joyce at one stage worked in the building, and has a pizza offering at its sister venue next door, The Yarn. Avoca on Suffolk street is another not-to-be-missed location for food (and shopping too). Those who prefer vegetarian or vegan options will find some good offers at Cornucopia, Brother Hubbard (good for gluten-free options too) and Blazing Salads. For some people-watching while you have a toasted sandwich and a tipple of your choice, Grogan' Pub on South William Street, or Loose Cannon in George's Street arcade are both a good bet. If, like me you have a sweet tooth, then Murphy's Ice-Cream on Wicklow street has some interesting flavours (sea salt, dingle gin, or brown bread) as well as the more traditional favourites. Should you prefer rolled ice-cream, then check out Three Twenty Ice-Cream Lab on Drury Street.
This is just a brief glimpse at the Irish capital with a few suggestions and Dublin really is a city worth exploring and awaiting discovery by you when you join us in August for ECMP 2022!

For more information about Dublin, visit the Lonely Planet and Visit Dublin web sites.

Loose Cannon Toasted Sandwich and Wine

Tasty Ice-cream from Three Twenty Ice-cream Lab

Naomi McElroy, B.Eng. M.Sc. has been working in the field of Medical Physics for almost half her life. She works as a Senior Medical Physicist in St Lukes's Hospital, Rathgar which is part of the St Luke's Radiation Oncology Network (SLRON) in Dublin. Her current work focuses on nuclear medicine therapies, and providing physics support in diagnostic imaging and radiation protection. She is a past Honorary Treasurer for the IAPM, currently serves on the IAPM Council and is registered as an MPE with the Irish College of Physicists in Medicine (ICPM). She is on the Local Organising Committee(LOC) for ECMP 2022 and looks forward to welcoming you to Dublin later this year.

EFOMP COMPANY MEMBER ARTICLE

PTW: Track-it – QA data management, simplified

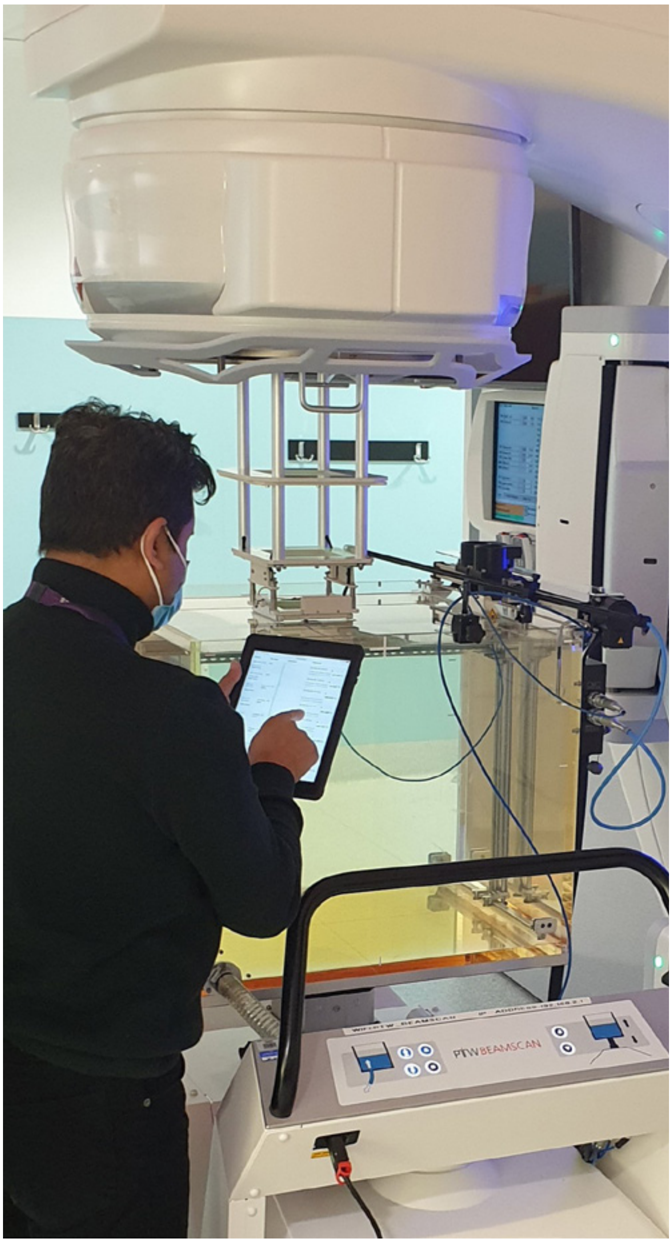
Quality assurance (QA) reports have always been time-consuming and hard to compile as not all relevant data and information are recorded in the same place or in the same manner. The annual audit is not the only challenge – monthly, weekly and daily QA tasks also demand a great deal of time and effort.

PTW has developed a browser-based QA data management platform called Track-it, which is accessible to any number of authorized users via a local area network connection. The system allows the user to document, monitor and access QA data from different sources any time using any end device – desktop or mobile. Data can also be entered offline in the treatment room and is automatically uploaded later, if there are issues with the WiFi. In addition, it is very easy to take a photo with a tablet whilst working at the LINAC and attach it to the QA record if necessary.

Mutually beneficial collaboration

The Leeds Cancer Centre at Leeds Teaching Hospitals was one of the first clinics to use Track-it. Not only have they been a pioneer in using this platform – they also supported PTW to develop and improve Track-it from the very beginning. As a result of this close collaboration, the QA team at the Medical Physics Department now benefits from using a platform that comes closer and closer to being absolutely ideal for the QA requirements of their entire services.

After setting up the software and testing it, the QA team converted paper forms and Excel spreadsheets, which had previously been the basis for their LINAC QA, into Track-it protocols and tested the protocols by integrating one of their linear accelerators (LINAC) into the Track-it workflow. The team also use Track-it to record data from their non-PTW equipment and devices as the data management system is highly flexible. Track-it has become one of the most important systems they have in radiotherapy, and its use extends across the whole of the service, including hundreds of tests across LINACs, simulators, afterloaders and a Gamma Knife®. All relevant QA procedures are now processed and managed with Track-it.



The web-based Track-it platform allows to document, monitor and access QA data from virtually any location

At the heart of day-to-day activities at Leeds Cancer Centre

The simplicity and user-friendliness of Track-it was amongst the main criteria which convinced the team to implement this software. It incorporates a traffic light system that indicates if there are any discrepancies or if any action is required to be taken. Furthermore, the scalability and the adaptability of Track-it has proved very useful, unlike many other systems that often struggle to cope with the demands of a large radiotherapy department with an extensive, multifaceted infrastructure.

One of the features that is used most frequently by the QA team at Leeds Cancer Centre is the trend function. It allows an overview of a machine's performance over a period of time to be evaluated, or even provides a direct comparison of the performance of different machines across the fleet. Comparing data is unbelievably easy and one of the system's greatest strengths.

When the staff suspect an issue, they can analyse the relevant data very quickly using Track-it, and thus establish if remedial action is required. The relevant data is selected, and within a few minutes they can assess how the equipment is performing.

Straightforward workflow, simplified protocols

The homepage offers a very useful overview on which tests need to be carried out, and the results from prior tests can be viewed with just a mouse click. With Track-it fully deployed, the QA workflow is very straightforward. The system allows the users to attach PDF documents to the protocols, so the staff no longer need extensive instruction booklets. If further information is required, they can easily access PDF versions of the procedures at any time. Because all the data in Track-it is always available, there is no need for the team to generate regular reports. Therefore, they only produce PDF reports for specific purposes, such as audits.

A massive improvement for the team was the development of protocol templates. This allows them to apply a particular protocol to any number of LINACs – which is especially useful regarding the size of the hospital. The machine fleet can be organised more easily by assigning a specific test protocol to a particular group of accelerators. When changes need to be made, all that needs to be done is to adapt the protocol template accordingly.

A further advantage is that the system is web-based and thus accessible from anywhere with a user-specific login. The data can be retrieved from within the treatment rooms, where the test equipment is located, or from anywhere else, which has been particularly useful during the SARS-CoV-2 pandemic, as the data can be accessed from home using Citrix.

All in all, Track-it allows all required tests to be accomplished much more conveniently and efficiently and therefore considerably simplifies the whole QA management.

Further information can be found at: www.ptwtrackit.com.

Steve Weston is Head of Radiotherapy Technology Physics at Leeds Cancer Centre. After receiving his PhD in physics at the University of Hull, he started as a Trainee Physicist at Leeds Cancer Centre and was accredited as a Medical Physics Expert (MPE).

Ashraf Esmail is Radiotherapy Clinical Scientist at Leeds Cancer Centre. After completing his PhD in physics at the South Bank University London, he worked as an MRI Physicist at the Royal Naval Hospital Haslar in Gosport, Hampshire.

Some Advice for Early Career Medical Physicists

Dr. Leticia Irazola Rosales provides advice for those embarking on the medical physics career ladder

Often, this time of the year initiates a period of uncertainty as many early-career medical physicists prepare to face the job market. There is usually a lack of advice to help clarify this frightening and unavoidable process. For the sake of simplicity let's say that moving within your own country seems to be the most straightforward option. After all, the requirements needed to work in this clinical field are those for which you've been preparing for the last few years. But... what happens if you want to move abroad?

Choosing this option may result in a long and arduous path since there is no homogeneity in the requirements to work as a Medical Physics Expert in Europe. In this sense, you should be aware of the different training programmes established in each of the countries that you may be interested in. There are some divergences in the specific Medical Physics trainee schemes, which range from a graduate level in Albania, 4 years of specific master's degree training in Sweden or 3 years of dedicated hospital training in Spain. Moreover, the access road to these programmes varies depending on the different number of ECTS credits from the Physics and Master's degrees needed as well as on the access process.

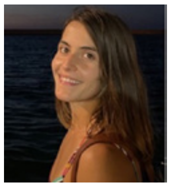
Furthermore, the job market is always full of random events, like differences in hiring processes between countries or in the number of years of scientific and clinical experience that are necessary to be considered as a candidate for Medical Physics Expert status. I want to put a special emphasis on this topic since there are several different profiles that can be found in Medical Physics early careers. Specifically related to scientific experience, having or not having a PhD and getting this degree before or after going through the Medical Physics training programme may be an issue. All of these options may or may not be considered as expertise, depending on the hiring institution.

All of these aspects may introduce a kind of qualm about even to moving abroad in order to get the most adequate education, depending on whether you want to be back home or not in the future. Working abroad is subjected to the approval of a commission which validates your previous education based on the thresholds of that specific country. Although usually there are no big issues with this process and they're rarely denied, it does sometimes require an additional training programme to cover some specific Medical Physics areas.

Another important topic regarding job searching is related to CV drafting. As we all know, EFOMP is making a great effort in order to unify Medical Physics Core CVs in the different areas of our career. But what happens with our not-expert CVs? As young professionals and completely new in this aspect we undoubtedly ask ourselves: "What would the Head of a Medical Physics Department think if they quickly read or skimmed my brief application?"

In this sense we do not have a standard template for a job application, and the doubt is how deep we have to go to fully describe our knowledge in the different areas of Medical Physics. So you will not have any restriction in crafting your own cover letter, it is important that your CV shows your medical physics competences, besides research and teaching abilities, in a way that highlights your unique skills for that position. A good idea would be to include your most amazing features in your cover letter to ensure that the reviewers will easily find them and do not jump off that topic.

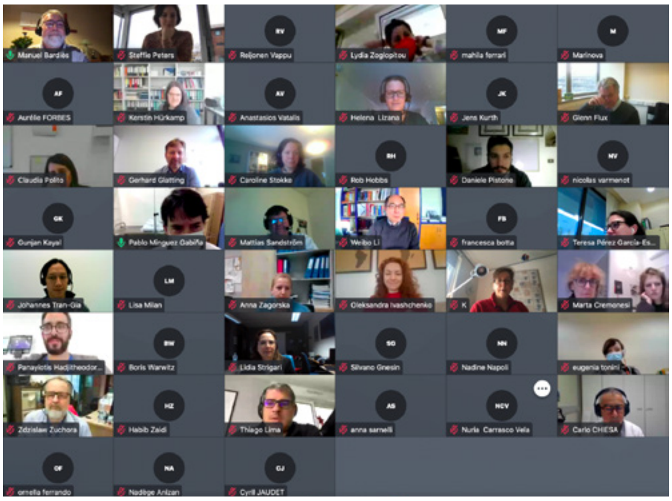
Finally, do you feel that having contact among European young Medical Physics from all countries stating their concerns about this or any other young Medical Physics aspect would help? If so, I invite you as a young member to get in touch via pubcommittee@efomp.org and your email will be forwarded to the author.



Leticia Irazola Rosales is a PhD graduate in Medical Physics. Her thesis was on secondary cancer risk due to peripheral doses in radiotherapy. Currently she is performing her 3rd and final year as a Medical Physics trainee at the Clinica Universidad de Navarra (Pamplona and Madrid) in Spain. She is also an assistant teacher at the University of Valencia and the University Francisco de Vitoria and is a member of the Lu-177 dosimetry Spanish Group, the Medical Physics trainee programme in Spain, the Communications and Publications Committee of EFOMP and the Scientific Committee of the 4th ECMP Congress.

Special Interest Group for Radionuclide Internal Dosimetry (SIG_FRID)

Pablo Mínguez Gabiña from Barakaldo, Spain, provides an update on the activities of this EFOMP Special Interest Group



Screenshot of the online SIG_FRID meeting held on 10^{th} December 2021

The SIG_FRID has kept up its work promoting radionuclide internal dosimetry in clinical practice. The number of SIG_FRID members is currently 109, but we sadly have to inform of the death of the SIG_FRID member Peter Kletting. New applications are always welcome (see the box below for how to become a SIG member).

The Steering Committee (SC) has had monthly meetings (December 1^{st} and January 17^{th}), and a general SIG_FRID meeting was held on December 10^{th} from 9:00 to 11:00 CET. In the general meeting, the advances in the eight priorities defined by the SC were explained by members of the SC. Up to 47 SIG_FRID members were connected at a given time. A screenshot of the meeting is shown above.

The latest advances in the priorities of the SIG_FRID (listed in previous EMP News articles) are summarised below. In those priorities that are not mentioned, the situation is similar to that in the previous issue of EMP News:

Priority 1. Survey on the practice of clinical radionuclide dosimetry

The objective of this priority is to collect up-to-date information on the status of radionuclide internal dosimetry in the EFOMP member countries. The electronic questionnaire is almost ready for distribution to centres that perform radionuclide therapy. The NMO representatives will help to distribute the survey within the countries. We hope to receive information from as many centres as possible, so your help in completing the survey for your centre is much appreciated! Further information will follow as soon as the survey is distributed.

Priority 4. Communication

A monthly newsletter has been issued for SIG_FRID members and quarterly news is published in EMP News (as here!).

Priority 5. Scientific issues

The second scientific meeting of the SIG_FRID was held online on January 25^{th}, from 15:00 to 16:30 CET, and was followed by up to 40 SIG_FRID members.

The meeting was chaired by Ernesto Amato and Gerhard Glatting and was focused on time-activity curve fitting. There were 2 talks followed by 60 min of discussion:

1. Non-evaluative comparison of Different Fitting Results by Boris Warwitz from Innsbruck/Austria. Boris presented the fitting results for kidneys and tumour kinetics (^{177}Lu-DOTATATE measured in Innsbruck) obtained by five different centres using different functions to fit the data.
2. Fit and integration of the time-activity curve by Rachele Danieli from the group of Marta Cremonesi. They used published data for 2 patients treated with ^{177}Lu-DOTATATE provided by the SNMMI in occasion of the 177Lu Dosimetry Challenge 2021 (Uribe et al. JNM 2021). One "simple" patient with just decaying data, the other having some influx and outflux. Six different models were fitted and investigated in detail.

The open questions that arose in the presentations were discussed afterwards and will also be included in the report of the SIG Work Group "Time-Activity Data Fitting" coordinated by Gerhard Glatting.

Priority 6. EU matters

The European Commission published an implementation roadmap and progress indica-tors for Europe's Beating Cancer Plan to monitor developments on the ten flagship initiatives as well as its other actions.

More information:

- Europe's Beating Cancer Plan implementation roadmap – web page

- Europe's Beating Cancer Plan – web page
- EU Mission on Cancer – web page

Priority 7. Regulatory issues

EFOMP has decided to answer the EU call *SAMIRA study on the implementation of the EURATOM and the EU legal bases with respect to the therapeutic uses of radiopharmaceuticals* – ENER/D3/2021/253-3. This is an important project as it may ultimately participate in wider dissemination of clinical dosimetry. This application will be coordinated by EIBIR, and EANM and EFOMP will send a joint application. Manuel Bardiès, Steffie Peters and Caroline Stokke are EFOMP representatives, with Caroline Stokke also being EANM Dosimetry Committee member.

How to become a SIG member:

The SIG is meant for networking professionals with an interest in radionuclide dosimetry.
Membership is open to all EFOMP members.

The membership application procedure is explained on the SIG pages of the EFOMP web site: https://www.efomp.org/index.php?r=pages&id=sigs

The application form and a brief CV should be sent to the SIG secretary: sec.sig_frid@efomp.org

Upcoming meetings:

- Séminaire Radiothérapie Interne Vectorisée, (March 14-16). Montpellier (France) (in French). https://indico.in2p3.fr/event/25268/
- 2nd course on Therapy in Nuclear Medicine. Barcelona. (April 28-29). http://terapianuclear.org/
- EANM Multidisciplinary days. (June 28-30). https://www.eanm.org/congresses-events/multidisciplinarydays/
- 4th European Congress of Medical Physics. Dublin. (August 17-20) https://www.ecmp2022.org/
- 35th EANM Annual Congress. Barcelona. (October 15-19). https://www.eanm.org/congresses-events/future-congress/

Pablo Mínguez Gabiña has been a senior medical physicist at the Gurutzeta/Cruces University Hospital in Barakaldo, Spain, since 2005. He has also been a part-time professor at the faculty of engineering of the University of the Basque Country in Bilbao since 2011. He has been a member of the Dosimetry Committee of the European Association of Nuclear Medicine since 2019. He is also a member of the Steering Committee of SIG_FRID.

EFOMP COMPANY MEMBER ARTICLE

Accuray expands partnerships to integrate the best technologies

Building partnerships with the best technology companies and bringing the respective strengths and capabilities together serves the common goal of enabling patients to live longer, better lives. Accuray collaborates with established industry leaders and emerging pioneers in radiation oncology and medical physics to improve patient outcomes and expand the curative power of radiation therapy. Progress and innovation cannot be achieved alone.

The new partnership planned between Accuray and Brainlab will enable the radiosurgery community to leverage the powerful precision of Accuray treatment delivery technologies in combination with Brainlab Elements planning software, expanding our planning capabilities optimized for neurosurgeons and neurooncologists. The platform will facilitate adaptive radiotherapy workflows by enabling rapid re-planning based on dynamic updates of the digital patient model. This collaboration will mark an important next step in the evolution of the CyberKnife® platform by expanding the capabilities to align with the needs of the radiosurgery community.

The recent collaboration between Accuray and C-RAD allows Accuray to integrate C-RAD's innovative, advanced radiation therapy solutions for patient positioning, tumour localization and treatment delivery. The companies will work together to provide customers with a solution for deep inspiration breath hold (DIBH) using the C-RAD Catalyst+ HD and Accuray Radixact® System, ensuring the best possible treatment outcome for both conventional and SBRT for breast cancer and other indications.

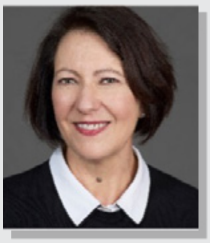
The Radixact System, the next generation TomoTherapy® platform, provides a fast, non-invasive, highly accurate and personalized option for the treatment of breast cancer. Leveraging the system's helical design enables the delivery of radiation from multiple 360 degrees around the patient, providing greater control of the radiation dose so it conforms precisely to the tumour and minimizes dose to healthy tissue. Radixact delivered radiation therapy provides a solution for treating breast cancer at almost every stage and can be used in combination with surgery and/or chemotherapy. It is commonly used to help reduce the risk of breast cancer recurrence and/or to provide relief from symptoms, such as pain, associated with advanced disease. The collaboration with C-RAD will enhance the Radixact System's ability to treat breast cancer.

The existing partnership between Accuray and RaySearch is built upon a long-term collaboration agreement to develop and market fully integrated solutions that combine the RayStation® advanced treatment planning system and RayCare® oncology information system (OIS) with the Accuray iDMS® data management system as a single platform for treatment planning and data integration for CyberKnife and Radixact treatments. Today's clinical facilities have a mixture of radiation treatment delivery devices with distinct treatment planning systems that integrate differently with the facilities OIS. This mixture can produce a complicated environment to learn, operate, and maintain for clinical staff. This seamless integration will create unique value for hospitals and clinics with multiple treatment systems by providing increased choice and flexibility. Clinicians will benefit from having more patient treatment options available and flexible workflows — all through a standardized, vendor neutral treatment planning system and next-generation oncology information system.

In collaboration with Accuray, ScandiDos has developed a solution that enhances the quality assurance (QA) of Radixact® Synchrony® real-time delivery adaptation. The solution independently simulates the breathing motion of patients, therefore, adding an extra dimension of QA to the already existing product, the ScandiDos Delta4 HexaMotion motion platform. The new Independent Motion Platform (IMP) option for the Delta4 HexaMotion is developed in close collaboration with Accuray, and its purpose is to mimic the breathing of the patient independent of the motion of the tumour.

The Accuray strategic partnerships are fundamental to drive collaborative innovation that delivers on what patients need. Deepening ties between complementary businesses fosters collaboration and allows us to offer services and solutions that help our customers to become more successful.

Francesco P. La Torre, PhD works as the CyberKnife Product Manager EIMEA at Accuray.



Susan Reid, DDR, MSc works as the TomoTherapy/Radixact Product Manager EIMEA at Accuray.

MEDICAL PHYSICS EDUCATION

Meet the Profs – Interview with Medical Physics Teachers

In the second article in this series, EMP News's Educational Advisor Danielle Dobbe-Kalkman has interviewed husband and wife team, Prof. Slavik Tabakov and Dr. Vassilka Tabakova from King's College, London, both of whom are highly-distinguished medical physics educators and communicators.

Prof. Slavik Tabakov and Dr. Vassilka (Assia) Tabakova

DD: You have both dedicated a large part of your careers educating medical physicists all over the world. Have you always been interested in education? Can you tell me something about your first experiences with teaching?

