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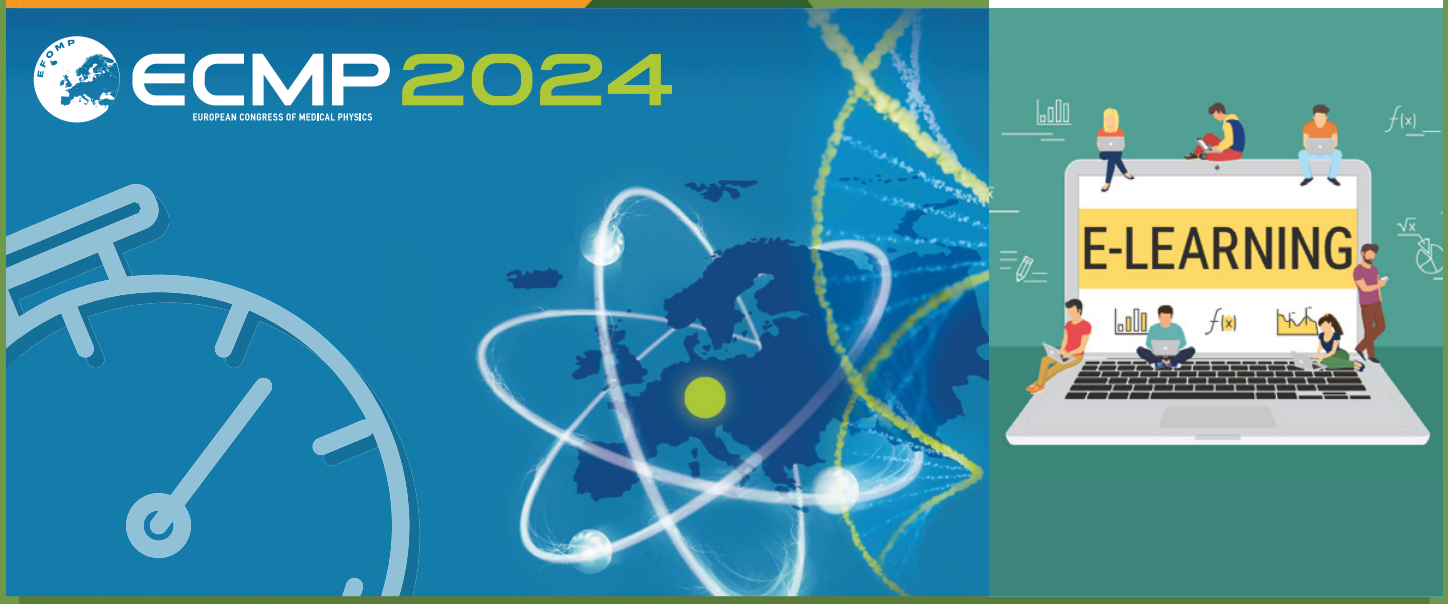

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EFOMP President's report

Efi Koutsouveli highlights actions which support EFOMP's Holistic Roadmap

Figure 1. The Middelfart Town Hall on the Island of Fyn, Denmark

During my visit to Middelfart, Denmark, in May to participate in the Annual Symposium of Medical Physics, I discovered the Middelfart Town Hall which has been designed as the most sustainable public building in Denmark. The building is not just climate and people friendly but also disabled friendly and future proofed to last for the next 150 years. On top of that, the town hall square is a meeting place with a city centre, housing, eating, shopping areas whereas the town hall itself converts to a cultural centre after town hall hours of operation to gather all residents (Figure 1). EFOMP's sustainability roadmap has such an holistic approach and includes actions not only for min-

imising environmental impact in the healthcare practices but interacts with all its members by promoting scientific exchange, training and re-training, driving equality, diversity, equity, fairness in its structures and ensures that EFOMP acts in the long run in the best interest of the National Organisations. In this article, I would like to share with our community our actions for a Sustainable European Congress of Medical Physics (ECMP).

The European Congress of Medical Physics (ECMP) is one of the EFOMP supporting bodies which brings together healthcare professionals every other year, cultivates a community of scientific and technological expertise, bridges knowledge across specialties, and addresses educational and professional matters. This year, ECMP is held together with the Joint Conference of the Medical Physics Societies of Austria (ÖGMP), Germany (DGMP) and Switzerland (SGSMP) and welcomes the neighbouring country France (SFPM) to further foster ties within the regional medical physics communities. All four national member associations share the same vision of sustainability as EFOMP. A sustainable development approach is adopted for the congress and actions are implemented to ensure environmental protection, to give the opportunities of participation to a big number of professionals and corporate members from across Europe, to engage the young professionals and organise a parallel early career track with themes focused on those in the earlier stages of their careers.

In order to promote green awareness topics on climate change and its impact on public health and society, the Congress President Yolanda Prezado and Trination Conference President Katia Parodi included in the scientific programme green lectures such as how to reduce the carbon footprint of external beam radiotherapy and new regulations in relation to polyfluoroalkyl. A green session will be also organised by the EFOMP Early Career Special Interest Group and the Young sector of DGMP which will provide space for related topics in collaboration with DGMP goes Green Special Interest Group.

The table below includes some of our combined efforts and initiatives to achieve sustainability goals.

Environmental actions	Principles of the 5 R's to manage waste generated from our event in the venue: Refuse, Reduce, Reuse, Repurpose, and then Recycle.
	The venue is Green Key certified for environmental responsibility and sustainable operation and easily accessible by public transportation
	Prioritise locally sourced organic, seasonal products for catering with recyclable wrapping
	Recommend the use of public transportation to the location of the social evening; every other location of the social programme can be reached by foot or public transport.
	Reduce paper use by switching to a mobile conference app, digital conference guide, digital posters and digital participation certificates
	The abstracts of the congress will be published in the European Journal of Medical Physics in digital format only.
Empower the young	Provide the opportunity to local young colleagues to be involved in the event as volunteers for informing and guiding participants.
	Organise an early career track as part of the congress main programme
Strengthen partnership	Include intersect sessions with professional organisations
Foster innovation	Organise for a second time the Do It Yourself fair where medical physics professionals can demonstrate their work. DIY-fair contributions will form a repository of solutions that can act as a foundation of knowledge and tools for our community.
Recommendations to participants	Optimise your travel journey to and from the venue
	Take advantage of recycling options in the venue for managing waste and minimise waste production.
	Have lunch locally in the venue and the city of Garching which offers a variety of shopping and gastronomic facilities
	Use reusable bottles for water and water fountains
	Encourage the choice of ecological friendly hotels
	Take promotional gifts only when you need them and prefer items which are reusable and make sure that these are biodegradable and sustainably produced.
Recommendations to industrial partners	Considering ecological certification and carbon offsetting during the planning and construction of exhibition booths.
	Use sustainable materials for the booths that are either recyclable or reusable. This principle also applies to transport packaging. Avoid in particular environmentally and health-hazardous substances and waste.
	Use energy-efficient devices for presenting your products and services. Try to optimise travel routes and the number of deliveries of goods and materials.
	Minimise distribution of paper material and products and if necessary, use products produced with respect to the environment. Promote your offerings through digital advertising and information (e.g. by using QR codes).
	For the travel and accommodation of the staff, we recommend following the above-mentioned guidelines for participants of the congress.

Munich has a highly developed urban transport system run by the Munich Transportation Corporation (MVG) in close partnership with the Munich Verkehrs- und Tarifverbund (MVV). The Underground station is right outside the entrance of the venue which is located in the middle of the Galileo – Neue Mitte Garching research Campus of Munich's Technical University. It is well connected to the Munich city centre, Franz Josef-Strauβ airport and Munich central train station – Line U6 (Garching-Forschungszentrum - Klinikum Großhadern). There are also possibilities for bike, car and scooter sharing.

In order to reflect the sustainability program of the current presidency of EFOMP and the tri nation hosts of ECMP, we are delighted to announce that we will be making three sustainability awards of free registration for ECMP 2026 in Valencia, Spain. Two free registrations will go to the most imaginative low carbon footprint physical journeys to the congress. The third registration will be awarded to the greenest company stand. The awards will be judged by the members of the EFOMP board and presented during the ECMP congress. The winners will be expected to write a brief article about their ECMP 2024 experience in the 2024 winter issue of EMP news.

Visit this page to apply for the EFOMP Travel Sustainability Awards.

We invite all participants and our industrial partners to help us achieving a 'Sustainable Congress', lead by example and encourage you to use the hashtag

#ECMP2024GOSUSTAINABLE

Reference: European Congress of Medical Physics

Efi Koutsouveli has worked as a Medical Physics and Radiation Protection Expert and Laser Safety Officer in the Medical Physics department of Hygeia Hospital in Athens, Greece since 1993. 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 EFOMP's President. In 2019, she received the IOMP-IDMP award for promoting medical physics to a larger audience.
Email: president@efomp.org

EFOMP Secretary General Report

In this report Brenda provides an update on institutional matters since our last edition EFOMP Committees: Driving Progress in Medical Physics

Our EFOMP committees have all been very busy holding virtual meetings over the last few months to propel their respective agendas forward. There are plans by all committees to meet at the European Congress of Medical Physics (ECMP) in Munich in September. We are delighted that many new people have joined our committees over the last few months.

E-Learning Platform: Empowering NMOs

One significant stride for EFOMP is the upcoming launch of EFOMP's new E-Learning Platform, a collaborative initiative aimed at enhancing education and training opportunities for National Member Organizations (NMOs). The platform will provide accessible resources for medical physicists across Europe. EFOMP President and the Chair of the Education and Training Committee have issued a letter to all NMOs, urging active participation in this ground-breaking endeavour.

EFOMPs Impact on EU Projects- MARLIN and SIMPLERAD

The months of hard work inputted by our volunteers into these two EU projects will soon be seen with the upcoming publication of the project reports. EFOMP is a consortium member in these projects. EFOMP is very delighted to be invited to take part in a project as a consortium member or endorse different projects that have an impact on and connection to the medical physics profession, research, education as well as to the field of radiation protection.

Special Interest Groups (SIGs): Launch of New Artificial Intelligence SIG

EFOMP's Special Interest Groups (SIGs) continue to thrive, welcoming new members and fostering innovation within specific areas of medical physics. The Early Career SIG, in collaboration with the EU & International Matters Committee, are hosting a series of webinars as a part of the warm-up to ECMP 2024. Meanwhile, the Radionuclide Internal Dosimetry SIG has embarked on new initiatives with a new steering committee, planning informative webinars for 2024. You can read about upcoming webinars here on the EFOMP website. The Artificial Intelligence SIG is our latest SIG to launch and is recruiting members. Check out the website for more information. The upcoming kick-off meetings of the Particle Physics SIG and Artificial Intelligence SIG promise to further enrich EFOMP's diverse scientific landscape.

ECMP 2024: Shaping the Future of Medical Physics

Anticipation is building for ECMP 2024, set to be a highlight of the year for EFOMP. With over 850 abstracts received and reviewed, the scientific program promises to be both enriching and diverse. The efforts of the ECMP 2024 Scientific Committee are commendable, ensuring a comprehensive line-up of speakers, our DIY fair, early career and poster sessions. Attendees can also look forward to social events and visits to nearby facilities, thanks to the diligent planning of the Local Organising Committee. Don't forget there are a number of travel grants and awards available to participants of the Congress. Check out the information on the ECMP 2024 Congress website.

EFOMP Working Groups (WG): Driving Policy and Standards

In February we launched a call to form a new WG to write Policy Statement 21 "The role of the Medical Physicist in the management of medical

laser sources". The nominations are currently under review and will be announced soon.

European School for Medical Physics Experts (ESMPE): Advancing Education

ESMPE organizes medical physics education and training events specifically targeted to Medical Physicists who are already Medical Physics Experts or would like to achieve Medical Physics Expert (MPE) status. The schools are accredited by an independent body (the European Board of Accreditation for Medical Physics) to ensure that they are at the required educational level, i.e., Level 8 of the European Qualifications Framework. We held elections in April for one open position on the ESMPE Board. I am delighted to announce that Sara Hackett representing NVKF was elected for a period of three years. Currently the ESMPE Board are busy preparing for the Pre Congress Schools and the Quantitative MRI school which will take place in Milan in October. You are strongly encouraged to book for these events as places are limited. Due to the limited number of places on each course, the interaction between lecturers and attendees is assured, guaranteeing the high quality of the courses.

Annual Council Meeting: Driving Collaboration with our members.

The Annual Council Meeting, scheduled to take place on the last day of ECMP 2024, provides a crucial forum for collaboration and decision-making amongst our NMOs . With preparations underway, NMO's are encouraged to submit topics for discussion by July 31st to the Secretary General. This meeting offers a valuable opportunity to shape EFOMP's strategic direction and priorities and we encourage our delegates to attend.