ST: For me the teaching experience that changed my professional life was back in 1988-1989. I was still living in Bulgaria at the time, having an academic position at the Medical University Plovdiv, but I also worked part-time for General Electric. We had a lot of contacts with different colleagues from all over the world, and when I was at a conference in Paris, I met a colleague from North Africa. Unfortunately, I lost his details afterwards, but he asked me a question about my lecture, and then another question, and another one, and we continued discussing this matter for three days while I explained a lot of things to him about X-ray equipment, which is my specialty. We didn't see much of Paris, but at the end of the three days he told me that during this time he had learned more than during his whole professional education. I was very much touched by that, and took a decision later that year, after talking with Assia, that I should dedicate the rest of my professional life to education in medical physics. So, this is how it started – it was a life-changing experience. I had been giving lectures before, but I never felt the importance of teaching as strongly until that meeting.

VT: I come from a family of educators. My mother was the first female medical physicist in Bulgaria and she taught at the Medical University in Plovdiv, our native town. My first reminiscences were of her preparing lectures late at night for the following day. She was also following in the footsteps of my grandmother who was one of the first graduates in mathematics in the country. She taught at college, and many generations of students would recognize her on the streets. So, for me it was a natural decision to continue in this direction!

DD: Do you think that your teaching has been able to really change things over the years?

ST: Back in 1989 when I decided to jump in the field of education, one of the biggest goals for me was to make sure we have good visuals for the lectures. We need lots of images in medical physics and you simply cannot do without good images. This is a very dynamic profession, but at that time the printing of images was way too slow. And because I was very much into computers, I was thinking that it was necessary to have educational images, and an educational image database. So, I developed a project about that (when we were in the UK) included colleagues from Sweden, Italy, Portugal, Bulgaria, ICTP and the UK. This EU project was called EMERALD (an acronym of European Medical Radiation

Learning Development). The head of our Department in King's College London, Prof. Colin Roberts was very supportive and took an active part in the project. In 1997 we developed a CD-ROM with an image database, and this was actually the second CD-ROM in the world with an ISBN number! I still remember how we had to explain the need of an ISBN number, because people would say "this is not a book", but it has the content of a book! Finally, we got it and the database was ready the same year. We decided to publish it when it was the EU deadline, because this was an EU project. This way we published it on the 19th of February 1998, but it appeared that Springer had published a similar CD (on Urology) on 30th December 1997, and after us there was also a third similar CD (on Psychology), published in the USA in April 1998. All three CDs were in the field of medicine, because we need images in medical education. We described this experience, and all colleagues who took part in the projects, in the e-book "The Pioneering of e-learning in Medical Physics".

DD: To have a good team, you need a motor and somebody who really believes in the importance of it.

ST: I was seen as the motor, but all members were very active. Sometimes you just feel it's the right time for something, and this was the right time, and so we planted the seeds.

VT: And of course, with education and technology, you can't stay in the same place. In 2012 there was also a big change, because our MSc course at King's College London increased sixfold. This was a crucial moment, because we succeeded to manage the educational process for such a big change mainly by introducing a pilot virtual learning platform.

ST: Yes, we would not have survived without that, and Assia worked a lot for the VLE implementation!

DD: So you have to keep adapting to changing circumstances?

ST: Exactly. There was a moment though, when we became a victim of our own success. The King's MSc course was so well received that they gave us projects that were too large. When you have twenty students and then go to 120, it's quite a challenge to manage everything well! But our students (plus the faculty) not only accepted it, but also really helped us! We organized many feedback meetings, and even separate meetings with each one of them. We involved the students a lot, and perhaps it made them feel special. It actually kind of felt like a family.

DD: When you're changing things, sometimes you have to deal with an environment that's more conservative. Was this also the case in your situation?

ST: 100% yes. But we organized several conferences! It took some time to get everybody on board. If you want to change things, you shouldn't be forceful. You need to be soft, and be able to see things from the perspective of other people. Just like with our students, we talked with our colleagues, and gave them time. I do not like competition, but I strongly believe in cooperation. We have to accept the view of others, and build a common view together. I still remember how we were discussing the first educational website in Lille in 1999 at a consortium meeting. Outside of the meeting we were all friends, but during the meeting we were all questioning things, and there were heated discussions. However, at the end of the day we decided on the concept of an educational website (the first in the profession) that has been used now for 23 years without significant change of the software! Similarly, the first Conference on e-learning in medical physics, which we organised in ICTP, Trieste, collected a lot of feedback and resulted in an International Declaration about joint activities in e-learning.

DD: What is your favourite memory, looking back at all the educational things you've done? What are you most proud of?

ST: Definitely it was the Encyclopedia of Medical Physics, which was actually also the biggest challenge! It was a totally new thing. We had a team of 150 people, and developing the e-Encyclopedia was like playing ping pong with all of them. This project has been so useful though! It has about 5000 – 8000 users every month. CRC Press just published an update of the Encyclopaedia.

VT: The encyclopedia is indeed one of the most cherished memories! But of course, also winning the Leonardo de Vinci prize that was awarded to our project EMIT in 2004 in Maastricht, was also something we will never forget!

ST: EMIT was the first international project for EFOMP. But I have to add that we are also very proud of our students from King's College London – from 300 students graduating between 2001 and 2018, 28 have won prestigious external awards! This is all due to the excellent teamwork and the strong educational focus, shared by the faculty of the MSc! Without the teamwork we couldn't have made it all happen!

DD: What is the most valuable thing you have learned from teaching others?

VT: That whoever you teach you always have to keep an open mind, because you can learn from them as well. And, as mentioned before, the teamwork.

ST: You cannot provide good education without a good team.

DD: Are there people out there who have inspired you during your careers?

VT: My parents, and grandparents! And Slavik is a constant inspiration. And of course, there are so many enthusiastic colleagues who really inspired us.

ST: Yes, the colleagues! We did seven large international projects, with colleagues from 52 countries, and most of them did it for free! They were driven by the need of global development of our profession, and healthcare in general. We are very much inspired by their dedication and their enthusiasm. One of the colleagues with very strong focus on education is Prof. Perry Sprawls, who has developed an excellent educational website, and he has become a very good friend.

But sometimes it's also the other way around and students can be an inspiration, like our former student, now professor, Magdalena Stoeva, who is absolutely brilliant in ICT skills and ideas, and who worked with us in most projects we did.

DD: Your efforts to educate the world can be seen as groundbreaking and visionary in a time where e-learning didn't exist at a scale it does now. What made you see the opportunities of e-learning?

ST: When we did the first project on "electronic education" in 1995, the term e-learning did not exist. There was no "pathway" at the time, but the profession needed a new type of education. When I started working in X-ray imaging, the technology hadn't moved much for 70 years. And then so many new methods emerged! Consequently, we needed a dynamic way to transfer this new knowledge.

VT: The power of e-learning is that it makes things more efficient. But it must be blended! You can't remove the classroom or the teacher. And just throwing lectures online also isn't the right way to do it. E-learning must be blended, and the teacher still has to be the role model.

DD: I really admire and appreciate all you have done for making education available in middle and low income countries – where did that drive come from?

ST: It was definitely coming from the ICTP College on Medical Physics where I've been a coordinating director since 2001. We've had about 1000 students there, from 82 countries. There's no better reward than the gratitude in the eyes of the students, and that's so inspiring to see! Many of these colleagues started new medical physics societies and educational courses in their countries. And this was what also triggered the development of the Scientific Dictionary. Developments in medical physics are triggered by development mainly in the US, the UK, and Europe, where we use English as a main common language. In many countries though, only the national language can be used in education. So, we developed an e-Dictionary of Medical Physics Terms in 32 languages (it is free at: www.emitel2.eu). More than 200 specialists took part in this project. It was specifically aimed at low-and-middle-income countries. And by helping people in these countries, one indirectly contributes to the development of healthcare there.

DD: I read in your latest paper (and I couldn't agree more!) that as an educator you shouldn't try to directly transfer your face-to-face teaching to online, because it's a different medium and materials need to be adapted to that medium. Do you have some practical tips for our readers on how to do that?

VT: I have seen a number of times that face-to-face content has been transferred directly online. It didn't work because it was too much loaded with information, and the navigation was difficult. So, I constantly say: "You need to structure, and then structure again." And sections should be easily identifiable. In the book that I wrote: "e-Learning in Medical Physics and Engineering - Building Educational Modules with Moodle", there are a lot of hands-on tips, about the building blocks, the organization of the content, the fonts etc. You have to be aware how students will be able to navigate your course.

ST: I totally changed my lectures for online teaching. And I must say it takes me three times longer to prepare than a normal lecture. I separate my lecture into small logical parts, short blocks of approximately 10-15 minutes. And each one ends with a recap and a small quiz. This works so well, that I actually decided to use the same organisation for my face-to-face lectures.

DD: A lot of people struggle with online teaching, but I think all three of us agree that it's here to stay, and that it has great potential. What would you say to people to encourage them to embrace online learning?

VT: I think especially for medical physicists, since it's such a dynamic profession, e-learning is fantastic because updates can be performed much easier this way. Also, the way of doing exams has been very much facilitated by online assessments. There should be more agreement though on how to do this, because there are many differences in the way educators approach online exams.

ST: We should have more global discussions about e-learning. And specifically, about online simulations, because for medical physics these are very important! However, they are very difficult to develop. Take for example a simulation tool our team developed. It took 6 months to create it. But to be honest, it was not appreciated as much as it should have been. Some people take it for granted, others do not realize that such software has a short life span. That's why the first task I took after my election as IOMP President was the establishment of the Medical Physics International Journal – a free e-Journal with focus on education, which can be a platform to share knowledge about educational software, teaching tools, etc.

The AAPM in US has an award "Innovation in education" and I think it would be a good idea to have something similar in Europe as well, in order to give people more credits, appreciation, and recognition for their efforts in education! We need to have more people who are passionate about education, and this way we can encourage them!

Danielle Dobbe-Kalkman is a Senior Learning Specialist at the LRCB, the Dutch Expert Centre for Screening, and the educational expert of the EUTEMPE consortium. She regularly presents on tactics to improve educational efforts and assists with the design of courses to enhance their didactic value. Danielle sits on the Editorial Board of EMP News as an Advisor.

MEDICAL PHYSICS IT AND SOFTWARE

Hacking Medical Physics: Part 2 – working with databases— a step beyond spreadsheets

This is the second of a new series of articles, in which Medical Physicists Jonas Andersson and Gavin Poludniowski from Sweden inform the readership and provide practical tips about topical IT issues in medical physics

This article continues a series on the topic of software and programming in medical physics. So, let's talk about databases. In the field of Information Technology, a database is simply an organized set of data stored electronically. This definition would also seem to include spreadsheets, but spreadsheets are not usually considered databases. Databases are designed to hold much larger amounts of data, while allowing many users secure access and the possibility to add and retrieve data using queries. A typical use case where databases shine is where data is accumulated regularly over time, for example, quality control results or radiation dose reports. The "querying" feature of databases allows the user to make simple or complex requests for information retrieval, filtering the entire accumulated set of data as desired.

A user interacts with a database using a database management system (DBMS), which, at the very least, allows them to add and retrieve data. Interactions by the user can be done graphically, in an application (via point-and-click), or programmatically (by typing code), while the DBMS is manipulating and interacting with the database behind the scenes. Most databases that we come across are known as relational databases, with data structured into tables with rows and columns. The most common querying language for relational databases is Structured Query Language (SQL). It was first developed by IBM in the 1970s, and it provides a standard way to access and handle the data in a database.

Let's get concrete. Many database systems are built on a "client-server" architecture, in which the users submit requests on their computers (the clients), which are then routed to another computer (the server) to be executed, where the data is being stored remotely. However, to get you started, we will consider the simple (but still powerful!) case of an embedded database management system called SQLite. This is a widely used DBMS and is installed (embedded) on the user's computer with a database stored in a single file. Querying is done using SQL syntax. A query to a database containing staff radiation doses might look something like this:

```
SELECT Name, Hp10, Report_date FROM staffdose
WHERE Hp10 > 0.1
```

In this example, the data is stored in a table called "staffdose" which has several columns, with each row corresponding to dosimeter readings for a specific measurement period. Three of these columns are the staff member's name, the personal deep dose equivalent value (i.e., Hp(10)) and the date of the dose report. The above query asks for those three columns of data to be returned for all cases where the dose exceeds 0.1 mSv. Data requests can be much more sophisticated than this, but it illustrates the power of database querying and the logical nature of SQL syntax.

The MATLAB and Python programming environments provide several ways to interact with databases. This is useful, as both also support powerful tools for analysis and plotting. In the software repository for this series (see: https://github.com/rvbCMTS/EMP-News) we have uploaded example cases of interacting with SQLite using both MATLAB and Python, together with some (hopefully!) helpful comments. The case-study presents short scripts to:

1. Read monthly staff doses from Excel files produced by a fictitious vendor.
2. Process the data into the format of rows of a data table.
3. Insert the rows entries into an SQLite database.
4. Query the database to extract information of interest.
5. Further process the data (in either MATLAB or Python).
6. Visualize the results in plot form.

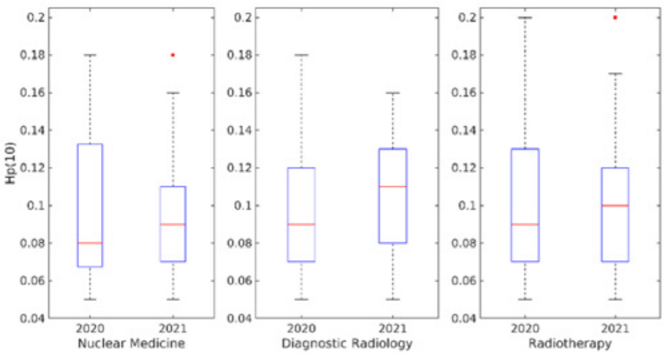
In MATLAB, we use the *Database Toolbox*, which you need to have installed. We chose to use the "JDBC drivers" for SQLite, as this provides full functionality. These drivers do not come with MATLAB by default and must be downloaded separately, but we also include them in the repository for convenience. Although not used in the example, MATLAB also provides an app called *Database Explorer* that allows the user to interact with existing databases, build queries, and import data into the MATLAB workspace. We should note that, although it is not essential for the database to work in the example, we use the *boxplot* function from the *Statistics and Machine Learning Toolbox* to visualise data.

In the Python implementation, we work with Python 3. For interacting with SQLite databases in Python, we use the *sqlite3* module, which is included in the core distribution. We use some other libraries, however, that you may have to install yourself. These include *Pandas* (for data processing) and *plotly* (for producing plots).

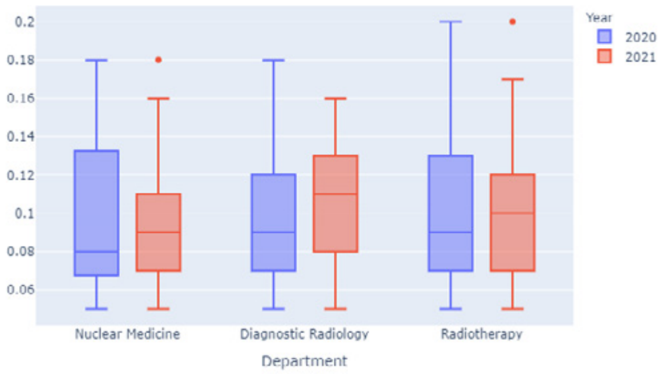
In the two screenshots that we have included in this article, you can see boxplots produced by the MATLAB code (upper pane) and Python code (lower pane). Each boxplot indicates the distribution of Hp(10) values for three departments, for a four-week measurement periods of the indicated year. This example just begins to illustrate what is possible. We hope that this short introduction, together with the MATLAB and Python examples in the EMP News repository, will motivate you to get started with databases if you haven't already.

Acknowledgements
We would like to thank **Josef Lundman** and **Johan Helmenkamp** for useful discussions on the topic of this article.

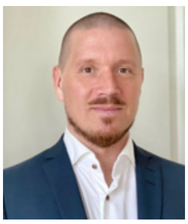
MATLAB



Python



Note: Remember that if you process any data that contains personal information, you should follow your local rules implementing the EU's General Data Protection Regulation (GDPR), or the equivalent legislation where that does not apply. Further, the level of quality assurance you need for any software you write will depend on the purpose for which it is used.



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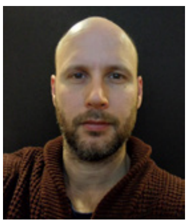

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EFOMP COMPANY MEMBER ARTICLE

Qaelum: An actionable metric for Radiology workflow that opens exam slots and reduces contrast waste

Qaelum

Blogpost by Timothy P. Szczykutowicz, Ph.D., DABR – Associate Professor, University of Wisconsin Madison; Director of Clinical Operations, CT Protocol Project

You don't have to be a domain expert to understand that when a CT technologist repeats a scan, the exam will take longer. If the exam administered iodinated contrast agent, a repeat may also cost the institution more money in a wasted contrast dose. Such inefficiency in radiology can easily be directly related to time/money loss for the hospital and radiologists. And in some cases, repeats represent a patient safety/quality issue [1].

The concept of reject/repeat analysis in digital radiography (DR) and mammography (MG) has been known for many years and it is being implemented for regulatory, radiation protection, and quality improvement purposes. However, our lab's recent work has highlighted that the repeat rates in CT significantly contribute to time loss in radiology [2] and that they are a source of excess radiation [1]. The main reasons for repeat CT imaging are protocol selection error, issue with contrast administration, poor protocol instructions, protocol settings error and patient motion or noncooperation [1,3,4]. **In short, the repeat metric shines a light on staff training issues or poorly set-up scanner protocols**.

The first company to commercialize our CT repeat rate metric is Qaelum. Qaelum implemented our repeat rate metric in a new focussed-on-quality platform called FOQAL (FOQAL-CT repeat, Qaelum, Belgium). I'm excited to work with a dose monitoring company that is offering more than traditional dose monitoring tools. When I speak with most radiology administrators and radiologists, they have a strong desire to keep their patients protected from higher than needed radiation doses, but see dose monitoring usually through a compliance/regulatory lens. **What I see administrators really wanting are ways to extend their personnel and equipment to scan more patients.** This is especially true in the current COVID19 pandemic.

The new Qaelum software solution is based on our lab's algorithm that recognizes standard protocols and alerts the user when there are scans in these protocols that are unnecessarily repeated (Fig 1). Some earlier attempts by vendors in this space failed to understand combo orders and optional delayed phases. Qaelum's solution is robust to such things because my lab spent years developing the repeat analysis algorithm to be robust to real clinical workflows. Furthermore, Qaelum's team has a wealth of experience and wisdom developing and incorporating quality solutions into a wide array of hospital settings. Besides the generic idea of calculating the repeat rate, Qaelum's FOQAL-CT repeat product analyzes repeated exams and assesses the financial impact on the department (Fig 2). Thus, it becomes a valuable assistant to improve the efficiency in a tangible way.

Figure 1: Repeat rates per repeat type and per 'base pattern' (i.e. identified standard protocol) are visualized in an intuitive way. Improvement plans begin from the protocols with highest repeat rates

Figure 2: Repeated scans are a source of extra cost for the CT department, in terms of time loss or contrast waste. Quantifying the financial liability assists in a tangible way. Here, Qaelum has summed the extra time spent on median repeated exams versus non repeated exams of the same type to demonstrate how many extra exam slots could be opened up if the site was able to reduce repeat imaging. Their FOQAL-CT repeat also allows the user to enter a rough cost estimate for lost exam revenue, letting site administrators gauge how much lost revenue they have from repeated scans.

A lot of metrics I see just show a needle for things like patient volume or radiologist interpretation volume. They are helpful for a big picture view, but do not provide us with actionable advice. Qaelum's FOQAL-CT repeat will allow one to easily see scanners, technologists, protocols, and even specific phases of a protocol that are causing trouble. I know, because we performed a multi-centre study at UW Madison on CT pulmonary artery exams for embolism detection and demonstrated we could do this [3]. We could detect specific technologists at specific locations who were underperforming compared to other sites, for the same protocol!

The software also identifies protocols with clinically relevant repeats (e.g., optional delayed phases in the setting of a slow bleed in a trauma patient). This means the metric appreciates when a radiologist actively adjusts the exam to the patient situation by not calling these events out as false positives. These cases are either identified by the solution automatically, or if performed rarely, the user can teach them to the software through a user specific interface (Fig 3).

References:

1. Szczykutowicz T, Rose S. "First Look: Repeat Rates in CT." Radiology Management, 2019, 41(5).
2. Rose S, Viggiano B, Bour R, Bartels C, Szczykutowicz T. "A Multiinstitutional Study on Wasted CT Scans for Over 60,000 Patients." American Journal of Roentgenology, 2020, 215:5, 1123-1129. DOI: 10.2214/AJR.19.22604.
3. Rose S, Viggiano B, Bour R, Bartels C, Kanne J, Szczykutowicz T. "Applying a New CT Quality Metric in Radiology: How CT Pulmonary Angiography Repeat Rates Compare Across Institutions." Journal of the American College of Radiology, 2021, 18(7). DOI: 10.1016/j.jacr.2021.02.014.
4. Szczykutowicz T, Rose S. "Repeat/Reject imaging in CT: An unnecessary source of patient dose and a tax to radiology resources." European Congress of Radiology, ECR 2020, Vienna, Austria. DOI: 10.26044/esi2020/ESI-02989.

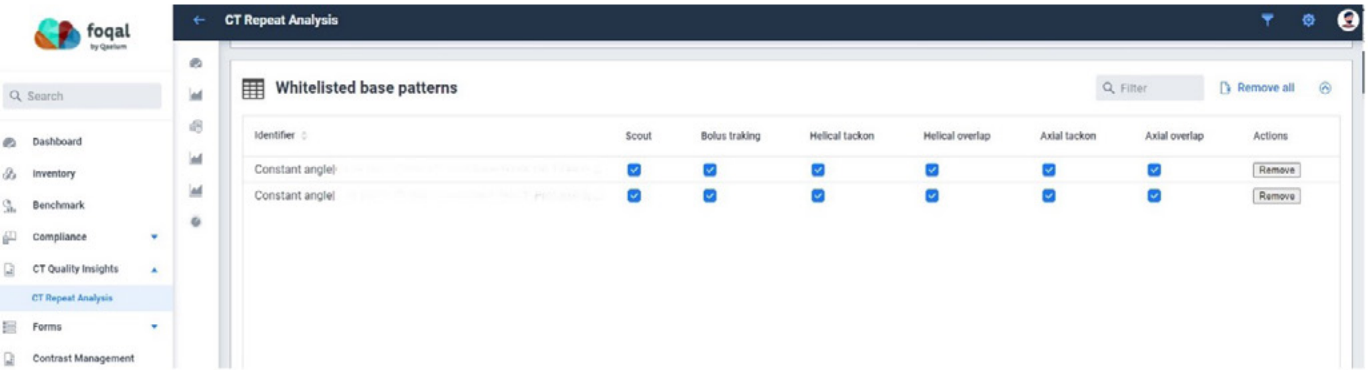
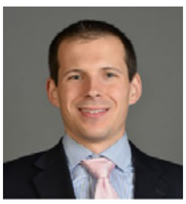


Figure 3: Not all repeated scans are superfluous. Clinically relevant repeats can be excluded from the repeat rate analysis in an easy way, with possibility to also select the type of repeat that needs to be excluded. This allows for rare and clinically needed delayed or optional phases to not raise false alarms. For commonly performance optional phases, like delayed phase in the setting of a slow bleed, the algorithm will learn those behaviours on its own without user input needed.

If you want to know more about our results and conclusions on this topic, don't miss our presentation *"Automated analysis of CT repeated scans in a large European hospital"* at ECR 2022. You can also visit Qaelum's booth at ECMP 2022 in Dublin or find out more about the product under this link https://qaelum.com/solutions/ct-repeat.



Dr. Timothy P. Szczykutowicz "Stick" is an Associate Professor of Radiology at the University of Wisconsin. Protocols developed by his team have been shipped to 3,500 sites around the globe. Dr. Szczykutowicz is the author of 40 papers, 2 book chapters, the book "The CT Handbook", 4 patents, and is a consultant to 5 companies.

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EFOMP COMPANY MEMBER ARTICLE

Introducing Radformation

RAD formation

Intelligent Automation in Radiation Oncology

One of the more salient and touching conclusions I've drawn from my time in radiation oncology is that the professionals in our field are deeply dedicated to improving the lives of the patients we treat. For such a diverse group of players, from the clinic and academia to industry and commercial partners, this truth seems to bear out. While the efforts we contribute are all unique and different, the goal is the same.

At Radformation, we fully embrace this goal of advancing radiation oncology through automation. As treatment delivery grows more complex, we need innovative solutions that leverage the collective experience of clinical experts. At the same time, these solutions must complement users, respecting their contributions as well as recognizing their limitations.

Known Benefits of Automation in Radiation Oncology

Keeping up with emerging opportunities and technologies that require resources for proper implementation is an ongoing challenge. This is especially true given that clinical staff is involved in many routine tasks that consume their time. To wit, at present, the scope of quality assurance tasks required to ensure patient safety is vast. Without tools to support fast and thorough treatment workflows, we are relying on precious few resources to push forward new initiatives that drive important change.

Time Savings

Luckily, efficiency is within our grasp. A number of workflows have the potential for key automation improvements, including contouring, treatment planning, and machine and patient-specific quality assurance. Streamlining tedious portions of these tasks saves valuable time for those involved, and reduces efforts squandered on items that do not add value to the quality of care but are nonetheless important for sustaining operations. The effects are not hypothetical; a recent survey publication shows that 88% of therapists, medical physicists, and physicians polled believe that automation will increase productivity.

Patient Safety and Quality Improvement

Over the last decade, clinicians have largely embraced a culture of safety and quality improvement. This paradigm shift delivers a number of benefits for patients, but it involves a continued effort toward reducing errors in radiation oncology. Absent automation, ongoing improvement will be inhibited by a lack of efficiency and scalability as clinicians grapple with manual processes and endless checklists.

Seminal society guidelines have advocated for automation to make progress in this effort. According to ASTRO's Safety is No Accident, in the prevention of errors, it is "best to 'hardwire' the systems for success using simplification, standardization, automation, and forcing functions to create workflows and systems that support human work." The report of TG-275 from the AAPM also recommends automation as a means to reduce error-prone human/manual inputs. Indeed, with efficient workflows, the care team can devote more resources toward tasks that require experienced human judgment and analysis.

Consistency and Standardization

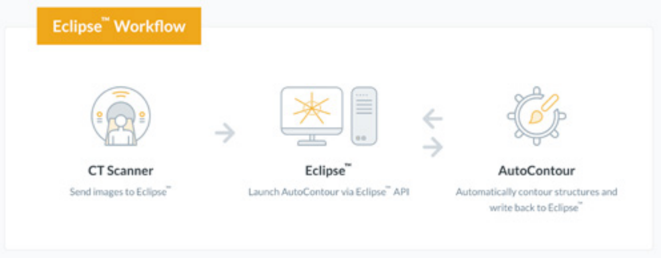
In the survey of radiation oncology professionals referenced above, 90% of respondents attested they believe automation will deliver higher consistency to treatment planning. Standardizing inputs reduces inter-staff variability and levels the playing field for those with different levels of experience. In addition, creating a standard both at the department level as well as the society level improves interoperability and facilitates larger-scale collaboration.

Automation Solutions from Radformation

Radformation knows automation. Founded by medical physicists, our team is supported by dozens of former clinicians that know the day-to-day workflow bottlenecks, and we have created the following solutions to address them.

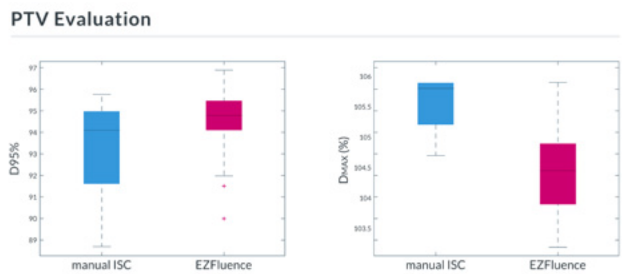
AutoContour

Supporting the earliest stage of treatment planning, AutoContour is a deep-learning auto segmentation tool that generates fast, accurate structures. With over 90 of the most common structure models available including target/nodal regions, patient data sets can be treatment plan-ready in just minutes. Regardless of workflow, AutoContour supports efficient contouring, drastically reducing the time required to generate accurate results. It is adaptable to multiple environments and vendors, but support for export-free data transfer is available through the Eclipse treatment planning system API.



EZFluence

EZFluence automates tedious tasks involved in plan generation for field-in-field, electronic compensation, and hybrid IMRT planning. The software automates the manual portions of creating such plans by creating homogeneous fluence maps, designing field-in-field subfields, and performing iterative calculations to achieve a clinically-acceptable plan. A University of Zurich case study validated EZFluence for clinical use, showing improvement in overall planning metrics as well as significant time savings.



University of Zurich study shows improved tissue coverage and lower hot spots using EZFluence for breast planning

ClearCheck

Plan evaluation is a complex process that involves a number of quality checks before a plan is regarded as treatable. ClearCheck is an automated evaluation software tool that provides valuable automated dose constraints, in-depth plan checks, plan comparisons, and instant documentation.

ClearCalc

ClearCalc is a secondary calculation software that independently verifies the accuracy of your treatment plan dose calculation. Supporting a full complement of clinical techniques including 3D, IMRT, VAMT, SBRT, SRS, etc., the software is vendor-neutral and is compatible with standard linear accelerators and specialty machines alike (Halcyon, CyberKnife, Gamma Knife, TomoTherapy, MRIdian, Unity, Superficial, and Orthovolage.) A recent case study featuring ClearCalc showed favourable results when compared to an existing secondary calculation solution.

The Leader in Radiation Oncology Automation

It's well-established that automation will play a greater and more important role in the future of radiation oncology. Established in 2016, Radformation has emerged as a leader in intelligent automation, bringing clinically relevant tools to the professionals that use them. Our team is proactive, designing automation tools not only that users love, but that also serve to elevate the level of care we provide for patients.

We're creating intelligent solutions so that radiotherapy departments can realize the promise of increased efficiency, better plan quality and patient safety, and standardization. For various steps in the workflow, from target and OAR delineation to plan evaluation and reporting, we deploy smart tools for use by smart departments. When it comes to putting efforts toward improving patient care, the team at Radformation is all-in.

The time to move your department forward is now. Click here to schedule a demo to learn more about these smart tools.

Disclaimer: Some products may not be available in all markets

Tyler Blackwell, MS, DABR is a medical physicist at Radformation, where he focuses on clinical collaborations and community engagement. Prior to joining Radformation, he spent a decade working as a clinical medical physicist in radiation therapy. He is active in a number of AAPM committees and is a member of the AAPM Board of Directors.

Medical Physics in Cyprus

Medical Physics Expert Erato Stylianou Markidou describes the provision of Medical Physics services in her home country

Medical physics is a unique profession. It is the branch of applied Physics pursued by medical physicists that uses principles, methods and techniques in practice and research, for the prevention, diagnosis and treatment of human diseases with a specific goal of improving human health and well-being.

In order to practice medical physics in the Republic of Cyprus, one must enter the Registry of Medical Physics by the registrar of the Council of Medical Physics and obtain a practicing license to the provisions of the Registration of Medical Physics Law in 2008(33(1)2008) as periodically amended.

There are three medical physics Departments in Cyprus, as well as Medical Physicists that work in the ministry of Labour.

The Medical Physics Department at the General Hospital of Nicosia employees one MPE – head of the Department, 7 Medical Physicists and two technicians of Medical Physics. The department is responsible to keep the high standards of the Quality assurance of all the equipment of ionizing and non-ionizing radiation for the purpose of diagnosis and therapy, for all the Public hospitals according to International standards. There is also a well-established thermoluminescence lab for Personnel Dosimetry. All the hospitals, including the private sector clinics, need to send their personnel dosimeters to justify the doses close the ALARA criteria since this is the only accredited lab in Cyprus. The department also owns the only lab that is accredited from the IAEA, part of the SSDL and WHO organizations for the calibration of all the radiation meters for ionizing and non-ionizing radiation. The Department also provides all the support to the government regarding Radiation Incidents in Nuclear Medicine, and they are part of the National Committee for any radiological accidents occurring in the country. The department also provides training for all the health care professionals in the hospital regarding their continuing education for radiation protection. The Department also played an important role in creating the infrastructure of hospitals PACS (Picture Archiving and Communication System) for all the public hospitals, bringing an innovative change and improvement of the quality of services provided by the public sector. The Medical physics Department was awarded with the silver award from the Medical Physics Department of State Health Services Organization (SHSO).

The Bank of Cyprus Oncology Centre Medical Physics Department was founded in 1998 in Nicosia, with the creation of the first Radiotherapy centre on the island providing cancer patients with a high standard of radiation diagnosis and therapy. The centre is a nonprofit organization with the support of the government and the Bank of Cyprus. The centre has three Varian True Beam Linear Accelerators and an HDR Brachytherapy unit, providing radiation therapy for more than 120 patients per day. The department employs 8 medical physicists (6 MPEs accredited by European and American Boards) including the head of the department – 7 of them are working in Radiotherapy and one in Radio diagnostics and Nuclear Medicine. The Department has been awarded several times with the IAEA QUATRO award for Radiotherapy Departments standards and the hospital keeps a continuing CHKS award for all the services provided. Medical Physicists are responsible for the commissioning of all the radiotherapy and radio diagnostic equipment, the periodic quality assurance of the equipment and provision of their expertise in creating treatment planning protocols and implementing new radiotherapy and nuclear medicine techniques and practices according to the international standards. The Medical Physics Department takes part in European Projects research and it is responsible for the training of all the ionizing radiation personnel of the Centre for Radiation Protection.

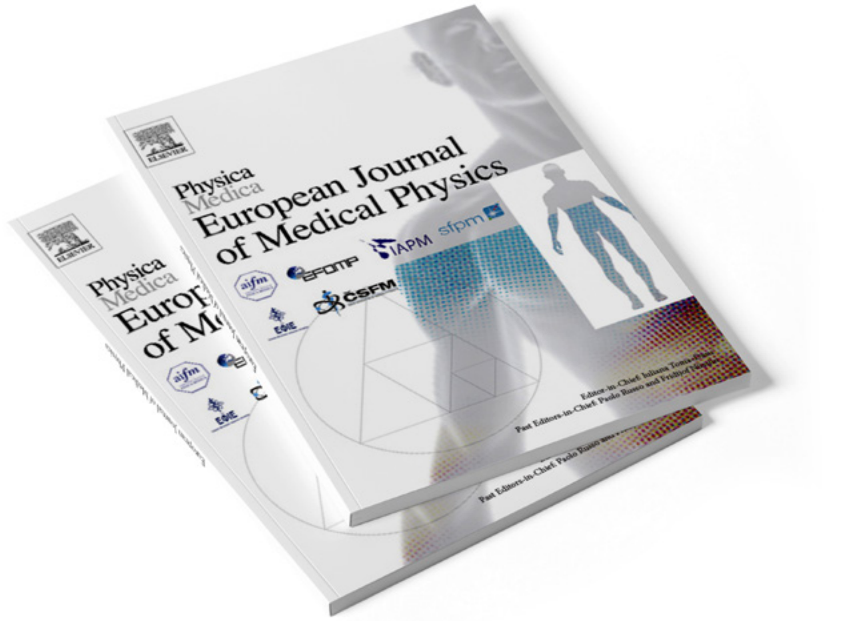
The German Oncology Centre is a new facility that was founded a few years ago in Limassol. The Centre, which initially started as a Private Oncology Hospital, currently employs 6 medical physicists in Radiotherapy, one medical physicist in Nuclear Medicine, one in Radiology and one medical physicist in IT. The centre is considered an Elekta Reference Site and RTSafe Centre of Excellence. The Medical Physics Department of the German Oncology Centre performs daily stereotactic quality assurance and ensures high quality plans which are produced within an average of less than 2 days. Deliveries are confirmed with Per FRACTION and EPID dosimetry, for every fraction of each patient. The Medical Physics Department of the German Oncology Centre performs all the necessary calibrations and Quality controls in order for the department to be accredited by the EANM (European Association of Nuclear Medicine) initiative to harmonize quantification in nuclear medicine imaging, as a

PET/CT Centre of Excellence for 18F Standard 1 & 2 (taking part in European studies along with other EARL accredited PET/CT Centres) and attested by QIBA (Radiological Society of North America initiative to unite researchers, healthcare professionals and industry to advance quantitative imaging and the use of imaging biomarkers in clinical trials and clinical practice), while offering a plethora of 18F labelled radiopharmaceuticals, many of which the department was amongst the first departments to offer. In terms of Radionuclide Therapy, the department offers support in forms of MPE and RPE for the safe and effective delivery of a variety of Radionuclide Targeted Therapies Benign and Malignant Thyroid diseases including high doses for bone metastases of patients' treatment.

Having in mind the increased need of treatments and diagnosis of cancer patients, as well as the importance of having highly educated professionals to deal with this situation, the Medical Physics profession appeals to several students of the island, who are currently searching for an applied science profession in medicine.

Erato Stylianou Markidou is a Medical Physics Expert currently working at the Bank of Cyprus Oncology Centre, Nicosia, Cyprus. She obtained her Bachelor's degree in Physics from the University of Cyprus in 2001 and graduated from Wright State University, OH, USA in 2003 with a Master of Science degree, concentrating in Medical Physics, with honours. She has been working with radiation therapy treatment planning and quality assurance and commissioning of radiotherapy and diagnostic equipment in a very busy department for the last 18 years. She is the Chair person of the Communication Committee of EURAMED and she is the past President of CAMPBE. She is also the president of BRF (Biomedical Research Foundation) and a member of the Cypriot Medical Physics Registry Council. She has been a member of EFOMP's Communications and Publications Committee for the last three years.

Physica Medica: Editor's Choice



Prof. Iuliana Toma-Dasu, Editor-in-Chief of Physica Medica – European Journal of Medical Physics, presents her choice of recently published articles in this regular feature

For this Spring issue of EMP News, I selected the following three articles, recently published in Physica Medica (EJMP), which particularly attracted my attention.

T. Ligonnet et al **Simplified patient-specific renal dosimetry in 177Lu therapy: a proof of concept** Phys. Med. 2021;92 :75-85 https://doi.org/10.1016/j.ejmp.2021.11.007

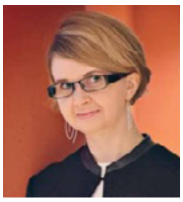
This study presents a methodology for radionuclide dosimetry based on multiple time point acquisitions using an external probe complemented by a single quantitative SPECT/CT acquisition of the abdominal region that could potentially be applied for patient-specific treatment optimization for renal dosimetry in 177Lu peptide receptor radionuclide therapy and prostate-specific membrane antigen treatments. Despite the fact that it is only a proof of concept at this stage, the method presents some challenges with respect to its translation to the clinical setting. However, this simplified procedure to estimate the patient-specific kidney half-life in peptide receptor radionuclide therapy from external dose rate measurements proved to be accurate and presented potential benefits in terms of clinical workflow and patient comfort if clinically implemented.

K. Yasui et al **Evaluating the usefulness of the direct density reconstruction algorithm for intensity modulated and passively scattered proton therapy: Validation using an anthropomorphic phantom** Phys. Med. 2021;92 :95-101 https://doi.org/10.1016/j.ejmp.2021.11.008

In this technical note, the authors compare the DirectDensity (DD) and the Filtered Back Projection (FBP) algorithms with respect to the robustness to variations in the CT imaging conditions and their impact on the dose distribution. The DD was proven to be more robust with respect to variations in the CT imaging conditions than the FBP. This may promote the DD algorithm since it offers a more effective choice for a robust workflow that potentially reduces the uncertainties in proton range calculations and could have a meaningful contribution to proton radiotherapy development.

H. Cook et al **Development of a heterogeneous phantom to measure range in clinical proton therapy beams** Phys. Med. 2022;93 :59-68 https://doi.org/10.1016/j.ejmp.2021.11.006

The proton range determination in proton radiotherapy was the reason of concern in this third study, as it might be a source of uncertainty in proton therapy, which is why I have chosen to highlight it as well. This work introduces a bespoke Range Length Phantom (RaLPh), allowing independent determination of the proton range in tissue. It is actually very interesting and it has a lot of potential for use in dosimetry audits. The results suggests that the use of this heterogeneous phantom with radiochromic film for dose measurements can offer a verification method for the range of clinical proton therapy beams.



Iuliana Toma-Dasu, Editor-in-Chief of Physica Medica – European Journal of Medical Physics

EFOMP COMPANY MEMBER ARTICLE

GE Healthcare: VolumeRAD™ Digital Tomosynthesis against Covid-19

The last two years, during the Covid pandemic, chest x-ray has been proved an important tool in detecting pneumonia and for close monitoring of patients. However, many hospitals around the world, such as the Morales Meseguer General University hospital in Murcia, Spain, faced the big challenge of the high volume of patients coming into the ED with Covid-19. In order to depict subtle lung nodule opacities consistent with Covid-19, that were not visible with chest x-ray and to exclude inconclusive findings, GE Healthcare's VolumeRAD™ Digital Tomosynthesis was the technique of choice so as to improve clinical diagnosis. Tomosynthesis helped to distinguish mild respiratory issues from moderate-to-severe respiratory cases based on the absence or presence of pulmonary dysfunction or opacities. If pneumonia was ruled out, they let the patient return home to isolate and thus avoid hospitalization. This helped to manage capacity pressures across the whole hospital.

The pathway of suspected pneumonia using the Covid-response 'high-resolution radiology service' is illustrated in green in Figure 1.

Since starting the VolumeRAD™ Digital Tomosyntheis technique, the volume of patients assessed in the ED dropped dramatically. This helped to reduce the risk of cross infection by separating Covid and non-Covid patients. A maximum of 42 patients per day were assessed during the first wave using VolumeRAD™, with 74% of patients with normal chest X-rays and oximetry able to return home without needing to go to the ED. By the third wave we reached 80 patients in one day (Figure 2).

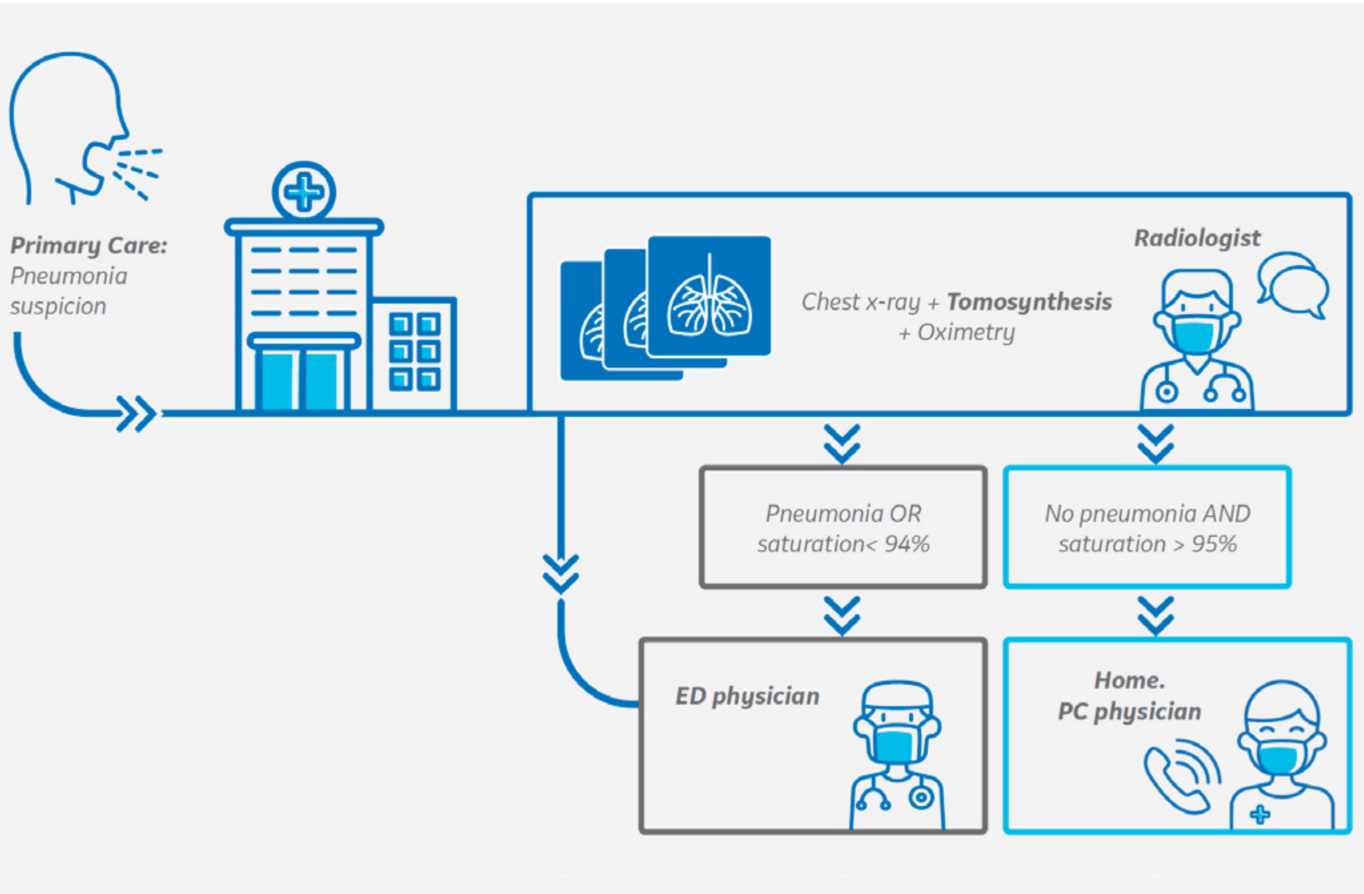


Figure 1: Care pathway illustration – from primary care, radiological investigation through to diagnosis and home discharge or hospital admittance using a dedicated high-resolution radiology service