In conclusion, EFOMP's committees, SIGs, and initiatives are driving progress, innovation, and collaboration within the field of medical physics. With ECMP 2024 on the horizon and a myriad of ongoing projects, EFOMP continues to be at the forefront of advancing excellence in medical physics across Europe and beyond. Please do not hesitate to contact me on secretary@efomp.org if you have any queries or would like to discuss EFOMP attendance at your scientific meetings. Please keep up to date with all our activities by following us on social media and checking our website.

Brenda Byrne is a Principal Physicist working in the Mater Misericordiae University Hospital, Dublin, Ireland. Her primary areas of interest are diagnostic radiology, nuclear medicine and radiation protection. She has been a registered radiation protection adviser (RPA) since April 2000 and is a recognised medical physics expert (MPE). Brenda is the current Secretary General of EFOMP and Past Chair of the EFOMP Professional Matters Committee.

Editorial

Dear EMPNews readers,

As time flies by, we are gradually approaching the much-anticipated summer season and a well-deserved break from work, allowing us to enjoy quality time with family. However, before the holiday season begins, let's take a moment to reflect on our busy s pring, the exciting events and activities we've recently wrapped up, and get a sneak peek at the preparations for ECMP 2024. We also have updates on major EFOMP projects, progress from our Special Interest Groups, and much more.

As always, spring is a season marked by two major MPE-related congresses: ECR, which we partially covered in the last issue, and ESTRO, where our radiotherapy MPE community truly excels. In this issue, we reflect on the activities and events from both congresses, including contributions from industry, SIGs, and EFOMP. Beyond these major events, we also highlight annual congresses organised by our National Member Organizations (NMOs), such as the latest annual meeting of the Danish Medical Physics Association. Last but certainly not least, remember that ECMP 2024 is just around the corner. If you haven't registered for the conference yet, be sure to check out the updates on the preparations from our Secretary General, Brenda Byrne, and President, Efi Koutsouveli. You'll be inspired by the innovative sustainability efforts for this event. For those with a competitive spirit, consider vying for one of EFOMP's Travel Sustainability Awards. Don't miss out on this exciting opportunity!

This issue of EMP News features an important update on a significant EFOMP project. In Veronica Rosetti's article, you'll get a sneak peek at the ongoing development of the eLearning platform, which aims to enhance the accessibility, affordability, and functionality of continuous education resources for the global medical physics community.

In addition to the major articles and topics covered by EFOMP members, I would like to extend a special thank you to our corporate contributors. Each quarter, they submit high-quality reports that highlight significant developments in the field. This time, PTW has provided a different type of article that I strongly recommend to anyone in the radiotherapy field. It's an outstanding piece detailing the major pitfalls and considerations when selecting a dosimeter for water phantom measurements. This article serves as an excellent 'how-to' guide and has already earned a place on our office wall.

And wow taking a small detour. Just five months ago, as I began my term as the new Communications and Publications (CP) Committee Chair, Efi Koutsouveli promptly arranged a call to discuss my vision and how the committee could support it. I aimed to enhance the accessibility of the EMPNews, introduce a digital submission system, and better engage the young generation of Medical Physics Experts (MPEs). Initially, my goal was to achieve significant graphical and accessibility improvements by the end of 2024. Little did I know about the incredible support from EFOMP, which allowed us to implement most of these goals within the first four months. As you may have noticed, the latest issue of EMPNews looks quite different from its predecessors and was published a bit late due to the new layout development and internal brainstorming. In the last editorial, I briefly mentioned the main changes we introduced, but let's delve into them more deeply, especially those you can influence.

1. **Interactive Cover Showcasing Major EFOMP Events and Goals**

   Starting with the Spring 2024 issue of EMPNews, our cover will always feature three images: one highlighting a major MPE-related

conference, another showcasing a significant EFOMP project, and a third representing a topic nominated by our readers. From Autumn 2024, we will launch online polls among EFOMP followers to identify the topic to be spotlighted on the cover and in the newsletter's content. Stay tuned for more updates on this initiative.

2. **Enhancing Transparency and Sharing EFOMP Leadership's Vision**

   EFOMP represents over 9,000 medical physicists across Europe. Many of you tirelessly contribute to committees, working groups, and other EFOMP projects on a voluntary basis. Typically, it's only when projects are completed and results disseminated that we appreciate colleagues' efforts through reports and publications. We aim to change this by highlighting those who volunteer for leadership roles, many of whom are young female MPEs, at the start of their projects. Our new 'Meet the Chairperson' article series, launched in Spring 2024, introduces these leaders and shares their vision and motivation upfront. We hope this will inspire more early-career MPEs to get involved in the community. This edition focuses on a newly elected member of the steering committee for the Special Interest Group on Internal Dosimetry (SIG_FRID).

3. **Spotlight on Special Interest Groups (SIGs)**

   EFOMP is a dynamic organisation, evolving with the needs of the European MPE community, as reflected in its support of the SIGs. These groups are unique, as they are not formal committees but rather communities driven by shared passion. We will gradually dedicate more newsletter space to the activities and projects coordinated by our SIGs. To learn more or get involved, check the SIG section of the newsletter or follow the provided link.

4. **Accessibility and Sustainability**

   Efi Koutsouveli's presidential articles have emphasised sustainability and equality as top priorities. Consequently, we aim to cover more topics on sustainability in medical physics. From Autumn 2024, we will launch a new article series on sustainability practices in Europe. If your NMO or hospital has a sustainability project worth sharing, please submit a short article through our submission system. In the Summer 2024 issue, you can already read about the efforts to make the ECMP 2024 congress a true green event. Additionally, significant effort has gone into negotiating an Open Access deal for all EFOMP reports and policy statements in the European Journal of Medical Physics.

Thank you to all contributors to the Summer edition of EMP News and to the CP committee members for their continuous support in preparing this issue. Enjoy the Summer 2024 edition, and see you in Munich in September!

Sasha Ivashchenko, MPE at the Department of Nuclear Medicine and Molecular Imaging of the University Medical Center Groningen, chair of the CP committee 2024-2025.

Physica Medica: Editor's Choice

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

M. Azimi et al Attention-based deep neural network for partial volume correction in brain 18F-FDG PET imaging Phys. Med. 2024;119: 103315.

It is very well-known that the accuracy and the quantification of the signal in Positron Emission Tomography (PET) at voxel level might be affected by the partial volume effect (PVE). Several methods have been proposed for correcting the signal and subsequently the image for the PVE, but none has widely entered clinical practice. This paper presents a deep-learning approach to circumvent the need of anatomical information for assessing the PVE and correct the images accordingly. The method presented and validated in this paper appears to be very promising with respect to performing the partial volume correction on PET imaging without the use of anatomical images in the brain regions. Potentially, the method and the technique used in this study could be applied to other anatomical sites and therefore the study has a very high potential to generally positively impact the clinical practice in PET imaging.

S. Domadia et al Segmenting brain glioblastoma using dense-attentive 3D DAF2 Phys. Med. 2024;119: 103304.

One of the most challenging aspects in the management of glioblastomas is the identification of the extent of the lesion in order to choose and apply the optimal treatment. This study presents a novel methodology for segmenting brain glioblastoma using the AI-based Dense-Attention 3D U-Net network. The method was tested on rather well-known sets of glioma cases publicly available and already used in ambitious competitions aiming at determining the best glioma segmentation approach. Given the clinical implications of being able to determine the size and shape of the observable volume occupied by glioblastoma cells, this study is highly relevant and has the potential to contribute to the increase in the capacity of radiotherapy treatment plans to control glioblastoma tumours.

E. Ciarrocchi et al Plastic scintillator-based dosimeters for ultra-high dose rate (UHDR) electron radiotherapy Phys. Med. 2023;121: 103360

Last paper selected for this summer edition concerns the dosimetry of one of the techniques regarded as the most promising nowadays for per-

forming radiotherapy, namely ultra-high dose rate (UHDR), known as FLASH radiotherapy. The authors propose the development of new dosimeters based on plastic scintillating fibres. The results of using these dosimeters on UHDR irradiations showed linearity, which is one of the main issues in ultra-high dose rates treatments, as well as the capability to reconstruct both the timing and spatial profiles of the beam, making them strong competitors in the race towards finding the most suitable detector for electron FLASH treatments.

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

Meet the new chair

In the latest issue of EMP News, we introduced a new article series titled “Meet the Chairperson,” which will become a regular feature of our newsletter. This series aims to bring readers closer to the leaders behind committees and working groups within EFOMP, sharing their motivations and visions for their roles.

Just over three years ago, EFOMP established its first Special Interest Group on Internal Dosimetry (SIG_FRID). This entity was created to bring together like-minded individuals focused on a major research or clinical question within medical physics, fostering collaboration on various sub-questions related to the main topic. SIG_FRID has been a tremendous success, growing to over 200 members in its first three years. It has organised a dedicated international scientific symposium (Symposium on Molecular Radiotherapy Dosimetry:The future of theragnostics), launched an exceptional educational webinar series, generated scientific output from its focus groups, and achieved much more.

In Q2 2024, elections were held for the steering committee (SC) of SIG_FRID, resulting in the election of nine members, six of whom are entering their second three-year term. In this article, we aim to learn more about the vision and background of a few of these members.

The Steering Committee members elected on March 2024 for a 3-year term are:

- Manuel Bardiès, Montpellier, France (re-elected)
- Julia Franziska Brosch-Lenz, Munich, Germany
- Carlo Chiesa, Milan, Italy
- Gerhard Glatting, Ulm, Germany (re-elected)
- Silvano Gnesin, Lausanne, Switzerland
- Pablo Minguez Gabiña, Bilbao, Spain (re-elected)
- Steffie Peters, Rabboud, Netherland (re-elected)
- Katarina Sjögreen Gleisner, Lund, Sweden (re-elected)
- Lidia Strigari, Bologna, Italy (re-elected)

Without further ado, let's meet the newly elected steering committee members.

Meet prof. Katarina Sjögreen Gleisner (KSG)

I have been a full professor of medical physics at Lund University since 2017. I received my PhD in 2001 and worked as a clinical medical physicist and academic until 2011, specialising in external beam radiotherapy and nuclear medicine. Additionally, I direct undergraduate studies in medical physics and supervise PhD students in medical physics and oncology.

Meet dr. Pablo Minguez Gabiña (PMG)

I am a senior medical physicist at Gurutzeta/Cruces University Hospital in Barakaldo, Spain, and a part-time professor at the University of the Basque Country in Bilbao. Additionally, I serve on the Dosimetry Committee of the EANM. I earned my PhD from Lund University.

Meet dr. Steffie Peters (SP)

I am Steffie Peters, a medical physicist based at the Radboud University Medical Center in Nijmegen, The Netherlands. My focus is on nuclear medicine imaging, therapy and dosimetry. I coor-

dinate the Dosimetry Core Unit, where we work on radiobiology and dosimetry for radionuclide therapy dosimetry, from a preclinical to a clinical setting.

Meet dr. Julia Bolsch-Lenz (JBL)

I am a passionate medical physicist from Germany with a strong interest in dosimetry to provide patients with optimum treatment and to move beyond 'one-size-fits-all' activity prescriptions. I am a clinical medical physics expert and I am actively researching image-based dosimetry for internal radionuclide therapies towards accurate, reproducible, and practical absorbed dose estimation at the organ, voxel- and microscopic level.

Why have you decided to (re)apply for the SC position of the SIG_FRID?

(KSG): I am passionate about advancing imaging and dosimetry in molecular radiotherapy. The SIG_FRID initiative is vital, offering a collaborative and open environment that I find incredibly inspiring. Reapplying for the SC position allows me to continue contributing to this important field and foster innovation and collaboration.

(PMG): Since beginning my career as a medical physicist, I have been deeply involved in dosimetry in nuclear medicine—a continuously evolving field. I have contributed to various working groups within the Spanish Society of Medical Physics (SEFM), EANM, and EFOMP. Over the past three years as an SC member of SIG_FRID, we have made significant advancements, including organising a successful dosimetry symposium. I wish to continue this impactful work.

(SP): I have worked with great pleasure with my fellow SC members the past 3 years, and I am proud of everything we achieved, including the creation of several focus groups (resulting in multiple publications already), organisation of Scientific meetings and Dosimetry case report meetings, contribution to publication of EFOMP Policy Statement 19, organisation of the SMRD symposium in Athens last November, and contribution to the EC SAMIRA Simplerad project, representing EFOMP. Most of all, we created a network for fellow medical physicists and other colleagues with an interest in radionuclide dosimetry, which is appreciated by many.

(JBL): I decided to apply for the SIG_FRID SC position to contribute to the priorities of the committee and to promote excellence in medical physics and dosimetry for internal radionuclide therapies. I am personally driven to improve internal radionuclide therapies towards precision oncology by personalising administered activity and absorbed doses. Being a member of the SIG_FRID steering committee enables me to actively shape future scientific meetings, forward teaching and education, and to push for professional and regulatory changes for the field of dosimetry.

What is your vision or things you would like to achieve in the coming 3 years?

(KSG): My vision is to promote the collection of dosimetry data to facilitate patient cohort analyses in molecular radiotherapy, thereby enhancing our understanding of radiobiological effects. To achieve this, I aim to advocate for comprehensive education in MRT dosimetry across Europe, ensuring that medical professionals are well-equipped to utilise and advance dosimetry practices effectively.

(PMG): In the next three years, I aim to see dosimetry in radiopharmaceutical treatments become more prevalent across all countries, enabling dosimetry-guided treatments that will benefit patients. Within SIG_FRID, I hope to see the current focus groups complete their projects and new ones begin, furthering our knowledge of dosimetry. Additionally, I believe that teaching

is crucial in this field, and I envision SIG_FRID becoming an invaluable resource for education and training in dosimetry

(SP): I know some new exciting things are in the pipeline, including educational activities on dosimetry. I think this would really add to the training material for medical physicists and other people working in the dosimetry field. As this really is an emerging field, I hope we can create more visibility for nuclear medicine and dosimetry within EFOMP, including at ECMP conferences. Also, we will continue the Scientific Meetings and Dosimetry case report meetings and hope to reach an ever expanding network. The discussions in these meetings have been very fruitful, so I hope we can proceed with that in the coming years. Lastly, I hope that we, as SIGFRID, can have a coordinating role in clinical implementation of radionuclide therapy dosimetry across Europe, making optimal use of the network we created.

(JBL): I believe that the current lack of absorbed dose and effect relationships – may it be organ toxicity or tumour response –for most internal radionuclide therapies is the greatest challenge and opportunity for our field. For the coming 3 years, I envision a growing network of medical physicists, nuclear medicine physicians and technologists as well as students that provide a fruitful exchange of methodologies towards a standardisation of dosimetry. Personally, I aim at providing education and training for dosimetry to provide our future patients with accurate and comparable dosimetry accompanying their therapies in the clinical routine setting. Within SIG_FRID, we have the chance to actively shape and promote important aspects of dosimetry starting with quantitative imaging, time-activity-curve fitting and absorbed dose estimation.

Sasha Ivashchenko, MPE at the Department of Nuclear Medicine and Molecular Imaging of the University Medical Center Groningen, chair of the CP committee 2024-2025.

Sasha Ivashchenko serves as the chair of the Communications and Publications Committee of the EFOMP as of January 2024. She holds a senior position as a medical physicist at the Department of Nuclear Medicine and Molecular Imaging of the University Medical Center of Groningen, and is active in personalized dosimetry research and science communication.

EFOMP

EUROPEAN FEDERATION OF ORGANISATIONS FOR MEDICAL PHYSICS

MAJOR EVENTS IN 2024

ECMP congress 2024

You are invited to participate in the highly anticipated 5th European Congress of Medical Physics, which will take place between September 11 and 14, 2024 in Munich. As always, the Congress will be accompanied by a series of pre-Congress schools accredited by the ESMPE.

Learn more

ESMPE School on MRI

The European School for Medical Physics Expert (ESMPE) of the EFOMP would like to invite you to the upcoming school editions in 2024.
Don't miss your chance to learn more about quantitative MRI between October 24 and 26 in Milan!
Each school is accredited by EBAMP as a CPD event at EQF level 8.

Learn more

International mobility

EFOMP encourages international collaboration and lifelong educational activities of medical physicists and encourages them to use the ongoing ENEN2+ and PianoForte funding programs for this purpose. Each ESPE school and EFOMP events are eligible for travel funding through the above calls.

Learn more

EFOMP e-learning platform: a cutting-edge platform for education and training in medical physics

In the dynamic field of medical physics, continuous education and training are essential for professionals to stay current with advancements, enhance their skills, and deliver optimal patient care. Recognizing this imperative, the European Federation of Organizations for Medical Physics (EFOMP) is working on the creation of a new e-learning platform with the ambitious aim that it will become a key reference point for medical physics education, training and retraining on an international level.

Since EFOMP strongly believes in the usefulness of a versatile e-learning platform with an attractive and modern interface, the Education and Training Committee is hardly working in collaboration with Cevents, our e-learning service provider selected after a European call for tenders, to create an appealing and user-friendly interface, that can be used by anyone interested and, at the same time, provides a service to its National Members Organization (NMOs).

Moreover, EFOMP's Education and Training Committee is working in synergy with the European School of Medical Physics Experts (ESMPE) to draw up a common strategy to cover all-round training, with synchronous, asynchronous, hybrid courses covering cutting-edge topics, webinars focusing on specific topics and more basic courses providing CPDs.

The platform is scheduled to be launched in Munich during ECMP 2024, but here are the first rumours about the content.

It will be divided into several sections, each with a specific content, some accessible to everyone, others only to those who have signed up for individual association membership (IAM), but becoming an IAM on the platform will be super easy: all it takes is a couple of clicks and €15 and the membership will last for a whole year!

The first platform section will be accessible to everyone, it will host the fee-based courses with registration fees, and will contain Webinars (one – two hours), Synchronous courses (one – three days), Asynchronous courses (on line for a few months/one year), Hybrid Courses or Blended courses.

All these courses are to be organised in the coming years and will provide CDP.

The second section will be accessible to IAMs, and will host the repository of all courses that have been and will be delivered by the ESMPE, which are already currently on the EFOMP platform. The course database will be clearly structured to be easy to use.

Since EFOMP is an organisation with many NMOs from different economic regions, the third section of the new platform will be dedicated to NMOs. In this section there will be information about each national (or international in some cases) organisation, in which the NMO's Logo will appear as well as some specific data both in English and the language of the NMO. In this section, interested NMOs can use their dedicated space to promote and/or

add their own courses. Publishing these courses is free of charge, however adding them to their dedicated section will involve a payment under the same type of contract that EFOMP has signed with Cevents. The language used for the courses will then be chosen by the NMOs, with the ambition to reach much easier people from their own country or countries who speak the same language.

A fourth section will contain some amazing surprises! Stay tuned for the updates!

With this platform, EFOMP hopes to reach a large number of professionals and students and to be able to provide a high level of education to all who are interested, with the ambition that the platform will meet the highest educational standards and serve the needs of the European medical physics community and beyond.

We hope you will join us on the platform!!!

Veronica Rossetti
Chairperson Education and Training Committee

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 used to be a member of the Scientific Committee of the Italian Association of Medical Physics (AIFM) and of the Communication and Publication Committee of EFOMP. She is for the second term Chairperson of the Education and Training Committee of EFOMP.

Accuray: Simplifying Radiotherapy Setup and Monitoring Patients with the Radixact® System.

Studies have revealed that surface-guided radiotherapy (SGRT) could potentially mitigate 21% of errors associated with radiotherapy [1]. Serving as a “second observer” [2] throughout the treatment process, SGRT enhances the precision of patient positioning and monitoring across all stages of the treatment delivery

Despite multiple checks in the workflow chain, errors do occur. Various factors, such as margins reduction and a shift towards hypofractionation [3–6], have resulted in reduced tolerances for errors. Consequently, there has been a corresponding increase in the need to monitor the quality and safety of treatments during delivery [7-8]. Through continuous monitoring of the patient's surface, SGRT emerges as an invaluable tool within the radiotherapy workflow, serving as an independent safety system, and detecting setup errors and intrafraction motion to further enhance treatment precision and efficacy [9]. Accuray acknowledges these challenges and has taken proactive measures to address them.

The Radixact® System now seamlessly integrates SGRT functionalities. VitalHold™ has been designed to streamline patient setup, enhance monitoring during treatment, and helps facilitate deep inspiration breath-hold (DIBH) treatments with ease and integration. VitalHold™ elevates its capabilities, helping to ensure enhanced patient safety and treatment quality.

The Radixact System with 3 Catalyst+ HDTM cameras.

In partnership with C-RAD, the Radixact System utilizes 3 Catalyst+ HD™ cameras which project optical imaging onto the patient's surface, enabling precise positioning, tattoo-free, and mark-free, all without additional radiation exposure. Originally tailored for breast cancer treatments, the VitalHold™ package's versatility extends to all patient cases with its three key functionalities:

Surface-Guided Patient Setup
VitalHold™ redefines patient setup on the Radixact System by eliminating the need for tattoo points. Instead, 3 high-definition cameras mounted above the treatment area enable surface-guided daily setup for every patient. Couch coordinates are directly sent to the Radixact System, streamlining workflows, and making patient setup easier and faster as compared to setups without VitalHold™, according to the team at CHUV, Lausanne, where the first system has been installed worldwide.

In-bore Motion Detection
VitalHold™ provides real-time visibility and motion management during treatment. By leveraging SGRT technology, the Radixact System can automatically hold the beam whenever intrafraction motion is detected. With the central camera boasting a field of view (FOV) exceeding 140 cm, the system promptly detects aspects that a human eye may not have observed on the console cameras, then reacts instantaneously.

Respiratory-Gated Treatments
Specifically, for DIBH treatments and other techniques requiring respiratory gating, VitalHold™ utilizes the central camera for precise beam delivery gated with the patient's breathing pattern. VitalHold™ automatically holds the beam when the breathing amplitude deviates from tolerance, minimizing radiation exposure to healthy tissues, particularly in breast cancer patients. Moreover, the system demonstrates the remarkable capability to hold the beam within 100 milliseconds and resume within 1 second.

In addition to its technical prowess, VitalHold™ prioritizes simplicity and efficiency in clinical practice. Through seamless integration with the Radixact System workflow, including automatic beam-holds, healthcare providers can optimize delivery processes. This enhances patient throughput and helps reduce overall treatment times with an average of 10 minutes door-to-door on the Radixact System, with just an average of 2 minutes of beam-on time.
By integrating SGRT capabilities with the Radixact System, including support for DIBH treatments, VitalHold™ empowers healthcare providers to deliver precise, personalized, and efficient treatments across a wide range of patient cases.

For further information refer to the Radixact System key features and benefits: https://www.accuray.com/radixact/

Accuray Disclaimers
VitalHold™ is 510(k) cleared and available in the EU market. Availability is subject to regulatory clearance or approval in some markets.

Medical Advice Disclaimer
Accuray Incorporated as a medical device, the manufacturer cannot and does not recommend specific treatment approaches. Individual results may vary.

Safety Statement
https://www.accuray.com/safety-statement/

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Rémi Tannouri, Clinical Product Manager, joined Accuray in 2020. He brings a decade of experience as a Medical Physicist across various positions in academic and private centers in France. Rémi has a M.Sc. degree in Medical Physics and an engineering degree in Electronics.

The integration of risk analysis and incident reporting

Reliability of risk evaluation

Risk analysis (RA) is a methodology used by multi-professional clinical teams to determine how to best avoid patient treatment failures. It is put into practice before starting a new treatment technique, or after significant changes to an existing one. Besides being mandatory for radiation treatments in the European Union [1], RA is part of the best practice to maximise the level of safety achievable with limited resources [2], [3].

One major RA difficulty is the intrinsic subjectiveness of risk evaluation, which is performed during team brainstorming sessions. Ideally, decisions to invest resources in new safety measures and workflow improvements should be based on this evaluation, and it should be validated with objective data like incident reports [4], [5], [6], [7]. For instance, in Ref.[7] the comparison between an FMEA RA and reported incidents revealed missing failure modes and incidents which were not reported. The goal of the SW application described here is to provide the missing tool necessary to routinely use this validation technique.

Software application

myQA PROactive is an IBA Dosimetry software suite for risk management, initially developed as an RA tool optimised for radiation therapy. The new version, developed in partnership with the University Clinic of Erlangen [8], will allow to validate an RA with the following procedure [9]:

1. Failure modes are evaluated quantitatively, in terms of occurrence (probability per patient that the failure occurs) and detectability (conditional probability that the failure is detected before generating an adverse event). The expected rate of adverse events (incidents with a consequence for patients) and near events (also called “near misses”, incidents which could have harmed a patient but have been timely detected and neutralised) can be thus calculated for a given patient throughput.

2. The application database is populated with incident data. Clinics can import incidents from their incident report and learning system (IRLS) using a spreadsheet interface. As an alternative, clinics without a satisfactory IRLS can use myQA PROactive for incident reporting and analysis too.