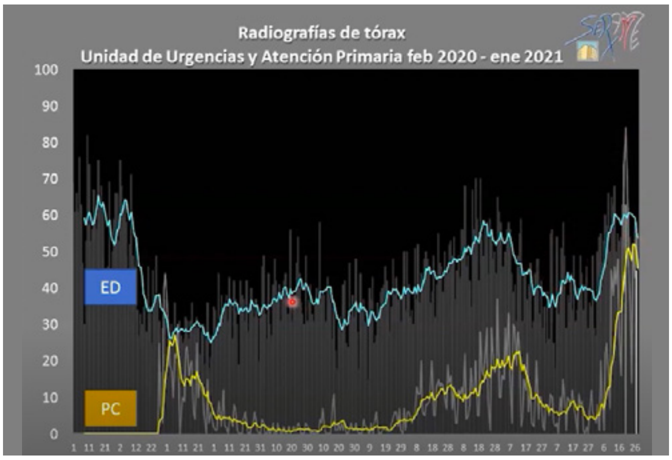
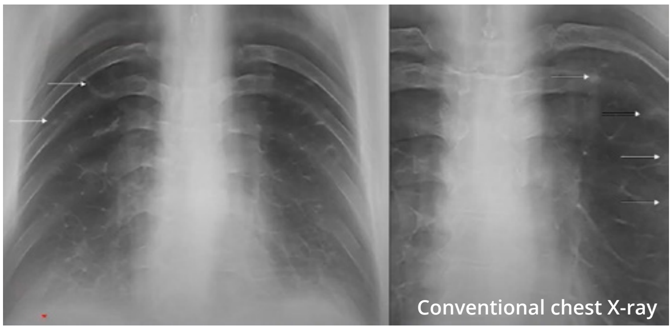


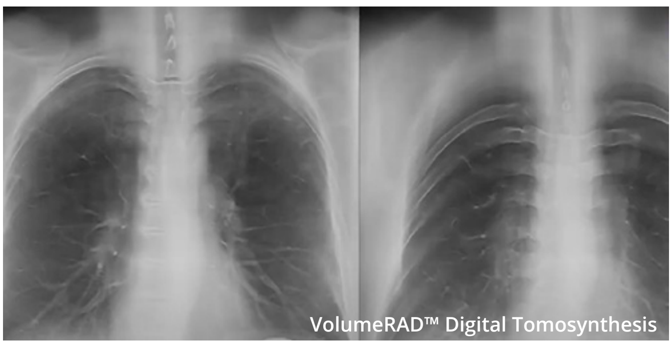
Figure 2: Number of patients taking ED (blue) and Covid-response high-resolution radiology service (yellow) pathways

VolumeRAD™ Tomosynthesis in action

The high-resolution service gave relief to ED capacity – and they were able to rule out Covid-related pneumonia and therefore avoid ED overload. The time for a patient to be seen via VolumeRAD™ was 5.6 times shorter than patients arriving in the ED, regardless of originating at home or as ED inpatient. Furthermore, the high-resolution service did not result in any radiological delays for patients arriving at the ED, who were also assessed by chest X-ray and tomosynthesis. The benefits of using VolumeRAD™ Tomosynthesis to manage the crisis were extensive, helping the hospital staff to confidently and accurately diagnose or rule out pulmonary opacities. In the first case, when using traditional chest X-ray, the presence of abnormalities is doubtful. However, with tomosynthesis the image shows an extensive involvement with small multifocal bilateral opacities which are difficult to detect in a chest X-ray.

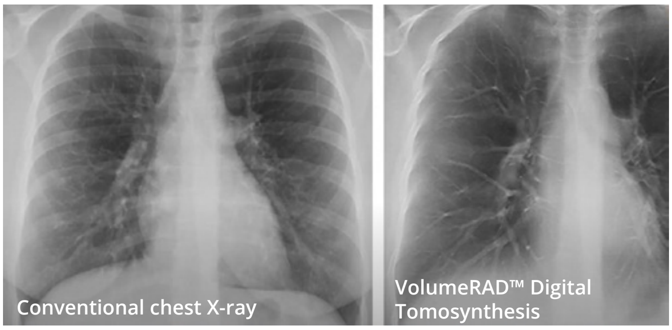
CASE 1:





CASE 2:

Other details more evident in tomosynthesis to confirm or rule out Covid-19 includes visualization of honeycomb patterns in the posterior lower lobes, very typical of Covid-19 infection; or 'tree in bud' patterns that are common of bacterial infections spreading into the airways that can help diagnose pneumonia.



GE Healthcare's VolumeRAD™ Digital Tomosynthesis technique can reduce time-to-diagnosis with a 6 min exam performed at the same time, same location, same equipment, immediately after any inconclusive X-ray. It helps reduce the need for additional CT imaging by 80% and can deliver 75% less dose than a chest CT.

It improves clinical diagnosis by removing overlying structures, enhances local tissue separation and provides in-depth information not only for chest exams but for many other structures of interest.

To learn more about VolumeRAD™ Digital Tomosynthesis click here:
https://www.gehealthcare.com/products/radiography/advanced-applications/volumerad

To learn more about the new Clinical Indication of VolumeRAD™ click here:
https://www.gehealthcare.com/products/radiography/advanced-applications/new-clinical-indication

Foteini Popota, PhD., Product Sales Specialist Mammography & X-ray.
Dr. Popota holds a PhD in Biomedicine from the University of Pompeu Fabra in Barcelona, Spain, an MSc in Medical Physics and an MSc in Biomedical Engineering from Surrey University, UK.
She gained her experience working in IAT/CRC Centre of Molecular Imaging – PRBB, Barcelona, as a clinical researcher in PET small animal imaging and as a Sales and Application Specialist in x-ray, mammography and bone densitometry in BIOTEX S.A., Athens, Greece.

UPCOMING EVENT

EUTEMPE Atelier – 17th August, Dublin, Ireland

EUTEMPE has something new in store for medical physicists interested in a day packed with in-depth knowledge and practical solutions for problem solving in the fields of dosimetry, equipment, and leadership in medical physics

The EUTEMPE Atelier is a satellite meeting of ECMP2022. It will immerse the participants in real-life realistic problem situations in an imaginary radiology department of a hospital. They will not only gain in-depth knowledge, but also field-specific problem-solving and presenting skills, because in their jobs, only having knowledge is not enough to be successful when facing complicated problems.

Three seasoned experts – Hilde Bosmans, Martin Fiebich, and Carmel Caruana – will share their knowledge and will coach the participants on how to find solutions by applying more in-depth knowledge and understanding of the topics. The participants will work on solutions in small teams in the afternoon, and will present them at the end of the day to the board of the hospital, who will provide them with feedback on both their teams' solutions and presentations. The hospital board will be represented by esteemed medical physicist John Damilakis and Danielle Dobbe-Kalkman, who will also be the chair of the day.


Hilde Bosmans


Carmel Caruana


John Damilakis


Danielle Dobbe-Kalkman


Martin Fiebich

With this format the EUTEMPE Atelier offers an experience that is all about knowledge sharing, practical problem-solving, and teamwork.

The event has room for a maximum of 40 participants.
You can register for this event on the official ECMP2022 website soon.

Danielle Dobbe-Kalkman,
is a Senior Learning Specialist at the LRCB, the Dutch Expert Centre for Screening, and the educational expert of the EUTEMPE consortium. She regularly presents on tactics to improve educational efforts and assists with the design of courses to enhance their didactic value. Danielle sits on the Editorial Board of EMP News as an Advisor.

EUTEMPE Atelier
August 17, 2022
Dublin, Ireland

EUTEMPE organizes a day-long simulation around practical high-level problem-solving in a fictional clinic. In this EUTEMPE Atelier participants will experience a problem situation that they can safely learn from, without actual consequences (except learning a lot!), and with a lot of valuable feedback from top-level experts in the fields of QC protocols, leadership, and dosimetry. This one-day event will be accredited by EBAMP (European Board of Accreditation for Medical Physics).

Faculty

Hilde Bosmans University Hospital of Leuven, Belgium
Carmel Caruana University of Malta, Malta
Martin Fiebich University of Applied Sciences of Giessen, Germany
John Damilakis University Hospital of Crete, Greece
Danielle Dobbe Dutch Expert Centre for Screening (LRCB), The Netherlands

Time-table

August 17	Title	Description	Lecturer
8:00-9:00	Registration		
	Scene setting		
9:00-9:20	Welcome & Introduction	Welcoming, scene setting, concise presentation of the complex cases (problems) in the clinic.	Danielle Dobbe (NL)
9:20-9:30	Preparation time	Participants have some time to analyze the cases and prepare questions for the four experts (in pairs).	All
	Expert carousel		
9:30-10:20	QC protocols	Presentation and examples of problem solving regarding QC protocols, plus time for questions from the participants	Hilde Bosmans (BE)
10.20-10.40	Coffee break		
10:40-11:30	Leadership	Presentation and examples of problem solving regarding leadership, plus time for questions from the participants	Carmel Caruana (MT)
11:30-12:20	Personnel dosimetry	Presentation and examples of problem solving regarding dosimetry, plus time for questions from the participants	Martin Fiebich (DE)
12:20-13:00	Lunch break		
	Group work		
13:00-14:30	Problem solving time	Participants are divided over the three different specialisms and will prepare a solution from that perspective, as well as a (ppt or poster) presentation to present their solution to the board of the clinic. The experts are present to coach the groups.	All

	Group presentations		
14.30-14.45	Coffee break		
14:45-17:00	Group presentations	Each group has 10 minutes to present their solution for 'the Board'. The board and the experts will provide feedback to each of the groups. Feedback will also be provided regarding the presentation itself and the way of presenting.	All

Further information

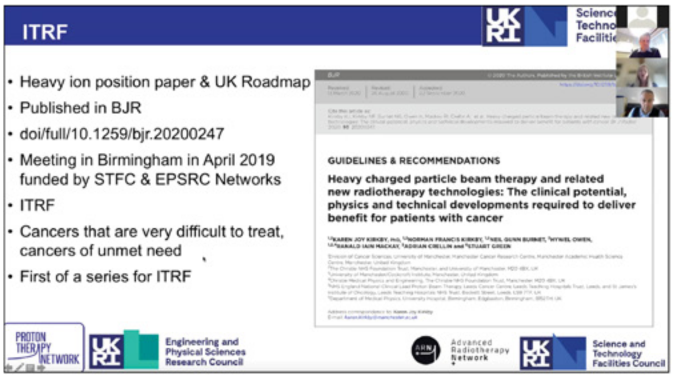
Course language	English
Level	MPE – Level 8
Maximum number of participants	**40**
Duration	**17th August 2022**
Study load	6.5 hours of lectures and group work

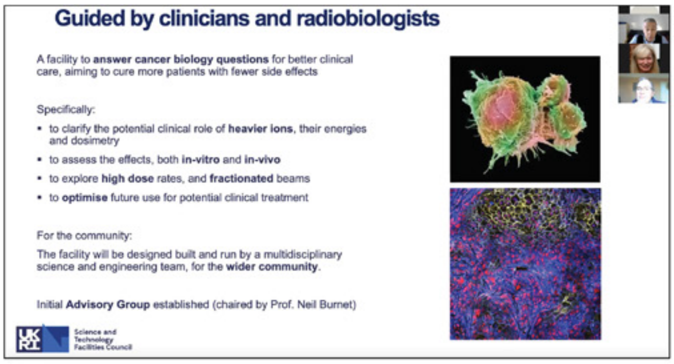
EFOMP EUROPEAN FEDERATION OF ORGANISATIONS FOR MEDICAL PHYSICS
iapm Irish Association of Physicists in Medicine
Fāilte Ireland National Tourism Development Authority
MEET IN IRELAND

MEETING REPORT

The UK Ion Therapy Research Facility virtual meeting

This online meeting was held on January 13th 2022 to discuss a potential Ion Therapy Research Facility (ITRF) for the UK. It was organised by Prof Karen Kirkby (University of Manchester and The Christie NHS Foundation Trust) and Prof Jason Parsons (University of Liverpool and Clatterbridge Cancer Centre), who write about it here.



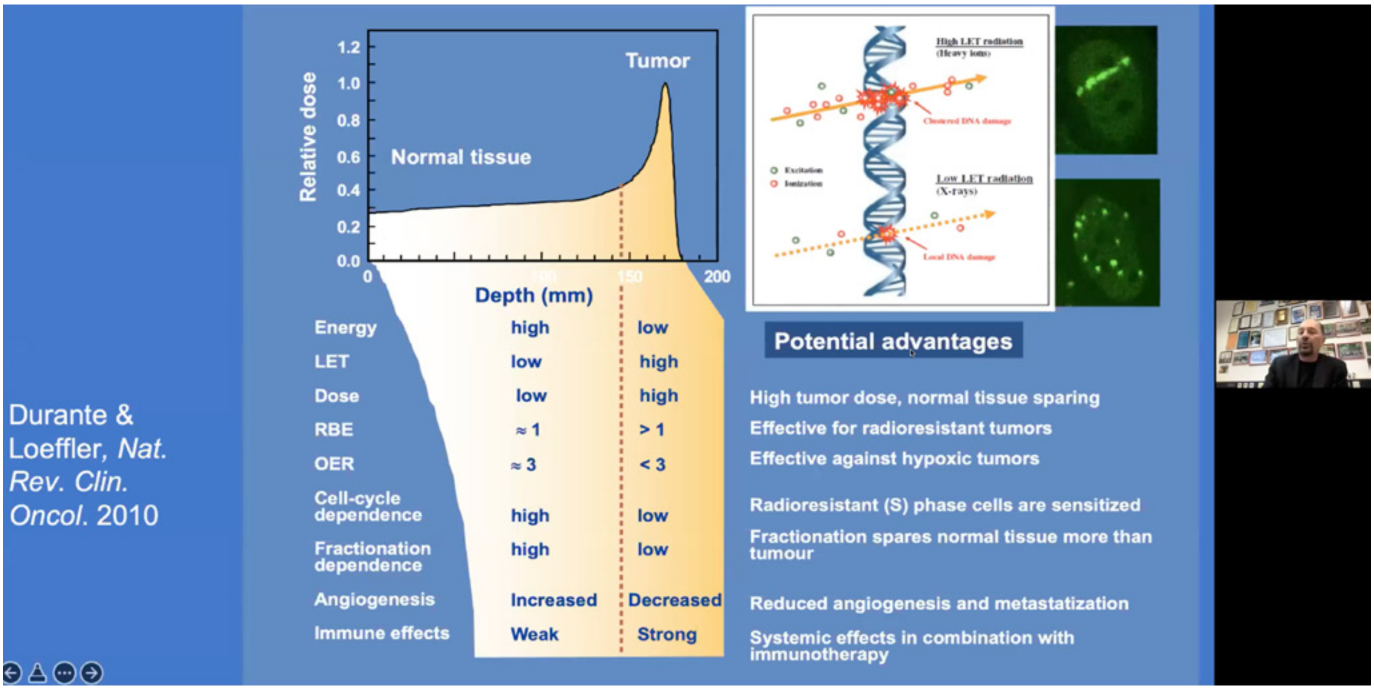


The meeting followed a meeting in Birmingham organised by the STFC Advanced Radiotherapy Network and EPSRC Proton Therapy Network in April 2019 which produced a position paper, road map and options for such a facility. This was published in the British Journal of Radiology in 2020 [1].

The meeting was introduced by Dr Massimo Noro from STFC's Daresbury Laboratory, where he described a proposal for a transformative Ion Therapy Facility which is being developed through STFC. This was followed by a talk by Professor Ken Long from Imperial College on the potential long-term opportunities for including laser driven ion accelerator technology as part of such a facility. Prof Karen Kirkby then talked about her team's work building a proton therapy research capability in the NHS clinical proton therapy centre at the Christie and the insights this gave into developing the research capabilities for the ITRF. She also went on to show some of the experimental results for both protons and ultra-high dose rate (FLASH) proton irradiation. Prof Jason Parsons then showed some of his Group's work examining the radiobiology of low versus high LET protons using head and neck tumour models at Clatterbridge, and the discoveries of the key cellular proteins and pathways that control tumour cell survival, particularly in response to high-LET radiation. This research can provide insights into the associations of work with heavier ions.

The next talks were from Professor Oliver Jäkel from the German Cancer Research Centre and Professor Marco Durante from GSI in Germany. Oliver discussed the translational research opportunities for heavy ions and the ion species that were available for treatment and research (including clinical trials). Oliver has over 10 years of experience in the clinical ion therapy facility in Heidelberg (HIT), where there is a comprehensive programme of physics and biological research to underpin the work of the clinical facility. Marco then outlined how biological studies with heavy ions can be translated towards the clinic. Marco's talk was wide ranging and also contained his Department's very latest results using heavy ion (C) FLASH, indicating that this may cause a reduction in metastatic disease.

The focus of the meeting then turned to accelerator technologies for ion therapy with a talk from Dr Maurizio Vretenar from CERN. He discussed the developments of the next generation of ion therapy equipment. This included more compact accelerators and gantries and collaboration with groups across Europe who are looking to develop ion therapy centres using this technology.



Dr Jeff Buchsbaum from the US NIH then spoke on high LET radiotherapy past and present, with a focus on the work they are funding in this area, including that led by Prof Jason Parsons. The final talk of the day was by Dr Yolanda Prezado on spatially fractionated radiotherapy. Similar to FLASH, spatially fractionated radiotherapy is a hot topic in radiotherapy and appears to spare normal tissue while still suppressing tumour growth. Yolanda's talk also looked at the possible opportunity for using heavier irons to deliver specially fractionated radiotherapy, which was a perfect conclusion to a really interesting afternoon.

Over 240 people registered to attend this virtual meeting and, as it was recorded, it was available to those who couldn't attend "live" to catch up later. We'd like to thank all of the speakers for their excellent and thought-provoking talks. They really did give fantastic overview of the international perspective of the current status of ion therapy. We would also like to thank all of those who attended and participated in the lively discussions during the afternoon. This is planned to be the first in a series, particularly as the ITRF continues to develop. We hope you will be able to attend future meetings, so please watch this space.

Professor Karen Kirkby
leads research in proton therapy and FLASH radiotherapy research between the University of Manchester and The Christie NHS Foundation Trust. Karen has a research grant portfolio of over £28 million from a range of funders, charities, and industry. She has over 200 publications, including Nature. Karen has also written for popular science magazines and the broadsheets. Her group's work is featured in the Science Museum's Cancer Revolution exhibition.

Professor Jason Parsons
is the University of Liverpool's Chair in Radiation Biology and the Clatterbridge Cancer Centre's Honorary Lead of Radiobiology Research. His research is focussed on the molecular and cellular biology of ionising radiation, particularly proton beam therapy and other high-LET radiation. He has published >60 peer-reviewed publications/reviews in the field (H-Index: 29), and acquired ~£6M grant funding, including from North West Cancer Research (NWCR), the Medical Research Council (MRC) and the National Institutes of Health (NIH).

Reference

[1] Kirkby K J, Kirkby N F, Burnet N G, Owen H, Mackay R I, Crellin A, Green S "Heavy charged particle beam radiotherapy and related new radiotherapy technologies: the clinical potential physics and technical developments required to deliver benefits for patients with cancer" Br J Radiol. 93(1116): 20200247 (2020) https://doi.org/10.1259/bjr.20200247

EFOMP COMPANY MEMBER ARTICLE

Standard Imaging: Plastic Scintillation Detectors and the Road to Clinical Use

In the search for water-equivalent detectors, researchers have long pursued the idea of active scintillation dosimeters. Plastic scintillators in particular have demonstrated water equivalence in megavoltage beams, thereby avoiding the additional corrections required to account, for instance, for air in ionization chambers or high-density materials in diodes that are present right at the point of measurement. As ever smaller fields became desirable for stereotactic treatments, use of traditional detectors became increasingly complex, since confounding factors such as changing beam quality with decreasing field size now had to be considered. Here again, the size of scintillators offered an intriguing option.

So why were no commercial scintillators available until Standard Imaging released the Exradin W1 in 2014?

Organic scintillators produce visible light when irradiated. The amount of light produced is directly proportional to the dose delivered to the scintillator. This light is transmitted through an optical fibre to a detection system that converts the visible light into electrical current, again directly proportional to the amount of radiation delivered to the scintillator. So far so good.

The difficulty with scintillators, and the primary factor that hindered commercialization despite their long history in the research sphere, is the stem effect caused by the production of Cerenkov light in the optical transfer fibre. Since Cerenkov light also falls within the visible spectrum, it overlaps the light produced by the scintillator itself and adds an undesirable stem effect signal. Eliminating this signal with techniques like two-fibre methods or hollow fibres came with its own difficulties. The second fibre in the two-fibre method is offset from the measurement fibre and may not receive identical dose, particularly in steep dose gradients. Hollow fibres introduced an air cavity close to the measurement location.

In 2011, Guillot et al. published a manuscript [1] describing a two-colour chromatic method for Cerenkov removal, which greatly simplified the Cerenkov correction and enabled Standard Imaging to develop the Exradin scintillation detectors. This method relies on the stability of the shape of the Cerenkov spectrum as the amount of fibre in the field changes. If two measurements are made with identical dose to the scintillator but different lengths of optical fibre within the field, the only changes in the measured composite spectrum are due to the Cerenkov signal. By splitting the measured signal into two portions, call them Blue and Green, the relative changes in the integrated signal in each of these regions can be attributed solely to Cereknov. A correction factor, called the Cerenkov Light Ratio (CLR) is generated based on the changes in the measured signal in those two regions.

$$CLR = (Blue_{MAX} - Blue_{MIN})/(Green_{MAX} - Green_{MIN})$$

Where $Blue_{MAX}$ and $Green_{MAX}$ are blue and green channel signals with the maximum amount of fibre in the field, and $Blue_{MIN}$ and $Green_{MIN}$ are the blue and green channel signals with the minimum amount of fibre in the field.

Using this known relationship, subsequent measurements can be corrected for Cerenkov using the CLR factor.

$$M = Blue - (Green*CLR)$$

Where M is the corrected measurement, and Blue and Green are the integrated signals from the corresponding portions of the spectrum.

A proportional amount of the green signal is subtracted from the blue signal, and what is left is the scintillator signal itself. The correction can be performed rapidly: for scanning measurements, the Exradin W2 system takes in the raw optical signal, applies the Cerenkov correction, and converts the corrected signal into a proportional electronic current that can be read by a water tank electrometer.

So while small fields are still daunting to most physicists, the availability of commercial organic scintillator detectors have greatly simplified the process of small field dosimetry.

Reference

[1] M. Guillot, L. Gingras, L. Archambault. "Spectral method for correction of the Cerenkov light effect in plastic scintillation detectors: A comparison study of calibration procedures and validation in Cerenkov light-dominated situations." Med. Phys. 38(4); 2140-2150 (2011). DOI: 10.1118/1.3562896

Shannon Holmes, Ph.D., is a Medical Physicist with Standard Imaging. She obtained her graduate degrees in Medical Physics from the University of Wisconsin – Madison, and bachelor's degree in Physics from the University of Puget Sound in Tacoma, WA, USA.