3. Incidents are assigned to failure modes (every incident is seen as the result of a failure) and classified either as adverse events, near events, or inconveniences (incidents without harm potential).

4. Expected and reported rates of adverse events and near misses are compared to reveal inconsistencies like risk underestimate or overestimate, or an incomplete incident reporting. This can be done for individual failure modes, for all aggregated failure modes, or for failure modes aggregated according to process step or severity. Risk evaluation of failure modes can thereafter be adjusted to remove inconsistencies, and the risk analysis is updated accordingly.

An example of validation for a specific failure mode is given in Figure. The cumulative plot on

the left (occurrences) refers to the sum of adverse events and near events. Here the number of reported incidents (red markers) is higher than expected (blue markers). This inconsistency can be solved by increasing failure mode occurrence (yellow line). However, with updated occurrence, more near events and less adverse events than reported would be predicted, showing that the initial detectability evaluation was too optimistic.

Conclusions

During development, the SW was extensively tested with positive results by about 20 clinics in Europe and North America. As an example, Ref. [10] shows how the application allowed to improve the RA of a radiation therapy workflow by discovering 15 missing failure modes and a general underestimate of failure mode occurrence (50% on the average). Available evidence confirms that integration of incident reporting and RA fosters risk management quality and meaningful workflow optimization, and that myQA PROactive provides for the first time an effective tool to perform this integration in clinical routine.

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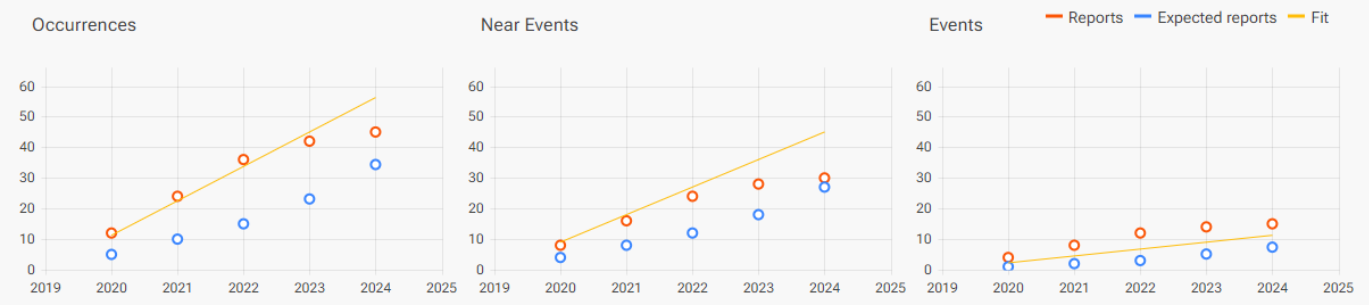

Example of comparison between expected and reported incidents for a specific failure mode.

David Menichelli is a product manager at IBA Dosimetry. He received his doctorate degree from the University of Florence, where he worked as a researcher in applied physics before moving to IBA in 2010

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LUNA 3D camera

Patients often come face to face with a variety of technical equipment in radiotherapy, large devices in particular. This environment, intimidating in both its complexity and technology, can itself generate even more uncertainty and anxiety in what is already a worrying health situation. This is where product design comes into play as a key factor, not only to optimize the functionality of the devices, but also to create a calming and reassuring atmosphere in the treatment room. The focus is on human-centered design, which not only takes account of medical technology requirements, but also focuses on the needs of patients and users.

The LUNA 3D product development process focused on this kind of product design too. LAP was able to rely on the support of Milani Design & Consulting AG in designing the LUNA 3D camera pod. Thomas Speck, Vice President New Product Solutions at LAP, emphasizes the strategic decision to involve an industrial designer in LUNA 3D's development process. The goal was clear: To create a solution that is not only technologically advanced, but also aesthetically pleasing, integrating seamlessly into existing medical environments and responding to users' needs.

"We weren't just looking for a product. We wanted a solution that would provide a positive experience for both healthcare professionals and patients. The design needed to quell fears and at the same time meet the stringent regulatory demands in the medical technology sector," he explains.

One of the reasons for selecting Milani was its many years of expertise in medical technology. The company's roots go back to Francesco Milani, who founded the company 60 years ago. At that time, the term "product design" was still not really on anyone's lips. Francesco Milani, originally a graphic designer, started out focusing on medical technology and so laid the foundations for the company's success story. Today, Milani looks back on an impressive 3,900 successful projects.

Fernando Cruz, Industrial Designer at Milani, explains the demands that design is called on to meet: "Good design is not just a matter of taste for us, but a strategic tool. It should inspire people, offer added value, bring companies success and have a positive impact on the environment." Milani's principles are reflected in functional, user-centered solutions that integrate intuitive operation, emotionality and a company's values.

LAP, Milani and the engineers worked side by side throughout the entire design process in the LUNA 3D development. Particular attention was paid to the user experience felt by healthcare professionals as well as patient centricity. "We worked intensively with a select group of reference customers to ensure that the design was not only functional, but also emotionally persuasive. One of the key decisions was to use aluminum to efficiently dissipate heat and eliminate the need for ventilation openings in the housing. This makes it easier to clean and maintain and increases the appliance's service life," says Thomas Speck. "The decision to opt for a glass front that doesn't look like eyes or cameras was also a very conscious one," adds Fernando Cruz. "The device should not look like a monitoring system to patients, but rather it should be reassuring and user-friendly. At the same time, we designed the surfaces to create an interplay of light and form that gives LUNA 3D a striking, professional appearance and a high recognition value.

The design process for medical technology products is all about striking the balance between regulatory requirements, usability, and aesthetics. The challenge here is to find solutions that not only meet technical requirements, but also satisfy users' needs. In the case of LUNA 3D, the focus was on the patient as well as the user. The camera pod demonstrates how innovation and design can go hand in hand to ensure not only technological progress but also an excellent user experience.

LUNA 3D has FDA 510(k) clearance. Availability of products, features, and services may vary depending on your location.

Annette Schindler is an International Marketing Manager at LAP GmbH Laser Applikationen

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Log File Analysis with ClearCalc and its RadMonteCarlo Integration

New Features Enhance Functionality

Introduction

Exciting news: the latest release of ClearCalc and its RadMonteCarlo integration (v2.5) is here. While there are many updates worth celebrating, let's explore one of these product updates in more detail: log file analysis. While this has been an option for ClearCalc users for some time, it's a significant new addition to the optional RadMonteCarlo feature. Let's explore how each software approaches log files a little differently.

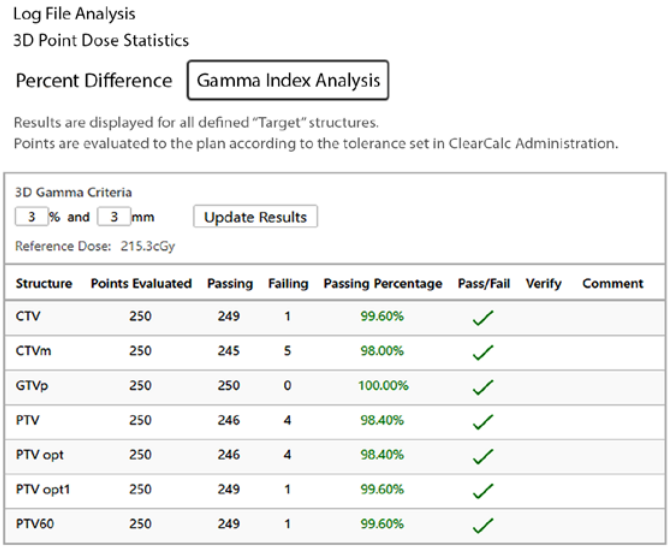
Log File Analysis is Here

Log files contain snapshots of machine performance details and provide positional readouts of individual MLC leaves as they move throughout the treatment. Analysing this array of data as-delivered can identify potential deviations from planned positions to assess the accuracy of patient plan delivery.

Log files can be used for ongoing quality assurance purposes, but can also be leveraged as a method of patient-specific QA. Alongside powerful secondary calculations, log file analysis with ClearCalc and RadMonteCarlo provides a comprehensive assessment of delivered plan quality relative to the prescribed plan for both Varian and Elekta linacs.

ClearCalc Finite-Size Pencil Beam Analysis

In the Log File Analysis module within ClearCalc, the 3D point dose statistics display looks similar to the main calculation results interface. The difference is that with log files, all points (a maximum of 250 per structure) are analysed based on the dose calculated from log file machine parameters. ClearCalc compiles all target structures (e.g., GTV, CTV, PTV, ITV) within the treatment plan for volumetric statistical analysis using either a percent difference or gamma index analysis.


Log File Analysis
3D Point Dose Statistics
Percent Difference | Gamma Index Analysis
Results are displayed for all defined "Target" structures.
Points are evaluated to the plan according to the tolerance set in ClearCalc Administration.
3D Gamma Criteria
3 % and 3 mm Update Results
Reference Dose: 215.3cGy

Structure	Points Evaluated	Passing	Failing	Passing Percentage	Pass/Fail	Verify	Comment
CTV	250	249	1	99.60%	✓		
CTVm	250	245	5	98.00%	✓		
GTVp	250	250	0	100.00%	✓		
PTV	250	246	4	98.40%	✓		
PTV opt	250	246	4	98.40%	✓		
PTV opt1	250	249	1	99.60%	✓		
PTV60	250	249	1	99.60%	✓		

Figure 1. The ClearCalc log file analysis workspace.

The ClearCalc Log File Analysis workspace provides valuable insights from plan delivery parameters for target structures.

To get a feel for planar dose agreement, ClearCalc provides a fluence comparison section that utilises the 3D plan dose to create a 2D planar fluence for each individual field. A similar fluence plane is generated using ClearCalc's finite-sized pencil beam algorithm calculated using the delivered log file parameters. These two planes are

compared using relative intensity and a Fluence Difference image is displayed.

Results are analysed and displayed in two different ways, using the Percent Difference or Gamma Index Analysis, to provide options for clinical users.

- Percent Difference: to understand the differences between the TPS and ClearCalc algorithms, the software compares multiple points in 3D space (~250) throughout any target structure against a tolerance set based on desired clinical thresholds (e.g., 5%/5cGy).

- Gamma Index: Based on a similar set of reference points within an HU range of -300 to 150, a 3D gamma analysis for each point follows the methodology described by Low, et al, according to user-defined thresholds. The resulting target structure passing percentage is displayed along with pass/fail indicators.

RadMonteCarlo 3D Analysis

The log file analysis workspace within ClearCalc's optional RadMonteCarlo feature provides an advanced tool set for full volumetric analysis for machine-delivered plans. RadMonteCarlo leverages the power and speed of cloud-based service-oriented architecture to perform a full Monte Carlo particle simulation on the delivered log file treatment parameters.
With gold-standard calculations applied to the entire dataset, a full 3D gamma analysis for target structures, organs at risk, and the full dose matrix is available for more granular and detailed analysis. Dose profile comparisons offer a detailed view of cross-sectional doses, allowing the assessment of local percent differences between the TPS and the delivered dose.

The platform provides an array of visualisation choices, including the ability to analyse various colour wash overlays on the patient CT with the following options:

- Relative dose difference
- Gamma index pass/fail
- TPS dose
- RadMonteCarlo dose

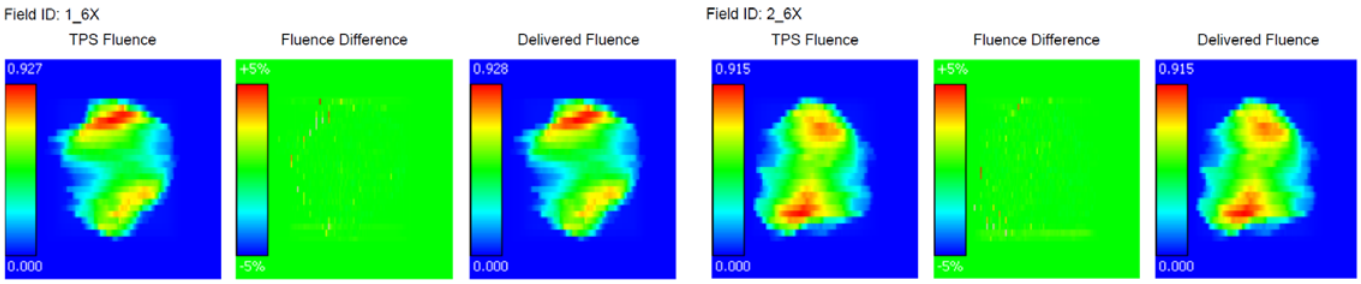


Figure 2. Fluence planes offer a visual assessment of agreement between planned and delivered doses.

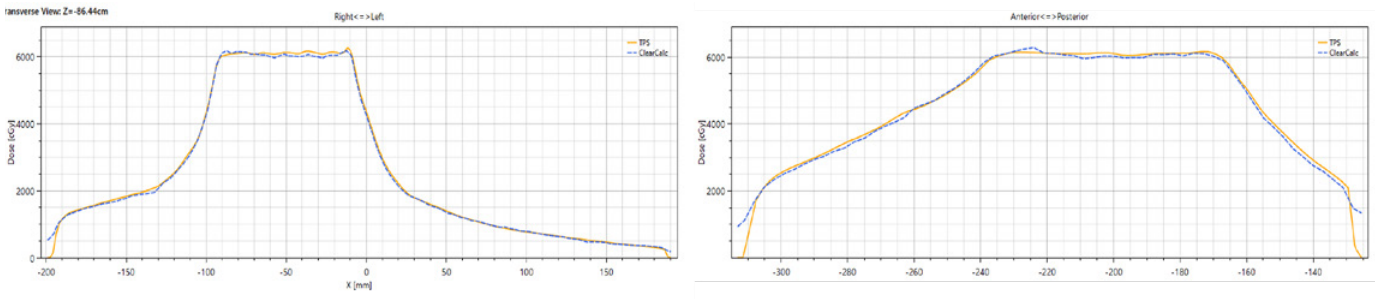
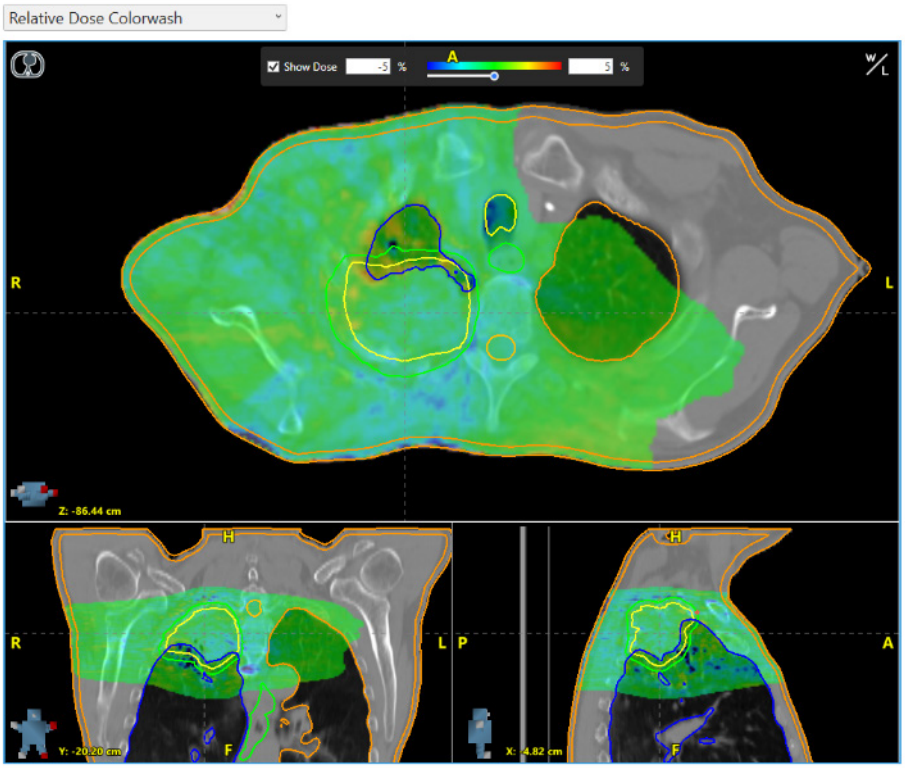
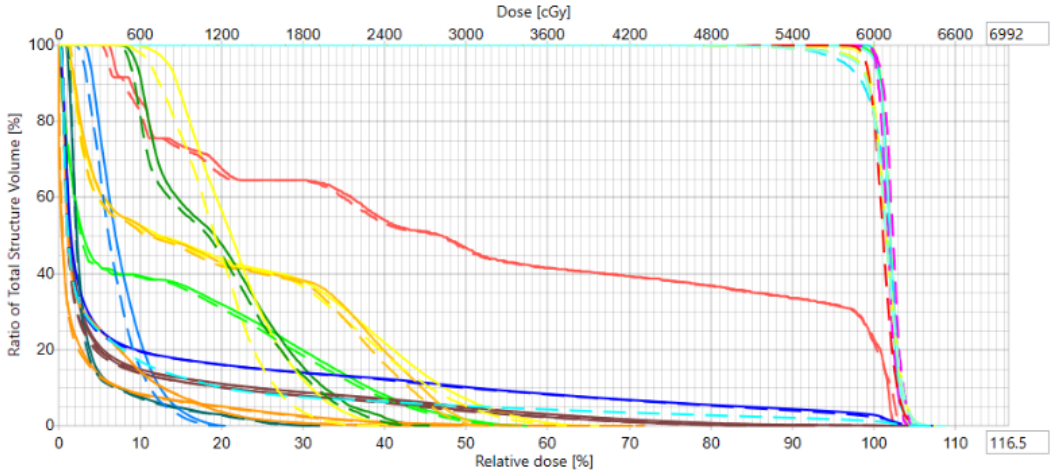


Figure 3. High-resolution profile comparison compares planned and delivered doses along any plane.





		TPS			Delivered			ClearCalc		
Show	Rt Lung1	Volume (cc)	Mean Dose (cGy)	Max Dose (cGy)	Show	Mean Dose (cGy)	Max Dose (cGy)	Show	Mean Dose (cGy)	Max Dose (cGy)
☑	Brachial Plexus	2.66	3,232.0	6,164.8	☑	3,206.9	6,205.6	☐	3,199.8	6,316.4
☑	CTV	166.41	6,119.8	6,385.7	☑	6,091.4	6,491.0	☐	6,079.0	6,712.1
☑	CTVm	8.47	6,116.9	6,380.6	☑	6,082.0	6,418.0	☐	6,115.6	6,568.1
☐	Dose 64[Gy]	0.97	6,149.8	6,247.0	☑	6,139.5	6,271.1	☐	6,139.6	6,377.2
☐	Dose 64[Gy] new	0.63	6,157.6	6,249.1	☑	6,102.4	6,243.7	☐	6,122.1	6,372.5
☑	Esophagus	46.50	785.4	3,466.3	☑	759.9	3,446.6	☐	753.4	3,494.6
☐	GTVp	101.01	6,116.2	6,292.1	☑	6,070.4	6,436.6	☐	6,051.5	6,555.1
☑	Humeral Head	68.52	223.6	1,923.5	☑	215.8	1,902.4	☐	214.3	1,906.1
☑	Larynx	32.24	465.3	1,226.3	☑	410.4	1,177.0	☐	410.6	1,234.7
☑	Lung Rt opt	2742.52	448.6	6,358.1	☑	429.0	6,438.0	☐	426.8	6,693.0
☑	Lung Rt opt1	2713.68	407.0	5,565.3	☑	387.7	5,640.5	☐	385.0	5,687.8
☑	LUNG_L	2683.82	247.0	2,971.4	☑	247.1	2,801.9	☐	245.1	2,821.1
☑	LUNG_R	2906.84	739.2	6,358.1	☑	716.6	6,459.8	☐	716.6	6,991.4
☑	MarginedCord	97.47	1,234.0	4,013.4	☑	1,177.6	3,979.3	☐	1,168.7	3,945.3
☑	PTV	277.76	6,118.3	6,400.8	☑	6,079.6	6,526.6	☐	6,078.1	6,991.4

Figure 4. All structures—targets and OARs—are available along with DVH overlays.

DVH curves are also available for TPS structures, RadMonteCarlo planned dose (optional), and RadMonteCarlo delivered dose.

RadMonteCarlo log file dose is calculated on the full 3D dataset for unparallelled analysis. Insights into

Conclusion

The introduction of ClearCalc's optional RadMonteCarlo integration to the log file analysis module (and improvements to the ClearCalc analog) represents a significant leap forward for secondary calculations. This powerful tool empowers medical physicists with a deeper understanding of machine performance during treatment delivery, enabling a more nuanced approach to ensuring patient safety and treatment efficacy.

Tyler Blackwell, MS, DABR, FAPPM is a medical physicist at Radformation focused on clinical collaborations and community engagement. Before joining Radformation, he spent a decade working as a clinical physicist. He is active on several committees for the American Association of Physicists in Medicine and volunteers for the American Board of Radiology.

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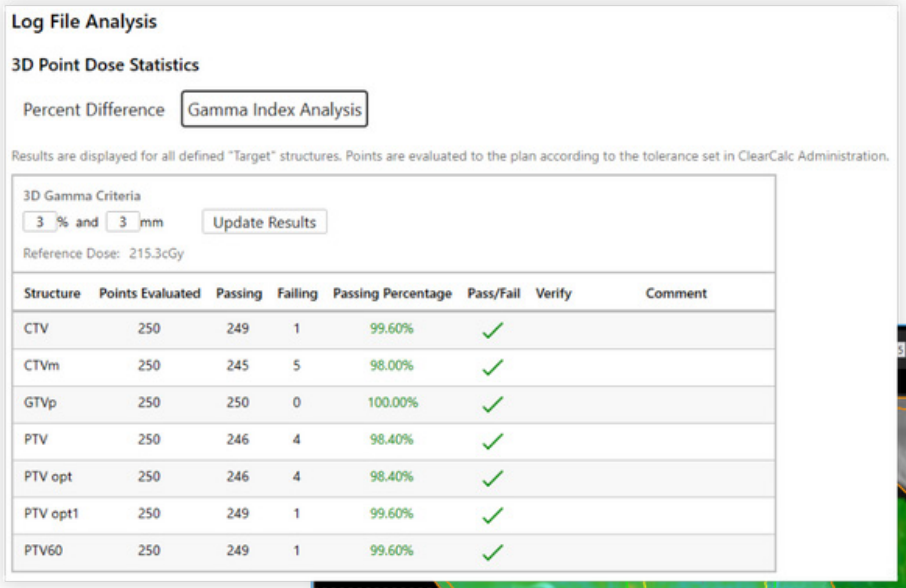
ClearCalc & RadMonteCarlo

NEW! Log File Analysis

Log file analysis—now available for ClearCalc and its RadMonteCarlo integration—enhances **patient-specific QA** by providing a comprehensive assessment of delivered plan quality relative to the prescribed plan.



Structure	Points Evaluated	Passing	Failing	Passing Percentage	Pass/Fail	Verify	Comment
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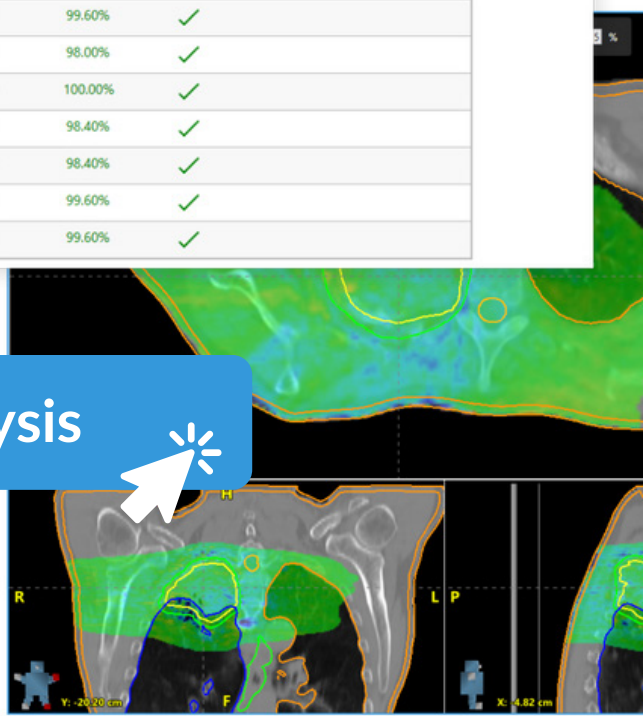

Read More About Log File Analysis

RadMonteCarlo is an optional ClearCalc feature and is not included in a standard ClearCalc Purchase.

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Best Practice: How to Choose the Right Detector for Your Water Phantom

New Features Enhance Functionality

Imagine your department has just purchased a new state-of-the-art water phantom. It is standing right in front of you in the dimly lit linac room, ready and eager to perform measurements. You start with a challenging task – beam profile measurements of small fields. And you know what you require for this task: a small-size detector with minimal perturbation, fast measurement speed, and known small-field correction factors. However, even though you know which properties you need, the wide range of available detector models makes it somewhat overwhelming to determine the best detector for your task.