BOOK REVIEW

Book Review: "Shielding Techniques for Radiation Oncology Facilities (3rd Edition)" by Melissa Martin and Patton H. McGinley

Medical Physics Publishing, 3rd edition (2020), 169 pages. Hardcover: ISBN 9781951134006, eBook: ISBN 9781951134013, 90$ (both versions). Link to book on publisher's web site.

Book cover, reproduced with permission from the publisher. © Medical Physics Publishing (2022)

Design and calculation of shielding for radiation oncology facilities is not an everyday task of a medical physicist. This book is dedicated to providing profound knowledge to accomplish this task. After the first edition in 1998 and the second in 2002 by Patton H. McGinley, this updated edition is now co-authored by Melissa Martin. The book is divided into 9 chapters with an appendix listing necessary data in tables as well as information about common barrier materials. The information and calculation examples given in this book are mainly based on the NCRP 151 (2005) recommendations, that use TVL (Tenth Value Layer)-thicknesses of the shielding materials with respect to the type and energy of the radiation as well as the workload factor W and the use factor U of the machine and the occupancy factor T and shielding design goal P for the allowed dose.

After an introductory chapter on the history of X-ray room shielding, chapters 2 and 3 are dedicated to the design of a "conventional" barrier and maze which means for X-rays up to 6 MV (including modern FFF-techniques), where no extra shielding for photo neutrons is necessary. This is the subject of chapter 4 which gives basic physical information about the production and activation of materials due to neutron radiation. Chapter 5 is on the special shielding design needs for mazes and doors to cope with photo neutrons and accompanying capture gamma rays. Chapter 6 picks up again the topic of photo neutron production but now with special attention to barrier materials and sandwich constructions. The design of chapter 7 is kind of a mix of special topics regarding skyshine and scatter, Ozone production and air activation, Atriums and high-density concrete as well as a long list of modern specialized accelerators for radiotherapy like the Accuray CyberKnife and TomoTherapy, Varian Halcyon and Ethos, ViewRay MRIdian, Elekta Unity, RefleXion, and finally for completeness, shielding for superficial and orthovoltage treatment rooms. In this reviewer's opinion, this would perhaps have been better divided up at least into two subchapters on special aspects for shielding and another on treatment machines. Or maybe even better, the selection of modern treatment machines might have been combined with chapter 8 on high-dose-rate brachytherapy, Gamma Knife and GammaPod and moved into a chapter of specialized treatment machines of its own. The last chapter 9 is about the systematic process list of the shielding design and the radiation protection survey to be done once the construction is realized.

The great value of this book is the number of shielding calculation examples that accompany each topic discussed. From the perspective of a course teacher, I would have liked some explicit calculation exercises with solutions given either in the back of the book or on a website of the publisher to train not only students but the reader themselves who is faced with a shielding design for the first time. Especially this group of readers will love chapter 9 with the structured template for the shielding design evaluation and radiation protection survey report. Numerous drawings of typical treatment room layouts, as well as formulae are found in the text, which together with material information given in tables in the text but more generally in the appendix render this book very useful for students and each medical physicist confronted with the task to layout or even just check the shielding design of a new treatment room.

An important note to conclude this book review:

The shielding design concept of NCRP 151(2005)described in this book differs from e.g. DIN 6847(2021) as the NCRP concept distinguishes between the first and subsequent TVL of the barrier as well as it takes into account the slant angle of the radiation in the barrier, while the DIN concept uses only one TVL for each barrier material and only the thickness perpendicular to the surface of the barrier in calculations since scattered radiation from oblique entering radiation would exit the barrier with a shorter path length which will reduce the shielding effect of the barrier to some extent.

Prof. Dr. Markus Buchgeister, Berliner Hochschule für Technik Berlin, Germany

Markus Buchgeister entered the field of medical physics in radiation therapy at the university clinic of Tübingen in 1995. In 2010, he received a call for a position as professor for medical radiation physics at the Berliner Hochschule für Technik (university of applied sciences and technology) at Berlin. Since 2003, he is engaged as co-opted DGMP board member for public relations and communications of the German Society for Medical Physics. Parallel, he served as chairman of the EFOMP Communication and Publications Committee 2003-2009 and from 2009-2015 as German EFOMP delegate. In 2017-2018 he was chairman of the EFOMP Education and Training Committee and is now German EFOMP delegate for a second round.

EFOMP COMPANY MEMBER ARTICLE

Varian: Less Downtime, More Insights with Varian Smart Services

varian
A Siemens Healthineers Company

Introduced in 2021, Varian's Smart Services is helping busy clinics reduce their downtime. In fact, Varian's data show that, with predictive and proactive service, a clinic can avoid some 3.6 hours of downtime per incident than would otherwise be the case. In addition, by using Smart Services, Varian is able to resolve 65% of service cases remotely. Through 24/7 remote monitoring, a powerful digital analytics platform, and a vast network of more than 2,000 continually trained support experts, clinics that choose Smart Services are completing an average of 95% of patient treatments without disruption.

Smart Services combines innovative technology, data intelligence, and personalized support from a global network of more than 2,000 Varian experts to optimize Varian systems and help clinics improve operational efficiency. Unlike third-party service contracts, Smart Services uses proprietary technology to provide clinics with valuable insights, alerts, and system diagnostics that can save valuable time.

SmartConnect Plus, powered by the ViDA digital analytics platform

Smart Services uses SmartConnect® Plus, which synthesizes anonymized and aggregated machine performance data using Varian's ViDA™ analytics platform. ViDA comprises more than 300 artificial intelligence (AI) and machine learning (ML) models constantly processing historical logs and configuration files and accessing Varian's vast knowledge base. Varian engineers use the output to provide data-driven services, such as predictive maintenance, proactive service, and actionable insights to increase operational efficiency and productivity.

"The ViDA platform gives us both historical analysis, which we can use to help clinics improve machine performance and workflow efficiency, and real-time alerts on certain kinds of faults that could have an impact on patient care," explains Brett Williams, Varian district service manager for the northeastern United States. "For instance, if the power goes out over the weekend at a clinic, I can let the physicist know in time to bring the machine back up before Monday morning's patients start arriving."

Superior support for a remote treatment center

For Jim Miller, director of the radiation oncology department at Penn Highlands DuBois, 24/7 remote service was the driving force behind choosing Varian Smart Services rather than a third-party vendor. Penn Highlands Dubois is a somewhat remote facility in Pennsylvania with service engineers often over an hour away, and patients who sometimes travel longer to receive care. Before Smart Services, even the smallest fault could cost the clinic a day's downtime, more if a new part needed to be shipped.

"Now we have Smart Services, our reps are telling us we have a potential problem before we know it," Miller says. "For instance, one day a part showed up out of the blue and the service rep called to say he'd noticed we'd been having couch faults. He'd already ordered a corrective part and was arriving that evening to install it. Previously, that would have cost us at least a day of downtime."

Proactive maintenance

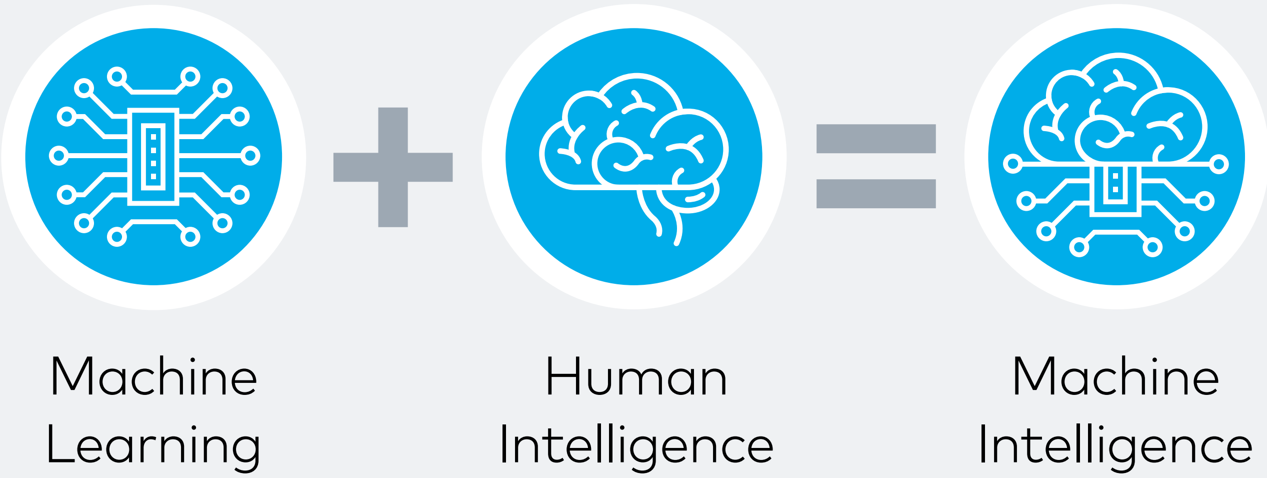
In addition to remote monitoring, Smart Services enables proactive maintenance. Running historical machine data through ML algorithms and constantly evaluating system performance enables Varian to predict failures, detect degradations months in advance, and alert the field service team to plan the required maintenance before any fault occurs.

"Smart Services is a team approach. Everyone in Varian's field service team has access to the data, so other experts can troubleshoot an issue while someone is on the road responding," Williams says. "Often, a service rep will have the answer or plan ready when they walk on site. There's so much we can do without ever being in front of the machine."

A version of this article previously appeared in Centerline, Varian's online magazine for the clinical oncology community

Julie Jervis is a California-based science and technology writer. Her articles have appeared in magazines and websites around the world, covering a diverse range of medical and technology topics, and her book, 'The World Beneath Their Wings', follows the careers of leading women in aviation. In addition to editorial roles in the private sector, her background includes working for the World Health Organization, the International Maritime Satellite Organization, and NASA Ames Research Center.

ECLIPSE 16



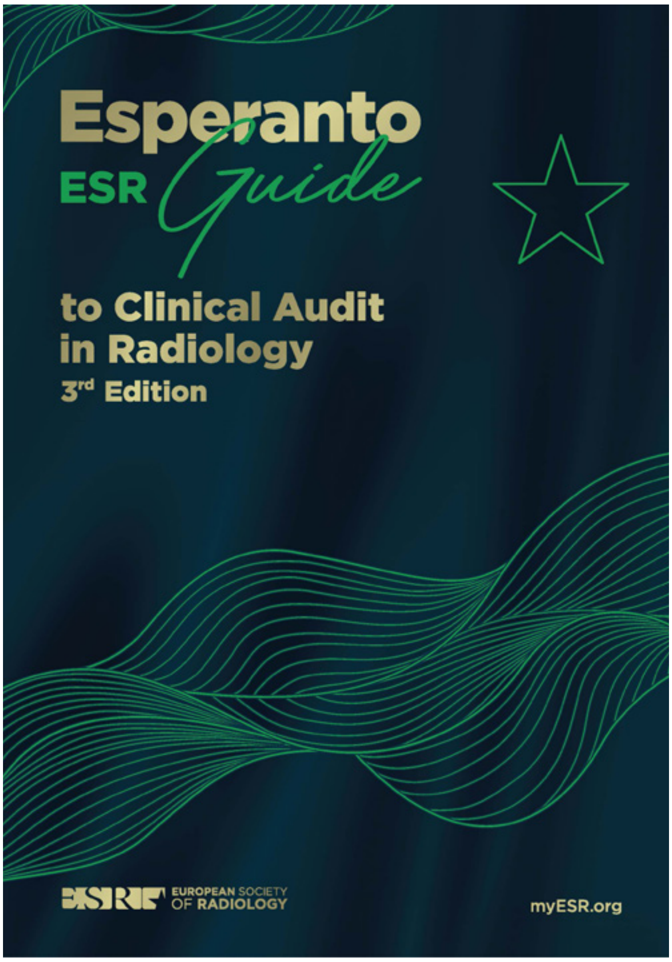
ECLIPSE 16 | When considering treatment planning systems, it's important to be able to quickly create optimal, concise patient treatment plans. RapidPlan™ combined with MCO harnesses the power of machine learning combined with human intelligence to provide high quality individual plans with an efficient workflow. Collaborating with your peers using RT Peer Review allows you to further refine your patient treatment strategy. Eclipse™ RT Peer Review, RapidPlan and MCO give you the tools to confidently create the optimal plans quickly and with more certainty.

To learn more, visit us at Varian.com/Eclipse

PARTNER ORGANISATION ANNOUNCEMENT

ESR Guide to Clinical Audit in Radiology

Developed under the guidance of David Howlett, Chair of the European Society of Radiology's Audit and Standards Subcommittee, and Núria Bargalló, Chair of the ESR Quality, Safety and Standards Committee, the ESR Audit and Standards Subcommittee is proud to present the updated 3rd Edition of Esperanto, ESR Guide to Clinical Audit in Radiology.



An important tool of clinical governance, clinical audits have emerged in the late 1990s as a concept within modern healthcare. They can be used to improve patient care, safety, experiences, and outcomes.

The third edition of Esperanto offers an enhanced clinical audit guide and an expanded section of audit templates that can be implemented to meet mandatory requirements, especially in regards to radiation protection and BSSD compliance (BSSD – Basic Safety Standards Directive). A Clinical audit as part of BSSD compliance is mandatory and subject to inspection and a key aim of Esperanto is to support radiology departments in this area. Additionally, QuADRANT – an ESR-led clinical audit-related initiative on behalf of the European Commission is also reviewed and its implications discussed.

This guide is designed to provide further awareness and understanding of radiology clinical audits within European radiology departments and to support such departments in developing effective clinical audit processes and practices. As part of this guide, different types of clinical audits are also discussed and defined - such as self-assessment/internal auditing, external auditing, and internal auditing under external supervision.

Using Esperanto as an audit guide and tool, radiology departments will be able to incorporate clinical audits into their working practices, with special attention being paid to implementing regulatory requirements and supporting the auditing process.

Originally published in 2017, the Esperanto booklet was named after the most successful constructed language in the world, Esperanto, created by the Polish ophthalmologist Ludwik L. Zamenhof.

The ESR would like to take this opportunity to also thank EFOMP, in particular Marta Sans Merce, EFOMP representative in the ESR Audit and Standards Subcommittee, for their contributions in the development of the 3rd Edition of Esperanto.

Professor David Howlett is a Consultant Radiologist based in the UK, he is a past Chair of the UK Royal College of Radiologists' Clinical Audit Committee and is current Chair of the ESR Audit and Standards subcommittee. He has led and published numerous national UK audits and surveys and audits on behalf of the ESR. He is project lead for QuADRANT, an important European clinical audit uptake and implementation project on behalf of the European Commission The project is led by the ESR working in collaboration also with ESTRO, the European Society of Radiotherapy and Oncology and the EANM, the European Association of Nuclear Medicine.

ESMPE European School for Medical Physics Experts

EFOMP PET/CT and PET/MR Quality Control Protocol

August 17, 2022

Dublin, Ireland

The school aims to illustrate the EFOMP PET/CT and PET/MR Quality Control Protocol. This one-day event will be accredited by EBAMP (European Board of Accreditation for Medical Physics) as CPD event for Medical Physicists at EQF Level 8 and is intended for practicing clinical Medical Physicists who are involved in Nuclear Medicine.

Faculty

Roberta Matheoud University Hospital Maggiore della Carità, Novara, Italy

Jaroslav Ptacek University Hospital Olomouc, Olomouc, Czech Republic

Marine Soret Service de Médecine Nucléaire, AP-HP Sorbonne Université, Paris, France

Time-table

17th August 2022 Wednesday	Title	Description	Lecturer
8:00-9:00	Registration		
Morning chairs: Roberta Matheoud (IT), J. Ptacek (CZ)			
	The bases for a guideline on QC on PET/CT and PET/MR		
9:00-9:30	Introduction/scope	How to setup a simple and feasible QC program starting from a survey	Roberta Matheoud (IT)
9:30-10:00	Routine manufacturer QC	The so-called "Daily QC" on PET, CT and MR components	Roberta Matheoud (IT)
	Auxiliary equipment, PET, CT and MR QC		
10:00-10:20	Routine QC on the auxiliary equipments	Radionuclide calibrators, weighing scales	Roberta Matheoud (IT)
10:20-11:00	Routine QC	PET scanners	Roberta Matheoud (IT)
11:00-11:30	Routine QC	CT scanner	Marine Soret (FR)

11:30-12:00	Routine QC	MR scanner	Marine Soret (FR)
12:00-13:00	**Lunch break**		
	'Practical' QC sessions		
Afternoon chairs: Roberta Matheoud (IT)			
13:00-14:00	QC on the PET component /I	'Hands on' the QC on the PET scanner: tutorial video for phantom preparation and acquisition setup	Jaroslav Ptáček (CZ)
14:00-15:00	QC on the PET component/II	'Hands on' the QC on the PET scanner: tutorial video for image analysis with home made software	Jaroslav Ptáček (CZ)
15:00-16:00	QC on the CT/MR component	'Hands on' the QC on the MR/CT scanner:	Marine Soret (FR

Further information

Course language	English
Level	MPE – Level 8
Maximum number of participants	**50**
Duration	**17th August 2022**
Study load	6 hours of lectures and demonstrations

The EFOMP Erasmus+ Traineeship Scheme

This exciting trainee scheme for undergraduate students is described in this article, which was contributed by:

Carmel J. Caruana, Medical Physics, Faculty of Health Sciences, University of Malta, Malta
Christoph Bert, Medical Physics, University Clinic Erlangen, Germany,
Kiki Theodorou, Medical Physics, Faculty of Medicine, School of Health Sciences, University of Thessaly, Greece,
Niall Colgan, Medical Physics, Faculty of Health Sciences, National University of Ireland, Galway, Ireland.

Introduction

The Erasmus+ scheme has been a game changer for education and training in Europe. The great majority of healthcare professions have schemes for their students and the prospect of having an experience at a foreign academic and/or healthcare organisation is considered one of the highlights of university undergraduate student life. Students simply love it and such an opportunity makes any programme and profession more attractive to students, hence increasing student numbers in the respective profession. Yet the Medical Physics profession has not done this in a systematic manner and on a European scale. This does not reflect well on the profession and the EFOMP Education and Training Committee decided to take up the challenge. There are several Erasmus+ schemes that one can adopt. For reasons explained later, we chose the Erasmus+ traineeship scheme. More information on the **Erasmus+ training scheme** can be found here https://erasmus-plus.ec.europa.eu/opportunities/individuals/students/traineeship-student. This year we have schemes from Malta, Germany, Greece and Ireland. For the following year, organizations from the Netherlands and France have already shown interest.

We look forward to more organizations welcoming students next year. Those who are interested should contact Carmel on carmel.j.caruana@gmail.com Let's turn this into a grand Europe-wide programme for our students! We guarantee that paperwork is at a minimum (just write to Carmel and he will explain). This will be a nice opportunity for you and your students!

Why did we choose traineeships?

We wanted to create a scheme that would attract undergraduate physics/engineering students to our profession. A traineeship would make it possible for physics/engineering undergraduate students to see what we do in our academic and/or clinical departments as opposed to listening to theoretical lectures. We wanted participants to see real world medical physics in action, meet medical physicists, network with young medical physicist from other countries and show them what life is like in the European Medical Physics family.

Principles guiding the EFOMP Erasmus+ traineeship scheme

Since we are all very busy, we wanted to design a scheme that follows a *"KEEP IT SIMPLE"* approach that:

(a) Leads to a MINIMUM DISRUPTION to the academic studies/examinations of students and MINIMUM DISRUPTION to busy academic / clinical departments. Unfortunately, students who travel abroad during the academic year tend to fall behind in their studies. We wanted to avoid this. We also wanted it to be relaxed for the students so that they could enjoy the cultural and other delights of the country where they would be visiting. Therefore, summer was the best time. There is usually a lull in activities both at universities and hospital clinical services in the summer (as many patients are on holidays) and people are more relaxed and would have some more time for the students.

(b) LEARNING OUTCOMES WILL BE VERY FLEXIBLE so that the trainees will simply join in and help out with whatever is happening in the academic department and/or hospital at the time of their visit. Hence, in the traineeship agreement, we just simply used: "Fundamental knowledge, skills and competences in academic and/or clinical medical physics and/or associated radiation protection for undergraduate physicists depending on the academic and/or clinical activities happening at the receiving department during the period of the mobility. Specific summary learning outcomes will be included in the text of the Traineeship Certificate awarded at the end of the mobility".

(c) THERE WILL BE NO COST FOR THE WELCOMING DEPARTMENTS. In fact, students apply for travel funds through the Erasmus+ scheme. There is no cost for the organisers at all.
(d) DOES NOT INVOLVE TRAINING PERIODS THAT ARE TOO LONG – we chose 60 days which is the minimum accepted by the Erasmus+ scheme. This makes the whole thing manageable. We wanted to avoid the whole semester exchanges (4 months) that are common and known to cause disruption.
(e) Is VOLUNTARY FOR THE STUDENTS WITH NO ATTACHED ECTS CREDITS as this would be more relaxed and would require minimum paperwork from students and medical physics staff. We decided not to attach ECTS credits to the scheme, as this would require again formal agreements between different universities and hospitals – which would, of course, mean tonnes of paperwork for busy medical physicists. We wanted that both organizers and participants to have an interesting yet calm and enjoyable experience.
(f) All insurances (travel, sickness, indemnity) are taken care of by the student and home institution.

HARMONISED structure of the traineeship programme
Again, we adopted a simple approach that would require minimum administration for both centres and students. The structure is given in the table below. Specific examples from Malta, Greece, Germany and Ireland are also given.

TIME	PROGRAMME
Week 1 Introductory Week (same for all traineeship centers)	Readings and tutorials on Medical Physics topics and the Medical Physics profession, the structure of the traineeship programme, programme requirements (e.g., attendance record, keeping of a diary of daily activities) and legal requirements (e.g., local safety rules, issuing of personal radiation safety monitor). Introduction to the department(s) and familiarization of the working environment(s).
Week 2 – 3 Placement 1	Academic department: Students will be required to carry out experimental work or prepare a research-oriented presentation or research paper or literature review under the supervision of an academic member of staff In MRI
Week 4 – 5 Placement 2	Academic department: Students will be required to carry out experimental work or preparation of a research-oriented presentation, research paper, or literature review under the supervision of an academic member of staff in electrical physiology measurement / Ultrasound imaging
Week 6 -7 Placement 3	Clinical Department: Diagnostic and Interventional Radiology Physics Presentations/readings and tutorials on Diagnostic and Interventional Radiology Physics. Follow the everyday clinical work on different diagnostic medical devices (CT, MRI etc). Keep track of scientific meetings and any other scientific work in the department.
Week 8 – end (11 days) Wrap-up Period (same for all traineeship centers)	Report writing and career guidance. Participants will be required to write a formal report about their experiences based on a diary of activities they kept during the entire traineeship. Participants will be advised of the variety of work and career opportunities in Europe.