To simplify the selection process, it is essential to understand

- the key properties of a detector and how they impact performance
- the detector properties important for your specific application and the minimum requirements for each property.

The following key properties can help you identify the most suitable detector for your task. The list comprises “hard” criteria, e.g., major performance characteristics, as well as “soft” criteria such as ease of use.

Key properties to consider when choosing a detector

Availability of background knowledge
Each detector has its own characteristics and behaves differently depending on the application. Understanding the performance characteristics of a detector, such as dose rate dependence, temperature and energy dependence, polarity or pre-irradiation, is crucial for accurate dosimetry. Check if the manufacturer provides detailed specifications, access scientific publications for more insights, and compare this information against relevant standards. PTW provides comprehensive technical specifications for each detector, as well as educational resources through lectures and webinars.

Availability of reliable correction factors
For applications such as reference dosimetry or small-field output measurements, it is essential to apply correction factors for accurate results. Evaluate the source and quality level of the correction factors to ensure accuracy and reliability of your dose measurements.

Range of use
The range of use for a detector is determined through extensive testing in accordance with international standards such as IEC 60731[1] It defines the approved operating conditions under which a detector can be reliably used. It is important to only use a detector within its specified range of use to minimise uncertainties. Operating a detector outside of its specified range of use can lead to increased uncertainties. By strictly adhering to the validated range of use, you can guarantee the reliability and accuracy of your measurements.

The PTW microDiamond detector is an example of a detector that offers a wide range of use as shown in the figure. As a versatile detector, it can be effectively used for different radiation qualities and for measurements from (very) small to large field sizes.

Ranges of use	
Radiation quality	100 keV ... 50 MV photons
	(6 ... 25) MeV electrons
	(70 ... 230) MeV protons
	(115 ... 380) MeV/u carbon ions[2]
Field size	(1 x 1) cm^2 ... (40 x 40) cm^2
Small fields[3]	down to 0.4 cm
Temperature	(10 ... 35) °C
	(50 ... 95) °F
Humidity	(10 ... 80) %, max 20 g/m^3

Figure 1. Range use for the PTW microdiamond detector.

Ease of use
A detector that is easy to use reduces the risk of measurement errors significantly. A directly readable signal, for example, makes a detector easy to use. Having as few processing steps as possible is also important for reliable and reproducible operation.

Fast measurement or speed of scanning
When you schedule a measurement session, you will notice that a considerable amount of time is spent on the measurements themselves. The faster your detector can move in the water phantom –while maintaining signal quality – the faster your measurements are completed. The speed of measurement relates directly to the relative noise of a detector. Solid-state as well as scintillation detectors are far more noisy than air-filled ionisation chambers. As a rule of thumb, the lower the noise, the faster you can measure.

Necessary pre-irradiation
Some detectors require pre-irradiation to stabilise their response. Before the pre-irradiation dose is reached, the response of such a detector will drift and change slightly. Other detectors need not be pre-irradiated and can start measuring right away. Understand if and how much pre-irradiation is needed for your detector to ensure accurate measurements.

Long-term stability
The long-term stability refers to the extent to which the calibration coefficient of a detector may change per year for a specific detector model. This property is crucial for detectors used for reference dosimetry.

Polarity dependence
When a detector is irradiated with a positive or negative bias, the resulting absolute value of the signal will vary slightly. The reasons for this are detector effects which (i) lead to a measurable signal and (ii) are independent of the applied bias. The polarity effect can differ in both magnitude and sign depending not only on the detector model, but also on the measurement situation. Utilising a detector with minimal polarity dependence reduces uncertainty. Polarity corrections require different formulas for relative dosimetry and reference dosimetry. While averaging both signals is standard practice for relative dosimetry, a specialised correction formula is required for reference dosimetry. This formula is detailed in the “Code of Practice” section of the PTW DETECTORS catalogue.

Temperature dependence
You may have noticed that many things are temperature dependent. Your car may not start at freezing temperatures, or you may be less motivated to go jogging when outside temperatures drop. The same applies to detectors: the amount of collected charges varies with temperature, usually within a range of 0 and 0.6 %/K. This information can be found in the technical specifications of the detector.

Small-field effects (density & volume)
When planning to use a detector for small-field measurements, you should know its small-field properties. The most important properties are the volume and mass density of the detector. Knowing the correction factors for any detector used in small fields is crucial for effective operation.

Dose-rate dependence

The response of a detector may vary slightly depending on the dose rate or dose per pulse of the radiation. This effect is fairly weak, amounting to less than 1.5 % in most practical situations. However, the effect is more pronounced for IORT electron linacs, FLASH dose rates, liquid-filled detectors, or broken detectors. Similar to temperature dependence, dose-rate dependence is a property that should be taken into account when estimating uncertainty.

Energy response

Water-equivalent detectors exhibit a good energy response and accurately measure dose to water in various positions within a water phantom. They perform well both within and outside of the primary beam, and their signal is independent of the measurement depth. In contrast, the signal of a detector with poor energy response depends on the position of the detector within the water phantom, or to be precise, it depends on the spectrum of the radiation at that position. For instance, a pure silicon detector may over-respond when deep in water, especially when measuring large fields or used outside of the beam. To avoid this problem, special silicon detectors are available that shield the sensitive volume against low-energy radiation.

Stability

Not all chambers are equal. While this may sound like a quote from the book Animal Farm, it actually refers to a detector property. The kQ value, necessary for reference dosimetry, is now calculated using an ideal Monte Carlo model of a detector. However, your measurement detector has been produced mechanically, and will have some production tolerances. The more your detector equals the ideal Monte Carlo model, the more accurate the kQ value will be for your individual detector. A possible measure for production reproducibility is the variation of the calibration coefficient over the serial number of a specific detector type (see B. R. Muir, Med. Phys. 42, pp. 1546, 2015 for an example).

Application-centred detector choice

Understanding the key properties outlined above aids in selecting the most suitable detector for your specific measurement task. We recommend adopting an application-centred approach in making your decision. Start by choosing your application, then review the list of key properties to determine which are crucial for your application. This method will help narrow down your choices and lead you to the optimal detector for your task. Figures 2 and 3 contain charts that can guide you in selecting the best detector for reference and relative dosimetry applications.

Application	Reference Dosimetry WFF Linacs	Reference Dosimetry FFF / Dedicated Linacs	Reference Dosimetry Electrons
Key Properties	• High-quality chamber (reference class acc. to IEC 60731) • Long-term stable calibration coefficient • Known k_Q value • Easy-to-use chamber, e.g., low pre-irradiation, small polarity effect • Low chamber-to-chamber variation	• High-quality chamber (reference class acc. to IEC 60731) • Long-term stable calibration coefficient • Known k_Q value • Easy-to-use chamber, e.g., low pre-irradiation, small polarity effect • Low chamber-to-chamber variation • Small-volume chamber	• High-quality chamber (reference class acc. to IEC 60731) • Plane-parallel chamber • Long-term stable calibration coefficient • Known k_Q (k_E) value • Known saturation correction (for IORT)
Recommended PTW Detectors	• PTW Farmer chamber (30013) • Semiflex 3D chamber (31021)	• Semiflex 3D chamber (31021) • PTW Farmer chamber (30013)	• Roos chamber (34001) • Advanced Markus chamber (34045)
Application	Relative Dosimetry Output Factor Measurements Standard Field Sizes	Relative Dosimetry Scanning Profiles & PDDs	Relative Dosimetry Output Factor Measurements Small Field Sizes
Key Properties	• All required field sizes within range of use • Good energy response • Low dose-rate dependence	• All required field sizes within range of use • Good energy response • Low dose-rate dependence • Good balance between low noise and fast measurement • Small detector for accurate penumbra measurements	• Available small-field output correction factors • Good energy response • Low dose-rate dependence • If ionisation chambers are used: check for polarity dependence
Recommended PTW Detectors	• Semiflex 3D chamber (31021) • microDiamond detector (60019)	• Semiflex 3D chamber (31021) • microDiamond detector (60019)	• microDiamond detector (60019) • PinPoint 3D chamber (31022)

Figure 2: Application-centred detector choice for reference and relative dosimetry applications.

For more information on the properties and use of PTW detectors for specific applications, download the PTW Detectors Catalogue (with Code of Practice) and Small Field Application Guide, or check out the Detector Selector on the PTW website.

References:

1. IEC 60731 Medical electrical equipment - Dosimeters with ionisation chambers as used in radiotherapy

2. To be precise, what actually counts is not the active volume of the detector, but the cross-section of the active volume perpendicular to beam direction.

Jan Würfel studied physics at Karlsruhe Institute of Technology (KIT) and holds a PhD in molecular electronics. He works as a research scientist at PTW Freiburg, focusing on the development of dosimetry equipment and detector physics. In addition, Jan serves as a speaker at international conferences and is involved in national and international standardisation of dosimetry.

Konstantin Burzlaff holds a Master's degree for Medical Engineering and currently works as a product manager at PTW Freiburg. In this role, he is responsible for expanding and further developing new dosimeter solutions for reference and relative dosimetry in radiotherapy.

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Rti Group: Next Generation Kv/Dose Meter For High Accuracy Mammography Qa

Experience the groundbreaking new detector technology with best-ever accuracy, for the most efficient measurements of kVp, HVL, outlines automated workflow for periodic QA of 4DCT systems

Figure 1. kV/dose meter for high accuracy mammography QA.

X-ray Diagnostic Mammography

In mammography screening, high-quality diagnostic images are required to ensure effective breast cancer detection. X-ray quality assurance plays a pivotal role in this process, ensuring that image quality is maximised for enhanced interpretation of mammograms, and that patient dose is minimised during examination.

Clinical mammography systems have the broadest range of radiation qualities (target and filter combinations used in X-ray production) compared to other X-ray modalities, with challenges in providing the necessary contrast in soft tissue (typically in the 18-39kV range), while also providing contrast-enhanced mammography (typically in the 40-49 kV range). As Full Field Digital Mammography (FFDM) is used in screening the population, patient dose for each image is a vital factor, and therefore having the right QA solution is important; that is where Mako comes in.

QA in Mammography

Accurate measurements of the X-ray output, such as kV, dose, half-value layer (HVL), dose, dose rate and exposure time, become critical for ensuring the balance between image quality and patient dose. In line with these measurements, and in line with international standards, calculations such as average glandular dose (AGD; or mean glandular dose, MGD) and absorbed dose are frequently performed.

Accuracy with Mako

With over 40-years of experience in diagnostic X-ray QA, and the vision of “Setting the standard for X-ray QA”, RTI Group has launched the ground-

breaking new Mako meter, which has its own dedicated 'Mako Mammo Probe'. The new Mako Mammo Probe covers the entire clinical kV range from 18-49 kV (unlike other sensors, which require change to an 'R/F' sensor above 40kV), meaning that the entire range of QA measurements, including for the contrast-enhanced mammography, are completed with a single Probe setup.

Mako Mammo Probe has industry leading accuracy (kV uncertainty of ±1.5% or 0.5 kV) across the entire kV range, thanks to its groundbreaking new detector design, and has been built to handle the latest target/filter combinations on the X-ray mammography diagnostic market, including Ti (titanium) filters up to 1.5mm (and Aluminum, Rhodium, Silver, Copper & Molybdenum in their varying combinations and ranges).

Efficiency with Mako

Ensuring accurate QA measurement involves removing complexity for the user, to eliminate any potential mistakes. Mako has been designed to eliminate potential user error and provide accurate readings. With the range of manufacturers, target/filter combinations and tests to perform, physicists and engineers may ask the questions, "shall I remove the compression paddle?", "do I have to orient the meter in a specific direction?", or "can this meter handle all kV ranges?" while setting up their QA process.

Mako eliminates the uncertainty to provide the ultimate user experience. The Mammo Probe is orientation independent and immune to the heel effect, meaning users can place the Probe in any position/orientation without affecting measurement accuracy (note – users should of course follow relevant guidelines for exact positioning of the Probe, such as 6cm from the chest wall (EUREF); or 4cm from the chest wall in US (ACR), for relevant measurements).

In addition, users do not need to worry about the presence, or position, of the compression paddle – Mako will automatically sense it and provide accurate readings whether it is in place or not. Mako handles all clinical kV ranges and provides all readings of kV, HVL, dose, dose rate & exposure time with every shot, together with kV waveforms and dose rate waveforms, so no detail goes unnoticed.