Exemplars of programme from the early adopting welcoming institutions
1. University of Malta
- Department of host institution organizing the traineeship: Medical Physics, Faculty of Health Sciences
- Name of main contact at the host institution: Professor Carmel J. Caruana
- Email address of main contact at the host institution: carmel.j.caruana@um.edu.mt
- Maximum number of trainees that can be accepted: 6
- Hosting period (60 days in July - September): starting Monday 18th July 2022

TIME	PROGRAMME
Week 1 Introductory Week (same for all traineeship centers):	Readings and tutorials on Medical Physics topics and the Medical Physics profession, the structure of the traineeship programme, programme requirements (e.g., attendance record, keeping of a diary of daily activities) and legal requirements (e.g., local safety rules, issuing of personal radiation safety monitors). Introduction to the department(s) and familiarization of the working environment(s).
Week 2 – 3 Placement 1	Academic department: Students will be required to carry out experimental work or prepare a research-oriented presentation or research paper or literature review under the supervision of an academic member of staff In MRI
Week 4 – 5 Placement 2	Academic department: Students will be required to carry out experimental work or preparation of a research-oriented presentation, research paper, or literature review under the supervision of an academic member of staff in electrical physiology measurement / Ultrasound imaging.
Week 6 -7 Placement 3	Clinical Department: Diagnostic and Interventional Radiology Physics Presentations/readings and tutorials on Diagnostic and Interventional Radiology Physics. Follow the everyday clinical work on different diagnostic medical devices (CT, MRI etc.). Follow scientific meetings and any other scientific work in the department.
Week 8 – end (11 days) Wrap-up Period (same for all traineeship centers)	Report writing and career guidance. Participants will be required to write a formal report of their experiences based on a diary of activities they kept during the entire traineeship. Participants will be advised of the variety of work and career opportunities in Europe.

2. University Clinic Erlangen

- Department of host institution organizing the traineeship: Radiation Oncology, Audiology, Radiology
- Name of main contact at the host institution: Professors Christoph Bert, Ulrich Hoppe, Frederik Laun
- Email address of main contact at the host institution: christoph.bert@uk-erlangen.de, frederik.laun@uk-erlangen.de, ulrich.hoppe@uk-erlangen.de
- Maximum number of trainees that can be accepted: 1
- Hosting period (60 days July – September summer 2022 as mutually agreed)

TIME	PROGRAMME
Week 1 Introductory Week (same for all traineeship centers):	Readings and tutorials on Medical Physics topics and the Medical Physics profession, the structure of the traineeship program, programme requirements (e.g., attendance record, keeping of a diary of daily activities) and legal requirements (e.g., local safety rules, issuing of personal radiation safety monitors). Introduction to the department(s) and familiarization of the working environment(s).
Week 2 – 3 Placements 1, 2, 3	Three placements in Radiation Oncology, Radiology, and Audiology each with a duration of ~2 weeks. Clinical Departments: Diagnostic and Interventional Radiology Physics, Audiology, Radiation Oncology Presentations/readings and tutorials. Keep track of the everyday clinical work on different diagnostic medical devices. Follow scientific meetings and any other scientific work in the department. All three departments also focus on academic work, i.e. students can also get the opportunity to carry out experimental work or prepare a research oriented presentation if mutually agreed.
Week 8 – end (11 days) Wrap-up Period (same for all traineeship centers)	Report write-up and career advice. Participants will be required to write a formal report of their experiences based on a diary of activities kept during the entire traineeship. Participants will be advised of the variety of work and career opportunities in Europe.

3. National University of Ireland, Galway

- Department of host institution organizing the traineeship: Medical Physics, Faculty of Health Sciences
- Name of main contact at the host institution: Dr Niall Colgan
- Email address of main contact at the host institution: Niall.Colgan@nuigalway.ie
- Maximum number of trainees that can be accepted: 2
- Hosting period (60 days June - July): starting Monday 16th June 2022

TIME	PROGRAMME
Week 1 Introductory Week (same for all traineeship centers):	Readings and tutorials on Medical Physics topics and the Medical Physics profession, structure of the traineeship program, programme requirements (e.g., attendance record, keeping of a diary of daily activities) and legal requirements (e.g., local safety rules, issuing of personal radiation safety monitors). Introduction to the department(s) and familiarization of the working environment(s).
Week 2 – 3 Placement 1	Academic department: Students will be required to carry out experimental work or prepare a research-oriented presentation, research paper, or literature review under the supervision of an academic member of staff in MRI
Week 4 – 5 Placement 2	Academic department: Students will be required to carry out experimental work or prepare a research-oriented presentation, research paper, or literature review under the supervision of an academic member of staff in electrical physiology measurement / Ultrasound imaging
Week 6 -7 Placement 3	Clinical Department: Diagnostic and Interventional Radiology Physics Presentations/readings and tutorials on Diagnostic and Interventional Radiology Physics. Follow the everyday clinical work on different diagnostic medical devices (CT, MRI etc.). Follow scientific meetings and any other scientific work in the department.
Week 8 – end (11 days) Wrap-up Period (same for all traineeship centers)	Report writing and career guidance. Participants will be required to write a formal report of their experiences based on a diary of activities they kept during the entire traineeship. Participants will be advised of the variety of work and career opportunities in Europe.

4. University of Thessaly, Greece

- Department of host institution organizing the traineeship: Medical Physics, Faculty of Medicine, School of Health Sciences.
- Name of main contact at the host institution: Professor Kiki Theodorou
- Email address of main contact at the host institution: ktheodor@med.uth.gr
- Maximum number of trainees that can be accepted: 6
- Hosting period (60 days July - September): starting Monday 18th July 2022

TIME	PROGRAMME
Week 1 Introductory Week (same for all traineeship centers):	Readings and tutorials on Medical Physics topics and the Medical Physics profession, structure of the traineeship program, programme requirements (e.g., attendance record, keeping of a diary of daily activities) and legal requirements (e.g., local safety rules, issuing of personal radiation safety monitors). Introduction to the department(s) and familiarization of the working environment(s).
Week 2 – 3 Placement 1	Academic department: Students will be required to carry out experimental work or prepare a research-oriented presentation, research paper, or literature review under the supervision of an academic member of staff.
Week 4 – 5 Placement 2	Clinical Department: Diagnostic and Interventional Radiology Physics Presentations/readings and tutorials on Diagnostic and Interventional Radiology Physics. Follow the everyday clinical work on different diagnostic medical devices (CT, MRI etc.). Follow scientific meetings and any other scientific work in the department.
Week 6 -7 Placement 3	Clinical Department: Nuclear Medicine Physics Presentations/readings and tutorials on Nuclear Medicine Physics. Follow the everyday clinical work on different diagnostic or therapeutic medical devices (e.g., SPECT, PET, thyroid therapy). Keep track of scientific meetings and any other scientific work in the department.
Week 8 – end (11 days) Wrap-up Period (same for all traineeship centers)	Report writing and career guidance. Participants will be required to write a formal report of their experiences based on a diary of activities they kept during the entire traineeship. Participants will be advised of the variety of work and career opportunities in Europe.

EFOMP COMPANY MEMBER ARTICLE

Sun Nuclear: Beam quality correction factors for radiation therapy with high energy photon beams

SUN NUCLEAR corporation

Ionization chamber measurements of the absorbed dose to water in high photon energy beams are an essential part of radiation therapy dosimetry. The response deviation of an ionisation chamber in reference conditions and clinical beam qualities is corrected for by the beam quality correction factor k_Q, which provides one of the most significant sources of uncertainty in the measurement of the absorbed dose to water.

k_Q values depend on the design, size and material composition of the components and are chamber specific. International dosimetry protocols often provide tabulated data for k_Q values. However, the recent release of ICRU 90 [1] provided updated values of the mean ionization energy of water and graphite (I-values), as well as updated density correction parameters. Consequently, k_Q values based on ICRU 37 [2] should be revised.

While Monte Carlo simulations using science grade algorithms like EGSnrc [3] (National Research Council, Ottawa, Canada) are the method of choice to calculate kQ values for clinically used ionization chambers, the implementation and validation of ionization chamber models is not trivial. To ensure the highest quality standard, we connected two leading research groups, the Canadian national metrology institute NRC, and the Institute of Medical Physics and Radiation Protection of the University of Applied Sciences Mittelhessen, Germany, for the revision and calculation of k_Q according to ICRU 90 [1]. Both groups independently created and validated Monte Carlo models of the reference class ionization chambers SNC 125c and SNC 600c to determine k_Q values according to TRS 398 [4], AAPM TG 51 [5] and DIN 6800-2 [6]. The Monte Carlo calculated data sets agreed with experimentally determined kQ values presented in NRC reports PIRS-3224 [7] and PIRS-3327 [8].

Figure 1 presents Monte Carlo calculated beam quality correction factors kQ for the reference class ionization chambers SNC 125c and SNC 600c, independently determined by NRC and THM according to the TRS 398 [4] protocol. The kQ values were calculated for various clinical photon beams with nominal energies ranging from 4 MV up to 24 MV. A polynomial function was fitted to the joint data sets calculated by THM as well as NRC.

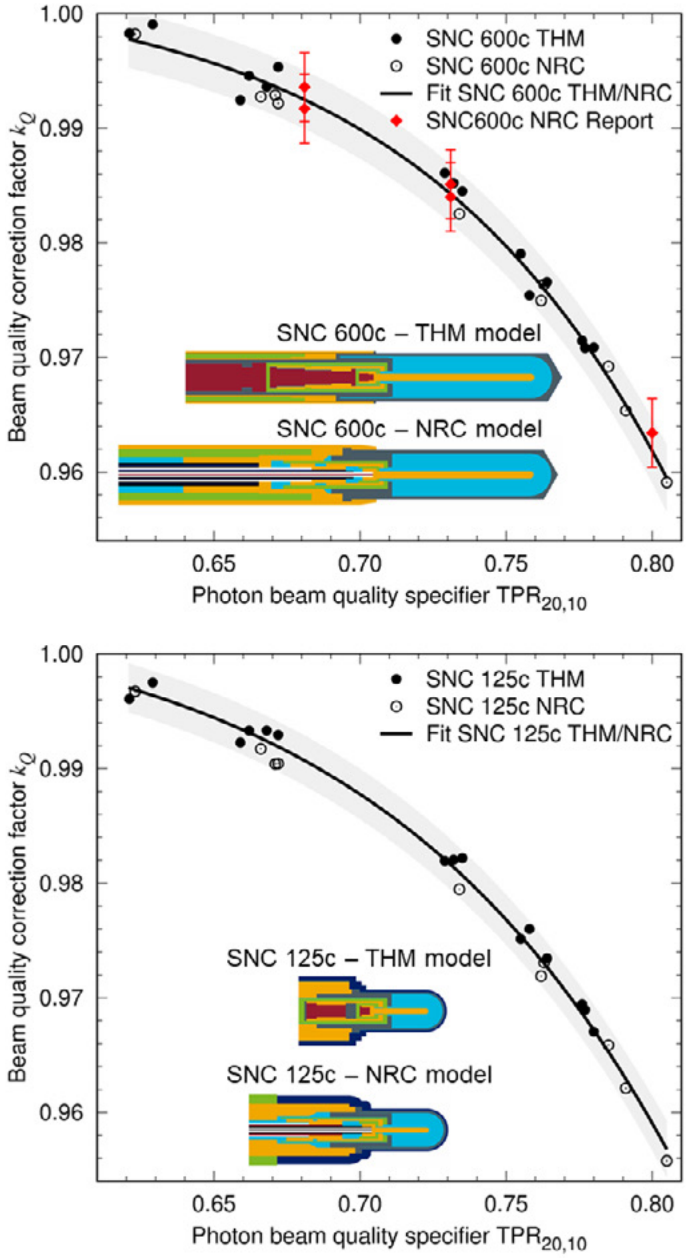


Figure 1: Calculated beam quality correction factors for the reference class ionization chambers SNC 125c and SNC 600c. Experimental data according to TRS 398 [4] is shown for the SNC 600c and available for the SNC 125c according to TG 51 [5] in Alissa et al. (2021) [9].

k_Q data according to TRS 398 [4], AAPM TG 51 [5] and DIN 6800-2 [6] for Sun Nuclear's ionization chambers SNC 125c and SNC 600c, as well as the corresponding fit parameters can be openly accessed in Alissa et al. (2021) [9].

References

[1] Seltzer S, Fernandez-Varea J, Andreo P, et al. Key data for ionizing-radiation dosimetry: measurement standards and applications, ICRU Report 90. 2016;

[2] Berger M, Inokuti M, Anderson H, et al. Report 37. Journal of the International Commission on Radiation Units and Measurements. 1984;(2)

[3] Kawrakow I, Rogers D, Mainegra-Hing E, Tessier F, Townson R, Walters B. EGSnrc toolkit for Monte Carlo simulation of ionizing radiation transport. 2000; doi:10.4224/40001303

[4] IAEA. TRS 398: Absorbed Dose Determination in External Beam Radiotherapy. 2006.

[5] McEwen M, DeWerd L, Ibbott G, et al. TG 51 Addendum to the AAPM's TG-51 protocol for clinical reference dosimetry of high-energy photon beams. Med Phys. Apr 2014;41(4):041501. doi:10.1118/1.4866223

[6] DIN. Dosismessverfahren nach der Sondenmethode für Photonen- und Elektronenstrahlung Teil 2: Dosimetrie hochenergetischer Photonen- und Elektronenstrahlung mit Ionisationskammern. DIN 6800-2. Berlin: Beuth; 2020.

[7] Muir B, McEwen M. Characterization of SNC 125c™ ionization chambers for measurements in linear accelerator photon beams. 2021. PIRS-3224.

[8] McEwen M, Muir B. Characterization of SNC 600c™ ionization chambers for measurements in linear accelerator photon beams. 2021. PIRS-3327.

[9] Alissa M, Zink K, Tessier F, Schoenfeld AA, Czarnecki D. Monte Carlo calculated beam quality correction factors for two cylindrical ionization chambers in photon beams. Phys Med. Dec 28 2021;94:17-23. doi:10.1016/j.ejmp.2021.12.012

Mohamad Alissa, M.Sc.

Mohamad Alissa is a clinical medical physicist at the University Hospital of Giessen and Marburg, Germany, and a PhD candidate at the Institute of Medical physics and radiation protection (IMPS) of the University of Applied Sciences Mittelhessen, Germany. He holds a master's degree in Radiation Protection and specializes in the field of radiation dosimetry in the presence of magnetic fields.

Dr. Damian Czarnecki

Damian Czarnecki is a post-doctoral research scientist at the Institute of Medical Physics and Radiation Protection (IMPS) of the University of Applied Sciences Mittelhessen, Germany. Damian holds a doctorate degree in physics and specialises in the fields of photon dosimetry, detector physics and Monte Carlo simulations.

Dr. Andreas Schönfeld

Andreas Schönfeld is a research associate at Sun Nuclear, the leader in quality assurance solutions for radiation therapy and diagnostic imaging. Andreas is based in Germany and supports product research, supervises the academic outreach program, and represents Sun Nuclear in DIN and IEC standardisation committees. He holds a doctorate degree in physics and is a certified clinical medical physicist.

Published Revised Core Curriculum (CC) for Medical Physics Experts in Radiotherapy

Borislava Petrovic and Efi Koutsouveli provide an overview of the educational path that leads to becoming a Medical Physics Expert in Europe

The first guideline for the education and training of medical physicists in radiation therapy was published in 2004 jointly by EFOMP and ESTRO (European Society for Radiotherapy and Oncology). This document provided theoretical and practical guidelines and was focused on skills and knowledge that should enable the safe and efficient activities of medical physicists in radiotherapy.

The first revision of this document was done in 2011, and was revised in accordance with EU recommendations on EQF (European Qualification Framework). Learning outcomes were defined in terms of knowledge, skills, and competencies.

Since 2011, the technological advancement and complexity of radiotherapy equipment have raised the bar for quality, necessitating a new update of the curriculum to address all the additional competencies in modern radiotherapy. The CanMEDS method, EU Guidelines on MPE (RP-174) and EFOMP Policy Statement 12.1, as well as the progress in radiotherapy, were the foundations for the changes. The CanMEDS role framework was implemented to ensure that the MPE training is in line with the highest professional training level, reinforcing the concept of competency-based education.

Therefore, the revised CC document provides a framework for the training of MPE in radiotherapy and is intended to be the baseline for national regulatory bodies in their own medical physics expert curriculum development. It also lays the groundwork for the standardisation of training and education practices in Europe and consecutively facilitates the cross-border mobility of MPEs in future years.

The educational path to becoming a medical physics expert is given in Figure 1. According to the latest EC guidelines and the EC Council directive 2013/59/EURATOM, a Medical Physics Expert is defined as a Medical Physicist who has reached EQF level 8 in one or more chosen specialties of clinical Medical Physics.

PRE-EDUCATION

BSc degree
(predominantly in Physics)

MSc degree
(Physics or Medical Physics)
=
BSc + MSc
(including in total at least 180 ECTS in Fundamental Physics and Mathematics)

EDUCATION AND TRAINING

- Duration of at least 4 years to obtain the competences (CanMEDS roles) to became an independent specialist
- The trainee appointed as a paid resident

Training in one or more sub specialties of Medical Physics

- Training conducted in a hospital/healthcare facility accredited by the competent authority
- Training facility and quality of the MPE training regularly audited by the competent authority

MPE CERTIFICATION

By competent authorities as MPE in Medical Physics speciality (one or more sub specialties)

CONTINUING PROFESSIONAL DEVELOPMENT (CPD)

Following European guidelines

Figure 1: Qualification Framework for the MPE in Europe, as proposed by the Working Group

The topics to be covered in a curriculum, together with proposed ECTs, based on a total of 240 ECTs, are listed in Table 1.

General competencies of Medical Physics Expert include, but are not limited to, good communicator, collaborator, leader, health advocate, scholar and professional.

Four different levels of competence were defined in the curriculum: expert, collaborative, contributive and awareness, which each trainee needs to develop depending on available equipment and techniques in his/her own environment. The minimum time to be spent on each specific topic has been given in ECTS, and the total amount of ECTS for a 4-year training is 240, as shown in table 1, with the Science and Innovation (Research) part representing an important part of the CC.

Despite the big differences between European countries that were found in the survey [1] that was prepared before the CC revision, the updated CC aims to secure not only an optimal level of training for safe and effective practice throughout Europe but also a realistic one. This will contribute to further harmonisation of MPE training and practice, which is in compliance with EU guidelines.

The CC [2] has been endorsed by 33 out of 36 national societies of medical physics in Europe, and also reviewed by international organisations such as the American Association of Physicists in Medicine, Australian College of Physical Scientists and Engineers in Medicine, Association of Medical Physics of India, Commission on Accreditation of Medical Physics Education Programs, Canadian Organization of Medical Physicists, Canadian College of Physicists in Medicine, International Atomic Energy Agency.

Figure 2: Workgroup during the last in person meeting in Brussels in Feb 2020

Specific MPE physics knowledge, skills and competencies	ECTS
III.1. Fundamentals of human anatomy, images of anatomy and physiology	2
III.2. Fundamentals of oncology and multimodal treatment	2
III.3. Basic radiation physics review	2
III.4. Radiobiology and radiobiological models	4
III.5. Radiation protection in medicine	5
III.6. Risk management, quality control and safety in the medical environment	6
III.7. Organisation, management and ethical issues in health care	3
III.8. Information and communication technology	4
III.9. Data processing, statistics, modelling and artificial intelligence	8
III.10. Dose determination	
III.10.1 Reference dosimetry	15
III.10.2 Non-reference dosimetry	10
III.11. Imaging for radiotherapy	
III.11.1 Principles of medical imaging and image handling	15
III.11.2 Imaging for treatment simulation	5
III.11.3 In-room imaging for set-up verification and on-line adaptive RT	5
III.12. External beam radiotherapy with photons and electrons	
III.12.1 Clinical use of treatment equipment	6
III.12.2 Treatment techniques for high energy electron and photon beams	10
III.12.3 Treatment planning	15
III.12.4 Techniques for managing geometrical and anatomical uncertainties and variations (margins, IGRT, ART)	6
III.12.5 Patient-specific quality assurance	5
III.13. Brachytherapy	12
III.14. Particle therapy	8
III.15. Principles of unsealed source therapy	2
IV. Science and innovation in radiotherapy (research)	30
*Deepen knowledge from this CC and/or additional topics from the CC of Medical Physicists in Nuclear Medicine and/or in Radiology [12,13]**	60
TOTAL	240

Table 1: Minimum number of ECTS credits for the different topics

References

1. "Towards an updated ESTRO-EFOMP core curriculum for education and training of medical physics experts in radiotherapy – A survey of current education and training practice in Europe." European Journal of Medical Physics, volume 84, page 65-71, April 01, 2021. https://doi.org/10.1016/j.ejmp.2021.03.030

2. Core curriculum for Medical Physics Experts (MPE) in Radiotherapy (2021), https://www.efomp.org/index.php?r=fc&id=core-curricula

3. "The 3rd ESTRO-EFOMP core curriculum for medical physics experts in radiotherapy", Radiotherapy & Oncology, February 18, 2022. https://doi.org/10.1016/j.radonc.2022.02.012

Borislava Petrovic is a medical physicist and works as chief of the Medical Physics group at the Radiotherapy Clinic, Institute of Oncology Vojvodina, Sremska Kamenica. She is also Assistant Professor of medical physics at the University of Novi Sad, Faculty of Sciences, Department of physics. She has been a member of the working group for the revision of the CC.

Efi Koutsouveli works as a Medical Physics Expert in the Medical Physics department of Hygeia Hospital, Athens, Greece. Her professional focus is on radiotherapy units (external radiotherapy & brachytherapy). She is currently EFOMP's Secretary General and she has been a member of the working group for the revision of the CC.

ESMPE European School for Medical Physics Experts Adaptive Radiotherapy: Pros and Cons of in-room and out-of-room Imaging

August 17, 2022

Dublin, Ireland

The school will explore the advantages and limitations of different approaches to adaptive radiotherapy using imaging modalities available today, as well as a look to the future of adaptive radiotherapy. This one-day event will be accredited by EBAMP (European Board of Accreditation for Medical Physics) as CPD event for Medical Physicists at EQF Level 8 and is intended for practicing clinical Medical Physicists who are involved in Radiotherapy.