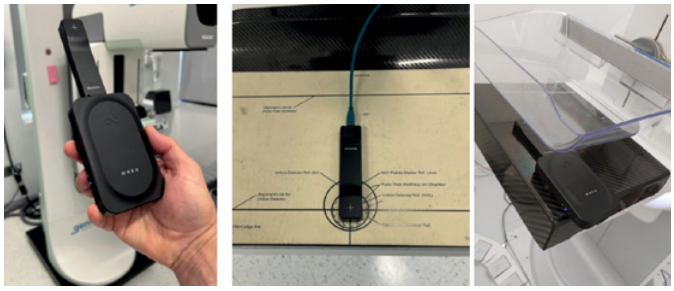


Figure 2. The Mako meter in practice.

Versatility with Mako

Mako can be used as a fully wireless QA solution by docking the Mammo Probe into the Mako Base Unit. The Base Unit has integrated Bluetooth, meaning immediate display of measured values to the Mako display device at the X-ray system controls, without the need for long wires. The Mammo Probe can also connect to the Mako Base Unit via USB cable, so that users can place just the Probe on the detector plate, for 'fine-tuning' of the Probe position.

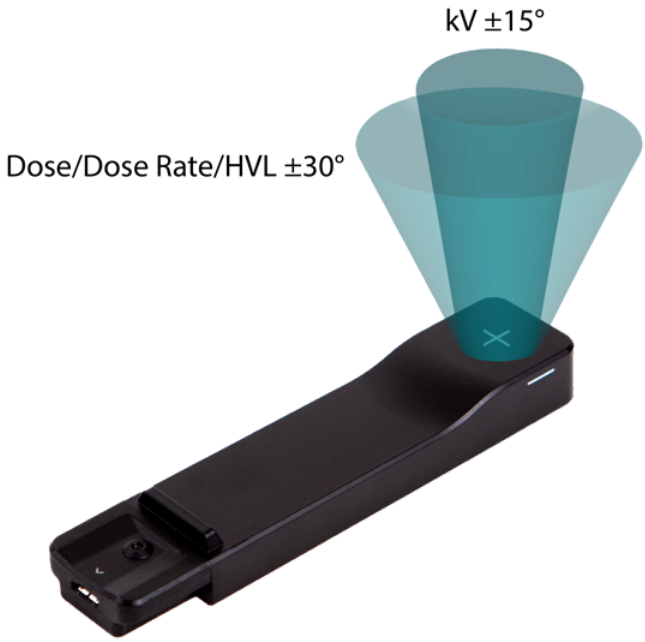


Figure 3. Dose and dose rate measurement volumes.

Mako in Tomosynthesis

Tomosynthesis (3D Mammo) is used to provide depth perspective to mammography images, helping to improve diagnosis. The X-ray tube moves to acquire images from multiple angles and multiple images typically results in higher doses than standard 2D mammograms.

Being able to measure dose in wide angular ranges is important for the QA process, and the groundbreaking detector design with Mako provides the widest angular measurement, for accurate results even during tomosynthesis acquisition (up to ±30° angle without compromising on accuracy for dose, dose rate and HVL; and Mako can measure wider still). This means that users can acquire dose measurements in 2D and 3D mode without moving the Probe, and still acquire all the necessary accurate measurements.

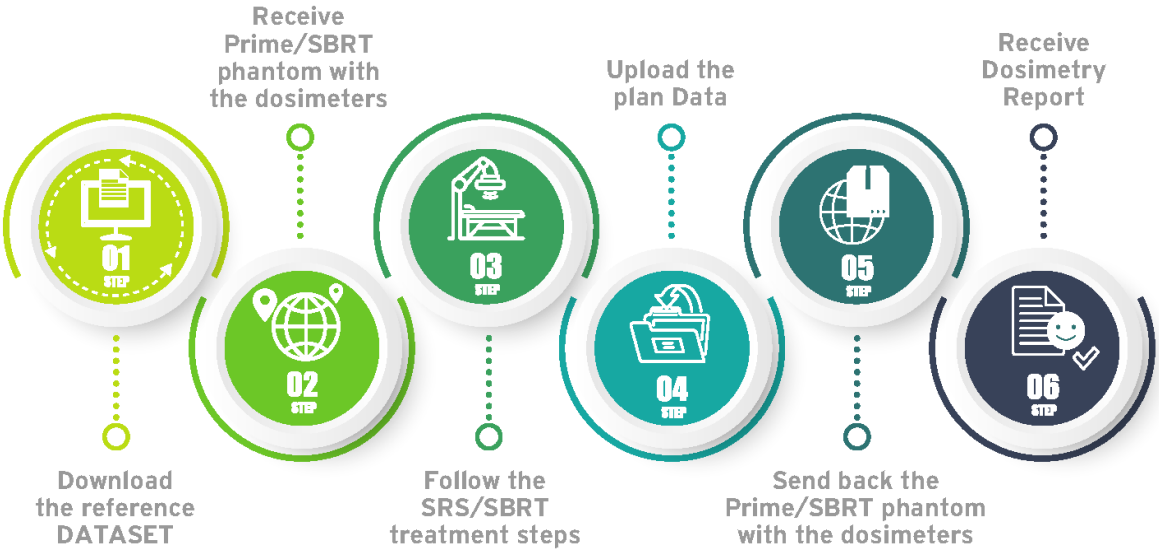
Industry-leading QA software

Mako connects to Ocean Next software on the Mako display device (can be any Windows tablet or PC, win10/11). Ocean software has the intuitive 'Quick Check' display, showing measured parameters and waveforms. Ocean makes it simple and efficient for users, while also ensuring that the correct calibration is applied. When connecting Mako Probe, the user simply has to choose the manufacturer of the system, then the model, and the relevant calibrations are shown; this avoids potential error and fulfils guidelines such as ACR recommendations "The medical physicist should ensure that the HVL has been determined for the target/filter and kVp combination used (...)".

Ocean software has been developed to make QA measurement simple, efficient and traceable. In addition to the user-friendly 'Quick Check', there are a wide range of automated workflows (Ocean templates) already built-in, such as for AGD calculation (using ACR, EUREF, and/or IAEA methodologies), Combo Mode (such as using dual-energy acquisition for contrast-enhanced mammography), constancy tests, mAs/dose linearity tests and much more - "It's like having Excel within the software". By automating the calculations within Ocean software, not only is efficiency increased but also traceability, as the whole chain from exposure – to calculation – to report, is all accurate & traceable.

Michael Olding PhD, is Head of Product Management at RTI Group. Michael works on the interface between product development at RTI and global end users of RTI's products & solutions (physicists, engineers and medical professionals), and is passionate about ensuring user needs are at the forefront of new product development at RTI Group.

succeSRS - RTsafe remote dosimetry auditing services for intracranial and body stereotactic radiotherapy applications



SucceSRS workflow

Promoting a culture of excellence

Intracranial Stereotactic Radiosurgery (SRS) and Stereotactic Body Radiation Therapy (SBRT) represent advanced radiotherapy (RT) techniques characterized by the precise delivery of high radiation dose to the target volumes, and therefore, their application is particularly critical to patient safety. Both SRS and SBRT techniques require well-defined and consistent methods of dose-describing, - prescribing, -modeling, -delivering, -measuring, and -reporting. This comprehensive approach ensures that these treatments are delivered accurately and safely, reducing the risk of adverse effects and optimizing treatment outcomes. Another significant benefit of having unambiguous, consistent, and harmonized procedures is the ability to share with confidence the clinical experience between centers internationally, thus promoting the "transfer of knowledge" and further empowering the scientific community.

Despite the widespread sets of recommendations on continuous and detailed quality assurance (QA) of equipment, procedures, and processes, including dosimetry, from national and international bodies, the inevitable human factor and/or the existing inadequate procedures during the radiotherapy process may lead to patient mistreatment. The interlinked dosimetry- and geometry-related treatment parameters, require a high degree of accuracy, precision, reliability, and reproducibility. This translates into the need for reduced uncer-

tainties at each step of the complex SRS/SBRT chain, as well as, the entire RT process that contributes to the overall accuracy. External dosimetry audits are recognized as an effective method of evaluating the above, promoting the best practice, and assuring high-quality treatments. In recent years, all of these guidelines have been integrated into wider quality management systems (QMS), covering all radiotherapy stages involved.

RTsafe's variety of solutions, from remote dosimetry services to cutting-edge high-precision/accuracy phantoms for end-to-end machine and patient QA, form the new generation of QA and external dose verification in intracranial radiosurgery and SBRT. Merging the above, RTsafe has recently upgraded the succeSRS into a remote dosimetry audit service not only for intracranial SRS but also for SBRT applications. Through a mailable end-to-end quality control (QC) program, that verifies the whole treatment chain from imaging to delivery, this service aims to evaluate the dosimetric quality, planned dose accuracy, treatment complexity, and treatment deliverability of both SRS and SBRT procedures.

These audit services are conducted with the RTsafe Prime and SBRT phantoms for intracranial and body stereotactic radiotherapy applications, respectively, using specially designed inserts to accommodate optically stimulated luminescence, Gafchromic film, and polymer gel dosimeters. All the dosimeters are calibrated at the Secondary Standard Dosimetry Laboratory of the Greek Atomic Energy Commission, providing traceability to BIPM-France. Depending on the user's needs, dosimeters for audit purposes can be used either individually or as a bundle. The user receives a specific RT structure set, depending on the practice to be audited, and is challenged to achieve a specific level of accuracy for the required treatment objectives. These services enable clinicians to build maximum confidence in their treatment procedures and staff capacities, both when launching or moving to new clinical practices, as well as in their day-to-day procedures for each SRS/SBRT patient. They also serve as a powerful tool for quality improvement when included in the center's routine radiation oncology QMS.

For more information on RTsafe's remote end-to-end dosimetry auditing service contact us at info@rt-safe.com

Vasiliki Margaroni is responsible for the data analysis and the scientific support and guidance of the end user. She is a PhD candidate at the Medical Physics Laboratory of Medical School, National University and Kapodistrian University of Athens and her research interests focus on radiotherapy with an emphasis on quality assurance, experimental and computational dosimetry in contemporary radiotherapy and radiosurgery systems.

Emmanouil Zoros 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 emphasis on quality assurance in stereotactic radiosurgery, experimental and computational dosimetry using Monte Carlo simulation techniques.

succeSRS

Promoting a culture of excellence

succeSRS is a powerful tool for quality improvement in intracranial stereotactic radiosurgery applications through a remote end-to-end dosimetry audit service.

Key features

- Confidence and reliability
- High quality treatments
- Dosimetry traceable to BIMP-France

RTsafe

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Recent developments from Standard Imaging

LUCYTM EA and LUCYTM ThorX phantoms

Meet Your Clinical SRS and SBRT Goals

Starting the journey to establish or enhance a Stereotactic Radiosurgery (SRS) and/or Stereotactic Body Radiation Therapy (SBRT) program means navigating intricate challenges and QA requirements. For many, the initial hurdle is selecting the appropriate QA tools that not only align with industry guidelines and standards, but also meet clinical goals. Complexity and usability issues often associated with stereotactic phantoms can pose significant barriers to facilities initiating or standardising their programs.

Leveraging their foundation built upon exceptional physics expertise, Standard Imaging has addressed the challenges faced by clinics. They've developed two new phantoms designed to meet guidelines and requirements: LUCY™ EA and LUCY™ ThorX.

End-to-End SRS and SGRT QA: LUCY™ EA

The new pseudo-anthropomorphic phantom: LUCY EA, is an ideal solution for any site starting a stereotactic program, especially those using surface-guidance systems, with limited resources. Designed to streamline end-to-end and multiple metastases SRS and SGRT QA procedures, the LUCY EA redefines efficiency and precision in medical physics. It's the ideal phantom for validating and maintaining the required accuracy for safe and effective SRS treatments.

"The epitome of accessibility and reliability, the LUCY™ EA addresses the rigorous requirements of SRS and SGRT QA with unparalleled ease," said Andrea Zens, Standard Imaging Product Manager. "The design is tailored for seamless access to cranial inserts, making QA faster without compromising setup integrity."

In a landscape where standardisation is paramount, LUCY EA emerges as the beacon of efficiency to standardise SRS and SGRT QA protocols across sites and machines while easing training for team members to maintain QA excellence. Standardised QA processes using LUCY™ EA allow users to leverage and share SRS QA data for patient load balancing, ensuring that the most complex cases are assigned to the highest performing linacs.

Single insert orientation and single phantom setup reduce variation and minimise setup risk while providing significant time savings to staff. Validate your system's ability to deliver dose safely to multiple targets using intelligently designed film and ion chamber inserts.

SBRT QA+: LUCY™ ThorX

The new SBRT phantom, LUCY ThorX, empowers teams to evaluate their entire radiother-

apy treatment process with unparalleled accuracy and efficiency. Designed to meet the rigorous standards set forth by IAEA TRS 430, TECDOC-1583, AAPM Task Groups and MPPG guidelines, the LUCY™ ThorX provides comprehensive evaluation across simulation, treatment planning, imaging, and delivery QA processes.