Faculty

Brendan McClean Saint Lukes Radiation Oncology Network, Dublin, Ireland

Efi Koutsouveli Hygeia Hospital, Athens, Greece

To be announced

To be announced

To be announced

Time-table

17th August Wednesday	Title	Description	Lecturer
8:00-9:00	**Registration**		
Morning chairs: Efi Koutsouveli (GR), Brendan McClean (IE)			
	MRI for Adaptive RT		
9:00-9:45	**Introduction to School**	What is Adaptive Radiotherapy and why is it important? Overview of different approaches	Brendan McClean (IE) / Efi Koutsouveli (GR)
09:45-10:30	**MRI Linac: pros and cons**	Scientific and clinical advantages of online adaptive RT using MRI linacs. Limitations and ongoing challenges.	To be announced
10:30-11:15	**Out-of-room and offline MRI approaches**	Combination of standard MRI and linacs to provide adaptive RT	To be announced

11:15-12:00	**Dose calculation in adaptive RT**	Absorbed dose calculation challenges using synthetic CT from MRI and in-room cone-beam CT	To be announced
12:00-13:00	**Lunch break**		
Afternoon chairs: Efi Koutsouveli (GR), Brendan McClean (IR)			
	CT for Adaptive RT		
13:00-13:45	**In-room Cone beam CT**	Use of linac based cone beam CT to allow real time adaptive solutions. Pros and cons	To be announced
13:45-14:30	**Off-line CT**	Conventional CT use at an appropriate frequency to enable adaptive responses.	To be announced
14:30-15:15	**Registration of MR and CT**	Challenges in combining MRI and CT images. Influence of motion	To be announced
15:15-16:00	**Debate: The future of adaptive RT lies with MRI or with CT**	Overcoming the challenges and looking to the future	All faculty

Further information

Course language	English
Level	MPE – Level 8
Maximum number of participants	**80**
Duration	**17th August 2022**
Study load	6 hours of lectures and demonstrations

WORLD MEDICAL PHYSICS

Medical Physics for World Benefit (MPWB)

Medical Physics for World Benefit
www.MPWB.org
Working together for effective patient care

Eduard Gershkevitsh from Tallinn, Estonia, writes about the MPWB initiative

Medical Physics for World Benefit (https://www.mpwb.org/) is a non-profit, volunteer run organisation registered as a charitable association in both Canada and the United States since 2016. MPWB's vision is of a world with access to effective and safe applications of physics and technology in medicine. This includes all areas of medical physics, although much of MPWB's efforts to date have been devoted to radiation therapy projects. Its mission is to support activities which will yield effective and safe use of physics and technologies in medicine through advising, training, demonstrating and/or participating in medical physics-related activities, especially with partners in Low- and Middle-Income Countries (LMICs).

MPWB is a membership-driven organisation with the formal application process having opened in June 2017. Membership has grown from about 230 members globally in 2019 to just under 600 presently. This membership growth has enabled the organisation to broaden its programmes with time.

Some major projects in the last two years reflect MPWB's efforts. Members have been actively engaged in the Open Syllabus project, preparing a web-based open environment to facilitate global access to radiation oncology Medical Physicist residency training content as defined by the IAEA syllabus. Work on this important project to date has enabled the migration of 80% of the content to online learning tools. A preliminary website is expected to start beta-testing in 2022.

With the onset of COVID-19, MPWB initiated a webinar series to enable world leading medical physicists to share their expertise. Two early webinars provided guidance on the response to COVID-19 from clinical physicists who had experienced its full impact and effects and had established clinical guidelines at the very start of the pandemic. The next webinars discussed the potential for artificial intelligence to assist in clinical service, cost effective globally deployable radiation therapy and the selection of megavoltage technology. These webinars can be accessed from the MPWB YouTube channel.

In another major outreach last year MPWB was able to support 36 medical physicists from LMICs to attend at no cost the virtual annual meeting of the American Association of Physicists in Medicine. The award recipients were evaluated through several criteria including: location with respect to the World Bank's list of LMIC countries, their stage in the career, a show of need, with applicants describing how knowledge would impact their clinical practice, and MPWB Membership (preferred but not exclusive). The sponsorship programme was made possible by essential support from industry partners IBA Dosimetry, Elekta, and Siemens Healthineers, as well as our own membership support.

The next programme MPWB is focussing on is the development of a medical physics mentorship programme. Initial work focussed on developing an international survey to assess whether the medical physics community considers virtual mentoring to be of benefit to the community, especially for under-resourced environments. The results of the survey are presently being analysed. There were about 400 responders from around the globe representing 76 countries, of which 65% were from high-income countries and 35% from LMICs. The preliminary analysis provides information on preferred practices in terms of the mentoring process and factors to consider in matching mentors and mentees. An abstract has been submitted and accepted for presentation at the World Congress on Medical Physics and Biomedical Engineering in June 2022. Stay tuned as more details unfold.

As our work develops, our efforts will benefit from increased engagement from the medical physics community. If you are a medical physicist and care about global health and access to quality health care, do consider joining us!

Eduard Gershkevitsh works as Head of the Medical Physics Service at the North Estonia Medical Centre, Tallinn, Estonia, a position he was appointed to in 2009. From 2001 to 2009 he was a Medical Physicist at the same institution. He began his career in radiotherapy at 1996. He is a past Physics Committee member of ESTRO, a member of MPWB, consultant to the IAEA, and is active in area of RT equipment commissioning, verification and audits.

EFOMP COMPANY MEMBER

Scandidos: Cutting-edge Technology at Herlev & Gentofte Hospital

Herlev & Gentofte Hospital has a multi-treatment machine department and is a long-time user of the Delta4 Phantoms. We were curious to hear about their QA work when doing treatments with the HALCYON, on-table adaptation with the ETHOS and their MRIDIAN. Beneath you can read the interview that was conducted with physicists Ulf Bjelkengren, Susan Biancardo and Grichar Valdes Santurio at Herlev & Gentofte Hospital in Denmark. You can find out more by following this link.

"We typically use the Delta4 Phantoms when implementing new techniques and treatment methods. We have been using the Delta4 Phantom since 2008 so we feel that we are very confident with the system. What has characterised this product is simplicity, flexibility, and stability. Also, ScandiDos has always had a great support team and we feel that the product, especially the software, has always been updated at a rapid pace.

QA ON TRUEBEAM, HALCYON AND MRIDIAN

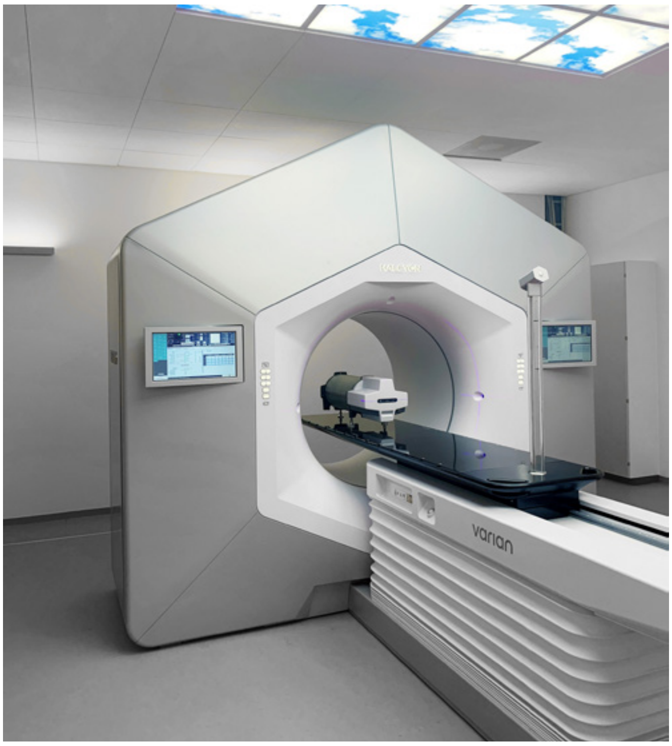
In 2018 we made a large purchase of accelerators and at that time, it felt natural to upgrade the Delta4PT Phantom to the Delta4 Phantom+. We were happy to learn that the new Delta4 Phantom+ had been given every feature we felt was missing in the older model. It now benefits from measurement detectors in a different geometry, wireless communication, cable-free synchronization, and a much simpler calibration procedure. We have used the Delta4 Phantom+ for the commissioning of four Varian TRUEBEAMS as well as two Varian HALCYON and one Varian ETHOS. We also purchased the Delta4 Phantom+ MR, soon after its release, for commissioning on the ViewRay MRIDIAN. The Delta4 Software platform is utilised across all Delta4 products, which is convenient for our staff since there is no learning curve when switching between models.

DELTA4 PHANTOM+ AND HALCYON

We got our first HALCYON machine in May 2019. The Delta4 Phantom+ was used to verify several treatment plans before the machine was released for clinical use. Since the beam data for HALCYON is pre-configured in the TPS and does not require any collection of measurements, all calculations could be made before the delivery of the machine. This meant that the commissioning, including dosimetry and Delta4 Phantom+ verification measurements, could be done in one day.

Suitable treatments on the HALCYON

Looking at the distribution of cancer sites in the clinic, about 30-40% are suitable for treatment on a HALCYON. Examples are pelvic tumours, head and neck, palliative treatments, and lung treatments not requiring motion management. The lack of motion management is one of the disadvantages of the HALCYON. It would be great to be able to treat patients in DIBH with the fast gantry speed and fast CBCT acquisition. One breath-hold would be sufficient in most cases to complete a CBCT or a treatment field/arc. Further, with the ETHOS, we are able to make a new plan for the patient while the patient is on the couch. Currently, we are treating pelvic tumours on the ETHOS. Especially for bladder patients, there is a clear indication that the adaptive workflow has a clinical impact. As one of our physicians expressed herself: "No bladder patient is ever allowed to be treated on any other machine".



Upgrade to ETHOS

Three months before upgrading one of our HALCYON machines to ETHOS we received an ETHOS emulator. This emulator simulates the complete workflow from prescription to treatment delivery. With CBCT's from the HALCYON exported to the emulator, real adaptive simulations could be performed on actual patient data. And since the ETHOS and HALCYON machine-wise are the same, the treatment plans from the emulator could be exported to the HALCYON and the treatment plans measured with the Delta4 Phantom+.

Evaluation of measurements

When we evaluate measurements, we primarily use the gamma evaluation with a local gamma of 3%/2mm. A result is a clear pass if the passing rate is above 95%. We do not solely rely on the gamma, evaluating the profiles is also a good tool to get a feel for the measurement. For some highly modulated plans, we have also exported the measurement plan and done comparisons with treatment plans in the Mobius DoseLab software, just to be on the safe side. Making sure that we did not draw any wrong conclusions from the results.

DELTA4 PHANTOM+ MR AND VIEWRAY MRIDIAN

We treated our first patient on the MRIdian in May 2019 and to this date, we have treated about 50 patients. The MRIdian is a very different system compared to what we are used to. The steep learning curve of operating the machine has led us to take a slow approach in ramping up treatments on the MRIdian. We have not used the MRIdian to treat standard cases such as prostate cancers. Instead, we have focused on patients benefitting from the MR capabilities of the machine such as liver treatments and abdominal tumours, utilizing all features of the system with adaptive treatments, gating and tumour tracking.

WORKFLOW, MEASUREMENT & ANALYSIS

Since MRIdian is a completely new system for us we do not have much experience in treatment planning and the corresponding results. Because of this, we are measuring all treatment plans on the Delta4 Phantom+ MR before treatment. For evaluation, we are using the same criteria as for conventional linac.

Workflow

The Delta4 Phantom+ is easily transferred onto the couch by simply sliding it over from the Delta4 Trolley. The phantom is positioned with the machine´s external laser and a couch shift to the isocenter is then performed.

Measurement

A QA plan is created in the MRidian system where the plan is calculated on the Delta4 CT data. The couch on the MRidian is attenuating the beam quite heavily so the couch is included in the calculation. The plan is then exported to the Delta4 software, treatment is delivered and measured in the phantom.

Analysis

The analysis is done with the gamma-analysis in the Delta4 software. Measurement profiles are also visually evaluated to get a sense of the plan quality. We are using a 3%/3mm local gamma and a 95% passing rate as our clinical plan criteria. We have not had any plans that failed these criteria and we have treated about 50 patients. "

The team at Herlev: left to right, Ulf Bjelkengren, Susan Biancardo and Grichar Valdes Santurio

MEDICAL PHYSICS THESIS

Investigation of Secondary Radiation Effects Caused by Metal Artifacts Inside the Patient's Body

In June 2021, Egidijus Lysenko graduated from the Medical Physics MSc programme at Kaunas University of Technology in Lithuania. In this article he provides a summary of his thesis.

Images in computed tomography are generated by using a rotating gantry with detector array movement around the patient. This fundamentally poses a problem whenever the scanned projection intercepts a dense object or a patient implant in its path. Due to the density of these implants, X-ray scattering effects may occur, creating shadow-stripe type artifacts. In many cases of radiotherapy, these artifacts are either overlooked or ignored. Only rarely are they reduced using commercial metal artifact reduction algorithms. The re-distribution of the doses when comparing original CT images to Metal Artifact Reduction (MAR) reduced images can be significant enough to sometimes reduce any unwanted potential after-treatment, radiation-induced side effects [1-2].

The aim of this work was to evaluate the difference and re-distribution of doses to the target organs of the patients, as well as organs at risk surrounding them, according to the organ dose constraint guidelines. A metallic artifact reduction algorithm was constructed, using different types of filtering methods traditionally used in photography and other image editing fields, for edge (detail) enhancement as well as overall image noise and blur reduction.

In order to facilitate this concept, the need for a working prototype program-algorithm was realized. Due to the nature of the original DICOM imagery parameters and anti-tampering protection of the original image kernels, an investigation had to be carried out to come up with the best possible way of tying multiple algorithmic filtering methods together. At the same time evaluating the most prominent types of artifacts in everyday CT imagery used in radiotherapy was necessary so that the comprised algorithm could target only the metallic based artifacts and sub-categories.

The workflow of the algorithm involves applications of "edge – Sobel, with Prewitt operator", "edge – Robert" with thresholding (Roberts cross operator), "LOG" (Laplacian and Gaussian) with zero crossing, "edge – Canny", and "motion – blur" (Weiner) filters with their respective thresholds and theta as well as relaxation values and parameters [3-5]. All of these filters acting together and detecting different edges make up the metallic artifact reduction algorithm. The MAR algorithm focuses on contrast – soft tissue enhancement in the peritoneal and pelvic areas, as well as metallic object attenuation, and image noise reduction around hip prosthesis areas. The images result in reduced artifacts while the image quality is not substantially degraded (Fig. 1).

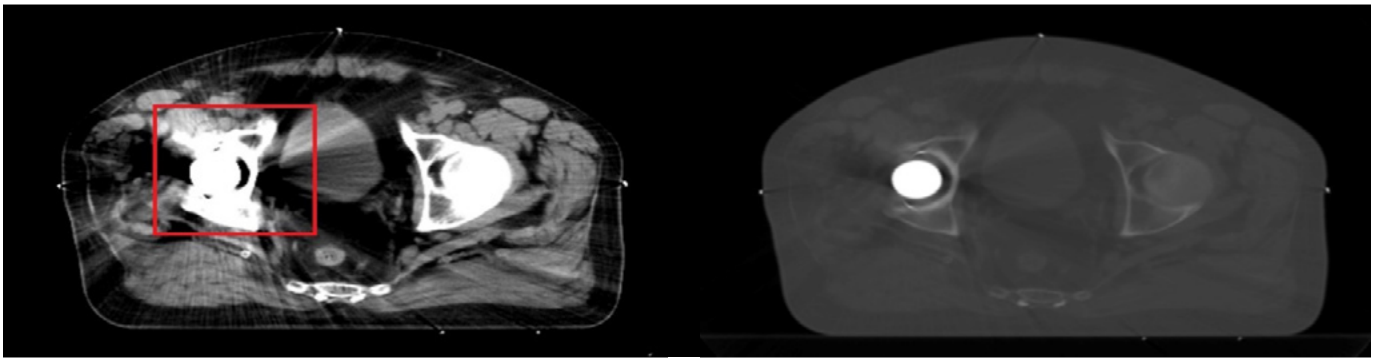


Fig 1: MAR algorithm application and artifact reduction across full slice

The subjected CT data sets of 7 patients in total were then evaluated for potential edge drifting and dose reduction in the PLUNC radiotherapy planning system. For further data evaluation, patients were split into two groups. One group consisted of prostate cancer patients (N=4), while the other group consisted of cervix uterus cancer patients (N=3). Individual radiotherapy plans for the original images and MAR algorithm filtered images were created, and volumetric-dose histograms were compared and evaluated to determine the change in the dose distribution in the patients in post processed CT RT plans.

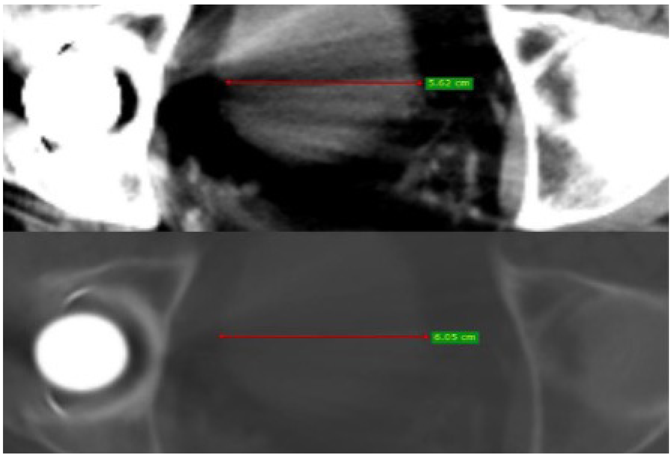


Fig 2: Resulting edge enhancement

The results show that there is a significant change in organ edges after computed tomography data was subjected to metallic artifact reduction algorithm application. Going through all patients' computed tomography slices, recording the bladder image, the edge change resulted in 5.1% of the edge drift as compared to the original organ diameter in the original non-filtered CT studies (Fig. 2). Additionally, the performed investigation has shown that application of the filtering algorithm resulted in significant dose reduction in RT for both patient groups: female patients with cervix- uterus cancer and male patients with prostate cancer. 2.6% reduction of dose to the target organ was indicated for prostate cancer patients. In addition to this, the dose changes to organs at risks like bladder and rectum were observed as well. Rectum irradiation dose was reduced by 2.21% while the dose to bladder was increased by 4.45%. For the cervix-uterus cancer group a substantial dose reduction to the target organ of 14.03% was achieved. Irradiation doses to rectum and bladder were reduced by 8.94% and 6.59% correspondingly. Estimated dose changes are indicative to further radiotherapy treatment plan optimization (Fig. 3).

The outcome of this investigation showed that the different filter applications working together can create algorithms which are capable of detecting a large range of deleted edges in CT images affected by noise or X-ray attenuations. A significant soft tissue and organ-edge enhancement was measured after filter application in all investigated patients, providing a unique possibility of radiation treatment plans optimization even further. Due to the nature of the CT scanner manufacturers' data protection, most commercially available algorithms are not available to the public for further algorithm research. Because of constant advancements, and consideration that CT scanners have had at least three iterations of MAR algorithms in the last 40 years, it is clear

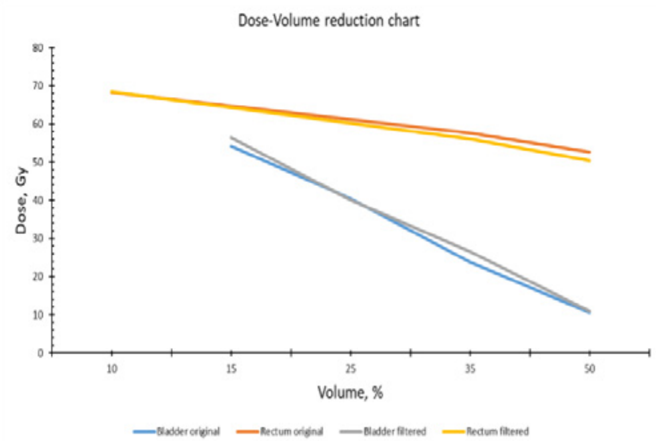


Fig 3: Dose volume reduction chart of the prostate patient group original and post-process CT

that continuous research in the field has potential to reveal possibilities for an even broader spectra of artifact reduction that are not only metallic in nature, but also frequently occur in other areas such as the cranium or chest, etc.

References

1. M.L. Kataoka, M.G. Hochman, E.K. Rodriguez, P.J. Paul-Lin, S. Kubo, V.R. Raptopolous, A Review of Factors That Affect Artifact from Metallic Hardware on Multi-Row Detector Computed Tomography, MedlinePlus, 2010, https://doi.org/10.1067/j.cpradiol.2009.05.002
2. F.E.Boas, D.Fleischman, CT artifacts: Causes and reduction techniques, Department of Radiology, Stanford University School of Medicine, 2012, ISSN: 1755-5191
3. N. Chetih, Z. Messali, Tomographic image reconstruction using filtered back projection (FBP) and algebraic reconstruction technique (ART), 2015 3rd International Conference on Control, Engineering & Information, 2015, http://dx.doi.org/10.1109/CEIT.2015.7233031
4. E. Punarselvam, P. Suresh, Edge Detection of CT scan Spine disc image using Canny Edge Detection Algorithm based on Magnitude and Edge Length, Institute of electrical and electronic engineers, 2012, p. 806-813. https://doi.org/10.1109/TISC.2011.6169100
5. W. Jiang, X. Zhang, Relaxation factor optimisation for common iterative algorithms in optical computed tomography, Hindawi - mathematical problems in engineering, 2017, https://doi.org/10.1155/2017/4850317

Egidijus Lysenko is a graduate of the Medical Physics MSc programme at Kaunas University of Technology. With CT imaging and artifact fields being his primary fields of interest, he strongly believes that the CT medical field has not reached its full potential yet, and that inevitable further advancements in this area can impact RT dose optimisation even further.

ESMPE European School for Medical Physics Experts EFOMP

Digital Breast Tomosynthesis QC protocol feedback session

August 17, 2022

Dublin, Ireland

The school aims to present the draft EFOMP Digital Breast tomosynthesis Quality Control Protocol with opportunities for discussion and feedback. This feedback will be taken into account in the final version of the protocol. This one-day event will be accredited by EBAMP (European Board of Accreditation for Medical Physics) as CPD event for Medical Physicists at EQF Level 8 and is intended for practicing clinical Medical Physicists who are involved in mammography/digital breast tomosynthesis.

Faculty

Ruben van Engen	Dutch expert Center for screening, Nijmegen, The Netherlands
Ioannis Sechopoulos	Radboud university medical center and Dutch expert Center for screening, Nijmegen, The Netherlands
Niall Phelan	BreastCheck, Dublin, Ireland
Alistair Mackenzie	National Co-ordinating Centre for the Physics of Mammography, Guildford, UK
To be announced	
To be announced	

Time-table

17th August 2022 Wednesday	Title	Description	Lecturer
8:00-9:00	**Registration**		
Morning chairs: Ioannis Sechopoulos (NL), Ruben Van Engen (NL)			
	Introduction		
9.00-9.15	Introduction/scope		Ruben van Engen (NL) /Ioannis Sechopoulos (NL)
9.15-9.45	Digital Breast tomosynthesis technology		Ioannis Sechopoulos (NL)

9.45-10.30	Overview draft DBT QC protocol	Ruben van Engen (NL)
	Draft EFOMP DBT QC protocol, part one	
10.30-11.15	X-ray tube QC tests	Niall Phelan (IE)
11.15-12.00	Image receptor QC tests	To be announced
12:00-13:00	**Lunch break**	
Afternoon chairs: Ioannis Sechopoulos (NL), Ruben Van Engen (NL)		
	Draft EFOMP DBT QC protocol, part two	
13.00-13.45	Automatic Exposure Control QC tests	To be announced
13.45-14.30	Image quality QC tests	Alistair Mackenzie (UK)
	Draft EFOMP DBT QC protocol, part three	
14.30-15.15	Breast dosimetry	Ioannis Sechopoulos (NL)
15.15-16.00	Discussion/wrap-up	All faculty

Further information

Course language	English
Level	MPE – Level 8
Maximum number of participants	**60**
Duration	**17th August 2022**
Study load	6 hours of lectures and discussions

Art to Challenge and Inspire: Images and Reflections for Medical Physics (3)

Professor Jim Malone writes about a painting with an unusual scientific angle

Peter Doig was born in Edinburgh and lived/ worked in many places including Trinidad, Germany, Canada, and London. His enigmatic paintings of figures and landscapes mix abstraction and unusual colour combinations giving a distinctive magical quality. Blotter is a beautiful, inspiring image that owes much to the presence of water and its implicit stillness. It was painted from a photograph and shows a child standing on a frozen pond. The title suggests total absorption — in thought, and in the reflections of snow and wintered trees. Hopefully, you will find it rewarding. Feedback is welcome at: jifmal@gmail.com

Blotter

(see next page)

The painting exemplifies totally absorbed presence. Perhaps, a compelling example of mindfulness, or a new reading of the Christian Scriptural Injunction that you become like little children. The child is totally present to whatever has taken his attention. The water is the entrance to another world; the snow and the trees provide the sheltered isolation to allow it to happen.

This quality of attention, without ego or agenda is valuable in science, and might be part of discussions of the scientific method with trainees. Stillness before the object of enquiry can be preferable to aggressive probing rooted in obligations to the service or funding agencies. When we are intensely attentive, insight or revelation can follow, often as a surprise — like something given. Nature and reality have their own terms and must be listened to attentively — at least some of the time.

Jim Malone is Professor (Emeritus) of Medical Physics and was Dean of the School of Medicine at Trinity College Dublin/ St James's Hospital. He also works/worked regularly with the WHO, IAEA, IEC, ICRP and the EC. He was recently awarded the EFOMP Medal, is an active researcher and has wide interests in the humanities. Recent publications include books on Ethics for Radiation Protection in Medicine, and on Mystery and the Culture of Science.

The drawing to the left is a study for a portrait, pencil on card, by Desmond Hickey (gifted by the artist).

Blotter (1993) by Peter Doig (1959-) . (See previous page). Permanent collection at the Walker Gallery, Liverpool, UK. Oil on Canvas, 2.6 m x 2.1 m, (1993). From a photograph of the artist's brother. Water was pumped onto the ice to enhance the reflections.

EFOMP COMPANY MEMBER ARTICLE

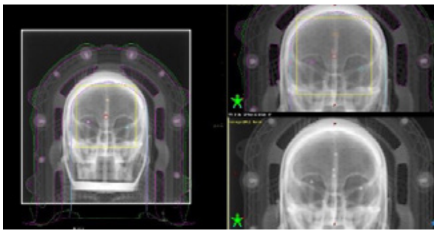
RTsafe: End-to-End evaluation of SGRT systems during commissioning and periodic QA

In advanced Stereotactic Radiosurgery (SRS) treatments, the role of the Surface Guidance systems is very important and becomes vital for the safe and efficient implementation of each clinical procedure. The accurate and precise patient positioning in the treatment couch for a single fraction or hypofractionated SRS applications, as well as the accurate patient monitoring during the dose delivery, can be achieved with advanced Surface Guidance Radiation Therapy (SGRT) techniques minimizing patient dose derived from x-ray, Cone Beam Computed Tomography (CBCT), kV and MV imaging. SGRT systems combine high-end technology with sophisticated software aiming to improve the treatment outcome and make the SRS treatment protocol more efficient. Specifically, the most recent integrated SGRT systems provide surface optical imaging with cutting-edge optical cameras combined with mounted light sources detecting the patient's 3D surface structure.

However, the more advanced the hardware and software used by these systems are, the higher the level of complexity is introduced and subsequently, End-to-End verification is mandatory. International committees and task groups strongly recommend the implementation of End-to-End tests during the commissioning and/or periodic Quality Assurance (QA) of SGRT systems. The complexity that hybrid systems have introduced leads to the need for a more realistic simulation of the clinical procedure during End-to-End testing. If we can summarize the main goal of QA in SRS with SGRT applications is the verification of the precision on localization and accuracy of dose delivery.

RTsafe, following the trends in modern SRS, is continuously developing adapted solutions to the most demanding QA needs. Specially designed anthropomorphic head phantoms have been modified and equipped accordingly to be used for the End-to-End evaluation of advanced SGRT systems. The combination of anthropomorphic anatomy and bone/soft tissue equivalency that phantoms offer is a fact that makes them a must-have tool in every radiotherapy department. More specifically, the human-like skin tone of the phantoms combined with the already unique features of realistic bone/soft-tissue contrast in CT (Computed Tomography) and MR (Magnetic Resonance) imaging and patient-like anatomy make them the best candidate for testing advanced SGRT systems. Moreover, RTsafe's head phantoms offer the ability to accommodate small metal spheres at predefined locations acting as reference points visible in CT, CBCT, kV and MV imaging. The external surface of the phantoms is modified to provide realistic external morphological characteristics, with dull surfaces minimising artifacts and unwanted reflections on optical imaging. The end-user also has the ability to evaluate the dosimetric and spatial accuracy of the SRS treatment in an End-to-End manner with a specially modified Prime phantom that offers point (ionization chamber and solid-state detectors), 2D (film), and 3D (gel).

Monitoring the position of the phantom.

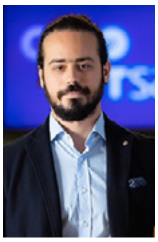


MV matching of the phantom.

At RTsafe we have a clear strategy; safer and more efficient SRS treatments will benefit patients ensuring a better treatment outcome, medical personnel allowing them to gain confidence in adopting new techniques, and clinics boosting and safeguarding their brand name. Our team is always ready to work with you and support you.

For more information visit
www.rt-safe.com
or email info@rt-safe.com

Emmanouil Zoros Medical Physicist - Product Manager
Emmanouil is responsible for product management, data analysis, and film dosimetry at RTsafe. He has a Diploma in Applied Mathematics & Physics from the National Technical University of Athens and a Master of Science in Medical Physics from the National and Kapodistrian University of Athens. His research interests focus on radiation therapy with an emphasis on quality assurance in stereotactic radiosurgery, experimental and computational dosimetry using Monte Carlo simulation techniques.



Georgios Kalaitzakis, Product Manager
Georgios is responsible for the 3D digital design of the 3D printed phantom, the data analysis, the communication and the whole scientific support and guidance of the end user. He has a diploma in Electronic & Computer Engineering, where he focused on the estimation of pharmacokinetic parameters via dynamic contrast enhancement imaging in order to annotate the perfusion of the brain tumour. During his PhD in medical school at the University of Crete, he introduced advanced MRI biomarkers in CNS diseases.

Visit RTsafe at ESTRO 2022 Booth 250

Prime

End-to-End quality assurance of challenging SRS applications

- Confidence through 3D
- True-to-life human anatomy
- End-to End QA in stereotactic radiosurgery

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The Short Story From My Windowsills

Evelina Jaselske from Kaunas, Lithuania tells us about her orchid-growing hobby

When I finished my bachelor's degree, 14 years ago, I did not expect that the first orchid I received as a graduation gift would become the beginning of a long-lasting hobby. Today I have around 130 examples of various species and hybrid orchids, none of which are from Lithuanian shopping or garden centres.

My passion for orchids began seriously at the exhibition of succulents and orchids in Raudondvaris Manor in 2010. I met a lot of like-minded people in one place and was warmly admitted to the community, despite the fact that I was growing just a few orchids bought from a shopping centre at that moment.

Around the same time, we founded the Lithuania Orchid Growers' Society which unites about 50 perennial orchid-growers. By growing orchids, I contribute to the Society's goal of preserving, researching, and popularising the orchid family (Orchidaceae) in Lithuania and abroad.

One more interesting fact is that orchids are one of the largest flowering plant families in the world, with at least 25,000 species. Every orchid grower can choose from a wide range of orchid sizes, from very small orchids with a few millimetres of flower width to very large species belonging to the Grammatophyllum genus, with flower stalks longer than 2 metres.

The orchid species mean that it is possible to find the same orchid in nature, and a primary hybrid is a cross between two orchid species. These orchids (species or primary hybrids) differ from the derived ones (like Phalaenopsis found in shopping centres, in their care requirements. Some are more sensitive to ambient humidity, have resting periods, need some range of light spectrum, or are kept in basements or refrigerators during the winter period, or just in an orchidarium with high humidity the whole year.

So, returning to my personal collection, for many years, I have been choosing the species that I like most and which that grow in my conditions, including the Pleurothallidinae (Masdevallia, Dracula, Pleurothallis), Epidendreae (Epidendrum), Angraecinae (Angraecum, Aerangis), Cypripedioideae (Paphiopedilum) and Dendrobieae (Bulbophyllum) subtribes.

The largest part of my collection is dedicated to Bulbophyllum. Nevertheless, almost all Bulbophyllums have foul scented and short-living (5-10 day) flowers.


Bulbophyllum palawanense


Bulbophyllum Daisy Chain x purpurascens


Bulbophyllum eberhardtii

Pleurothallidinae group orchids are more difficult to grow due to special temperature requirements; most of them are cool-growing, but can surprise by flowering twice a year, by their fragrance, or by producing a lot of flowers at once.

The attempt to grow cool or cold growing orchids introduced valuable practical knowledge: cool-growing orchids tolerate summer heat better than warm-growing orchids in the winter cold. To this end, my collection


Cochlioda noezliana

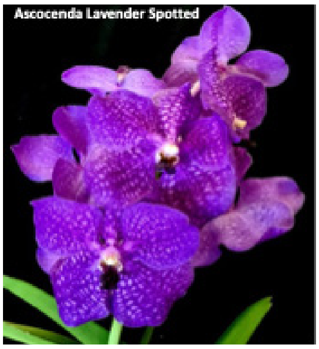

Stelis gemma

mainly consists of cool-to-warm-growing orchid species and primary hybrids. Some of them, like Cochlioda noezliana and Stelis gemma, grow at high altitudes in cool and cloudy forests, that naturally flower in the winter season.

All orchid growers, including myself, have a few more "tasks" to complete in order to progress with this hobby: visiting foreign botanical gardens, learning about water and environmental parameters and honing their photography skills. Some people in our society attended a photography course and bought photo cameras as well, but all the photos in this article were made using an integrated phone camera.

Our Lithuanian plant-lovers' community is active. We organise exhibitions, visit foreign exhibitions together, explore Lithuanian wetlands and other orchid habitats, and share information about seedling adult orchid and other terrarium plants with community members and like-minded people.

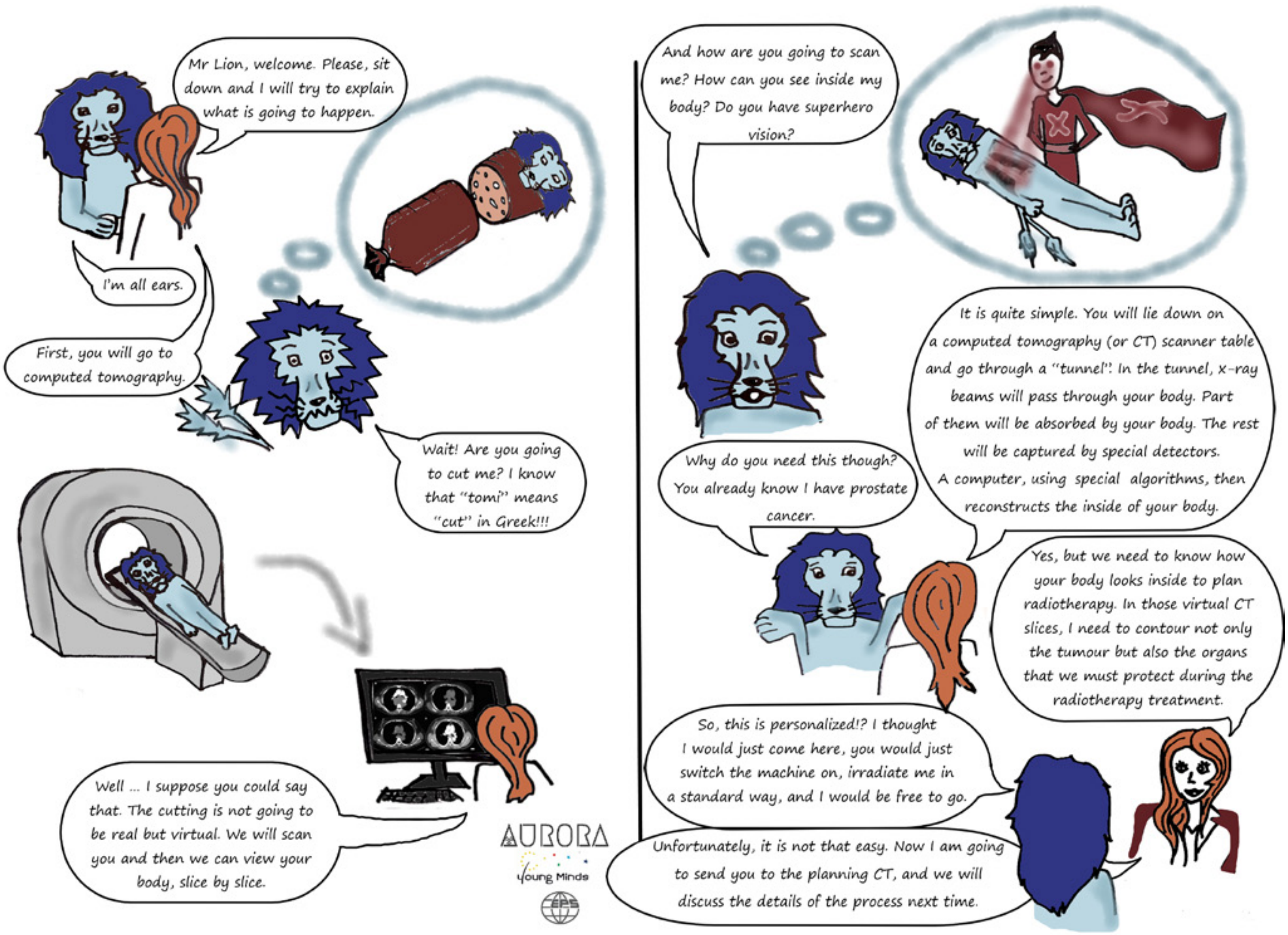
As can be understood, the orchidarium installation or photography parameters correlate not with medical physics but with physics. Another part of this hobby is related to flowers, beauty exploration, and smell investigation. At the end of this short description, I would like to show two warm-growing orchid hybrids from my windowsill. The fragrant flowers are each more than 12 cm wide!



Evelina Jaselske recently graduated with a PhD in material sciences at Kaunas University of Technology, funded by the Lithuanian Research Council. She is working on the development of new free-standing dose gels for individual patient dosimetry purposes in radiotherapy and radiosurgery. Evelina is a medical physics expert at the Radiotherapy and Neurosurgery departments of HLUHS Kauno klinikos. Her main experience is in dose planning, dose verification and dose reconstruction issues in radiotherapy and radiosurgery. She is also a lecturer at Kaunas College and Kaunas University of Technology and gives lectures to students in the field of biomedical sciences. She participates in scientific projects related to medical physics issues in medicine.

The Aurora project-informing about medical technology through comic strips

This is the latest comic strip from the Czech Republic's Aurora team, aimed at educating the public about the benefits of technology in medicine, in a highly- original way. In this episode, Lev the lion finds out about his upcoming CT scan to plan his radiotherapy treatment.



Aurora is a project of the Prague section of the European Physical Society (EPS) Young Minds initiative. The main aim of Aurora is to spread knowledge about ionizing radiation in general, including ionising radiation in medicine and cancer. And how do we intend to spread this knowledge? For example, by creating topical comics! Our team is still expanding. Now, we have two main painters, Marketa Hurychova and Anezka Kabatova. Then, there are four people who create stories for the comics, consult with the painters and translate texts, Barbora Drskova, Petra Osmancikova, Jana Crkovska and Anna Michaelidesova. Anna Michaelidesova is also the coordinator and the person in charge of the whole project.

The Aurora team grants permission and consent to EFOMP and EFOMP NMOs to use the comic strips for educational purposes. In case you would like to translate the comics into another language, email us the translated text and we will modify the comic and send it back to you. No other modifications to the content are allowed. You can contact the Aurora team at aurora@youngminds.cz

The Aurora team are:

Marketa Hurychova
studied Medical Physics at the Czech Technical University in Prague, gaining an MSc degree in 2019. She worked at the Department of Medical Physics at Hospital Na Homolce from 2018, at the Department of Radiation Dosimetry Nuclear Physics Institute of the Czech Academy of Sciences from 2019 and since 2020 she has worked at the Department of Medical Physics at Motol University Hospital.

Anezka Kabatova
has been studying Experimental Nuclear and Particle Physics at the Czech Technical University in Prague since 2015. After receiving her MSc degree, she plans to start a PhD in Astronomy. She has been an active member of the Prague section of EPS Young Minds since 2017, acting as a vice-president of the section between 2018 and 2019.

Barbora Drskova
finished her Medical Physics Masters programme at the Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering in 2019. Since then, she has been working on her PhD. She works as a medical physicist in radiotherapy at General University Hospital in Prague and University Hospital Královské Vinohrady.

Petra Osmancikova graduated from the CTU and holds an M.Sc. and a Ph.D. degree in Medical Physics. She is a clinical medical physicist in radiotherapy in Motol University Hospital in Prague.

Jana Crkovska
received her PhD in High Energy Nuclear Physics from the Universite Paris Sud in 2018. Since then, she has continued her research on charmed particles production in the Los Alamos National Laboratory. She is part of the LHCb Collaboration, one of the experiments at the Large Hadron Collider (LHC) in CERN.

Anna Michaelidesova received her MSc and PhD degrees in Medical Physics from the Faculty of Nuclear Physics and Physical Engineering of the Czech Technical University in Prague. She worked as a researcher at the Nuclear Physics Institute of the Czech Academy of Sciences from 2010 to mid 2019. In the period 2012-2017, she was employed as a medical physicist at the Czech Proton Therapy Center. From 2018 to mid 2019, she also worked as a researcher at the Faculty of Nuclear Physics and Physical Engineering of the Czech Technical University in Prague. Since June 2019, she has been a postdoctoral researcher at the department of Translational Radiooncology and Clinical Radiotherapy of the OncoRay® - National Center for Radiation Research in Oncology at the Medizinische Fakultät Dresden Carl Gustav Carus in Germany. She has been a member of the leadership committees of the Prague section of EPS Young Minds and of the IRPA YGN since 2019.

Upcoming Conferences and Educational Activities

This list was correct at the time of going to press.
For a complete, up-to-date list, please visit our **EVENTS WEB PAGE**

Mar 21st, 2022 - Mar 23rd, 2022

5th conference on small animal precision image-guided radiotherapy
Munich, Germany

Apr 11th, 2022 - Apr 13th, 2022

International Conference on Monte Carlo Techniques for Medical Applications
Antwerp, Belgium

Apr 21st, 2022 - Apr 23th, 2022

Data Analysis with Python for Medical Physicists
Online

Apr 25th, 2022 - Apr 29th, 2022

International Conference on Individual Monitoring of Ionising Radiation (IM2022) and Neutron and Ion Dosimetry Symposium (NEUDOS-14)
Kraków, Poland

Apr 28th, 2022

How to improve reports
Virtual

Apr 29th, 2022 - Apr 30th 2022

37th annual symposium of the Belgian Hospital Physicist Association
Brussels, Belgium

May 2nd, 2022 - May 5th, 2022

Course on Therapeutic and Diagnostic Medical Physics
Herlev, Denmark

May 16th, 2022 - May 18th, 2022

BNMS Spring Meeting 2022
Glasgow, UK

May 26th, 2022 - May 28th, 2022

Image Guided and Adaptive Radiotherapy in Clinical Practice Course 2022
London, UK

May 30th, 2022 - Jun 3rd, 2022

6th European Congress on Radiation Protection
Budapest, Hungary

June 1st, 2022 - Jun 3rd, 2022

10th Alpe-Adria Medical Physics Meeting
Ljubljana, Slovenia

Jun 10th, 2022 - Jun 12th, 2022

2nd Edition LOPS2022 Hybrid Conference: Online & In person June10-12, 2022 Fort Lauderdale, United States
Fort Lauderdale, United States

Jul 25th, 2022 - Jul 29th, 2022

Jubilee RAD 2022 Conference – Summer Edition
Herceg Novi, Montenegro

Aug 17th, 2022 - Aug 20th, 2022

4th European Congress of Medical Physics (ECMP 2022)
Dublin, Ireland

Sep 21st, 2022 - Sep 24th, 2022

German Conference on Medical Physics
Aachen, Germany

Nov 13th, 2022 - Nov 16th, 2022

EPSM22: Engineering & Physical Sciences in Medicine Conference
Adelaide, Australia

Dec 13th, 2022 - Dec 16th, 2022

International Conference on Integrated Medical Imaging in Cardiovascular Diseases (IMIC-2022)
Vienna, Austria

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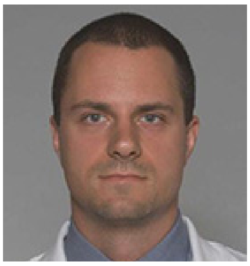

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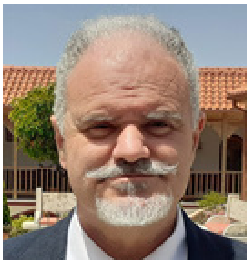

Constantinos Koutsojannis

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EFOMP

EUROPEAN FEDERATION
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The European Federation of Organisations in Medical Physics (EFOMP) was founded in May 1980 in London to serve as an umbrella organisation for medical physics societies in Europe. The current membership covers 36 national organisations which together represent more than 9000 medical physicists and clinical engineers working in the field of medical physics. The motto developed and used by EFOMP to underline the important work of medical physics societies in healthcare is “Applying physics to healthcare for the benefit of patients, staff and public”.

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