"Physicists want to improve efficiency and reduce the number of phantoms they are using for routine QA," said Umar Baharom, Standard Imaging Product Manager and Senior Engineer. "The LUCY™ ThorX is a unique all-in-one phantom to perform key QA tasks for both CT simulator and linac from image quality monitoring to more complex periodic SBRT QA."

Composed of four primary sections, the phantom contains embedded fiducials and objects that are simple to use for imaging QA. For SBRT QA, the LUCY™ ThorX has two film inserts and it also accepts a variety of detectors using interchangeable plugs.

With its pseudo-anthropomorphic anatomy featuring ribs, vertebrae, spinal cord, lung, and kidney, the LUCY™ ThorX ensures realistic simulation scenarios for precise dose verification. Measure dose using ion chambers and film with four detector cavities and targets for Multiple

Met SBRT QA.

User-friendly and Comprehensive QA Solutions Tailored to SRS and SBRT Program Demands

Through these two new QA Phantoms, LUCY™ EA and LUCY™ ThorX, Standard Imaging empowers clinics to streamline their QA processes, enhance treatment accuracy, and ultimately, deliver superior care to patients undergoing SRS and SBRT treatments.

About Standard Imaging

Standard Imaging is a leading manufacturer of QA instruments for radiation-based treatments. We've dedicated more than 30 years to developing solutions that save you time, while maintaining accurate and precise results. For more information, contact us here!

Ashley Reis is the Marketing Specialist at Standard Imaging, Inc. and has been with the company since 2020.

Taking Efficiency and Innovation to the Next Level with SunCHECK® Software

A 2021 study showed how specialized treatments contribute to more physics staff time required per patient, finding a 45% increase in patient load and 150% increase in work intensity [1]. As the field of radiation therapy continues to evolve, radiation therapy teams are challenged to provide the highest level of quality and accuracy in treatment planning and delivery—without proportional staffing adjustments.

SunCHECK, the quality management platform from Sun Nuclear, is designed to address the dilemmas faced by radiation therapy teams negotiating the complexities of data management and status tracking. SunCHECK is relied on by radiation therapy departments globally to deliver true efficiency gains and support enhanced quality. A one-year summary of a 10-linac network using SunCHECK for Machine QA found 208 hours saved in Daily QA Physics Checks and 540 hours saved in Monthly QA, equating to 83% and 82% efficiency gains, respectively [2].

Offering a centralized, worklist-focused view of Patient QA phases, Machine QA tasks, and assets requiring attention, SunCHECK eliminates the need for disparate applications and databases for different parts of QA.

Landmark Update Further Advances Radiation Therapy Workflows

Recently announced at the ESTRO Annual Meeting, SunCHECK Version 5.0 introduces 20+ new features to drive a more connected Quality Management experience, optimize workflows and prioritize patient care.

Patient-Centric Features

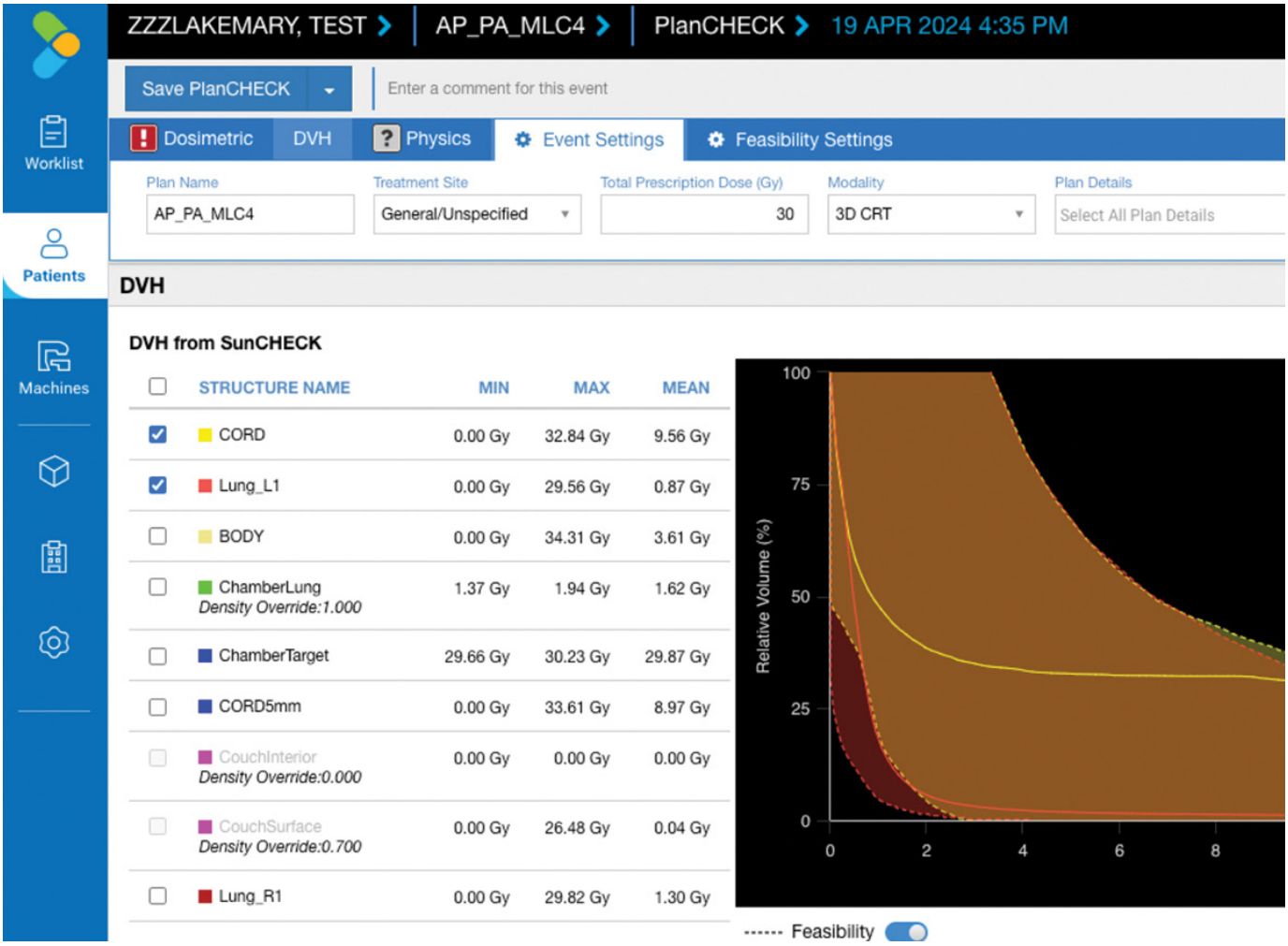
SunCHECK v5.0 introduces two patient-focused features to improve treatment planning:

- Plan Feasibility - Planners can assess the treatment plan quality and identify areas for improvement by analyzing clinical goals and dose-volume histogram (DVH) data to gain valuable insights and make informed decisions that optimize patient outcomes.

- Plan Complexity - Planners can determine the achievability of a treatment plan more quickly, reducing the risk of patient movement during planning, and ensuring achievable dose delivery.

Integration with Varian Medical Systems® Workflows

With v5.0, we have added stronger continuity of



Plan feasibility evaluation coming soon in SunCHECK.

clinical goals and data management when moving from the linac treatment planning system (TPS) / oncology information system (OIS) into the SunCHECK software. SunCHECK offers intelligent integrations with the Varian Medical System® Eclipse™ treatment planning system and ARIA® oncology information system:

- Clinical goals created in Eclipse can now be seamlessly imported into SunCHECK, ensuring consistency and reducing mismatches between the two platforms.

- DoseCHECK™, SunCHECK's secondary dose calculation tool, can be launched directly within Eclipse, eliminating the need for data transfer between systems.

- The ability to auto-save Patient QA reports directly into the ARIA patient workflow reduces mouse clicks and data organization between the OIS and SunCHECK.

Machine Quality Assurance Enhancements

SunCHECK v5.0 introduces several machine-focused enhancements to streamline quality assurance tasks, including:

- Direct device control of PC Electrometer™ and 1D SCANNER™ simplifies measurements into a single workflow and automates measurement recording.
- Enhanced image-based machine quality assurance through a range of new tests and functionalities (e.g., IC PROFILER™ off-axis measurements, jaw orthogonality, MLC leaf

positions and collimator QA starshot) support meeting ANSM and other protocols.

Enhanced User Experience

A refreshed UI, with a focus on worklists, presents relevant information at a glance and helps clinicians more easily find and address critical tasks. Additionally, departmental assets are prominently displayed on the main page, elevating visibility of upcoming calibration due dates, software updates and scheduled maintenance to ensure important deadlines are never missed.

As evolving treatment modalities continue to challenge the medical physics workload, the ability to view and understand status quickly becomes more and more critical for resource- and time-challenged radiation therapy teams.

A Higher Quality of Care

SunCHECK v5.0 represents Sun Nuclear's 40-year commitment to advancing radiation therapy workflows to empower medical physicists to deliver the highest level of care and sets a new standard for Radiation Therapy QA.

As the field continually evolves, so too will SunCHECK to support radiation therapy teams in their critical role to provide safe and effective radiation therapy treatments.

References:

1) Thind K, et al, Int J Rad Onc Biol Phys (2021); Increasing Demand on Human Capital and Resource Utilization in Radiation Therapy: The Past Decade

2) Onsite assessment conducted by Sun Nuclear, 2023

Michael Bealer is a Director of Product Strategy - SunCHECK and has over 10 years of product development and management experience with Sun Nuclear.

Introducing SunCHECK® 5.0

The Connected Workspace for Higher Quality

Aggregate insights, actions, and opportunities to drive continuous improvement in radiation therapy.

Featured enhancements:

- Plan complexity metrics
- Evaluation of plan feasibility per patient
- Enhanced TPS integration
- Refreshed UI with worklist focus

Learn more & request a demo.

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MRI – The Future of Personalized Radiation Therapy at Oulu University Hospital

View of the Oulu University Hospital

Today, radiation therapy is simulated and planned using CT as the primary imaging modality; however, there are many procedures that could benefit from clinical insights that MR imaging offers.

At Oulu University Hospital in Oulu, Finland, multimodality imaging "plays a crucial role in radiation therapy," says Kaisa Lehtiö, MD, Specialist in Radiation Oncology, in a short video about how multimodality imaging, and especially MRI, can impact patient care.

Chief Physicist, Juha Nikkinen, adds: "From CT images, we can visualize bony structures well and perform dose calculations. With MRI, we can define healthy tissues and treatment targets more accurately, thanks to the superior soft tissue contrast." Professor Nikkinen goes on to explain that treating small brain targets without multimodal imaging "would be impossible without the use of MRI." For some patients, he says, a patient's treatment pathway could be shortened by using MR-based Synthetic CT that enables an MR-only workflow with dose planning solely based on MR images.

Watch the video to learn more about how Oulu University Hospital is integrating MRI in radiation therapy.

Interested in hearing about more practical examples? Join the Siemens Healthineers MRInsights in RT virtual user meeting and discover how RT experts from around the world and their teams advanced radiotherapy in their clinic by integrating MRI into daily clinical routine. (Registration is required to participate.)

For more information about magnetic resonance imaging for radiation therapy, please visit MRI for Radiation Therapy on the Siemens Healthineers website.

Meryl Ginsberg, MBA, is Director of Communication Initiatives at Varian Medical Systems, a Siemens Healthineers Company.

Highlights from EFOMP's participation in ESTRO 2024

It's no secret that ESTRO organizes one of the biggest congresses for professionals in the field of oncology and radiotherapy each year. With this year's theme, "Radiation Oncology: Bridging the Care Gap", the stage was set for an unparalleled gathering of participants and industries, coming together to exchange experiences and expertise.

During ESTRO 2024, the European Federation of Organizations for Medical Physics (EFOMP) took part in the Communities Pavilion near the ESTRO village. Amidst a constellation of international and national organizations and societies from May 3-6, EFOMP showcased its latest activities and upcoming events of 2024.

Figure 1. EFOMP's delegation at the ESTRO 2024.

Since sustainability is the vision of the new EFOMP president Efi Koutsouveli, she is always looking for ways to involve young MPs in EFOMP activities. Thus, I was given the honor as Vice-Convener of EFOMP's Special Interest Group (SIG) for Early Career of representing EFOMP alongside my colleague, Leticia Irazola, Early Career SIG Convener, at the EFOMP booth.

Figure 2. Early Career SIG's representatives at the ESTRO 2024.

Our booth served as a hub for introducing EFOMP's diverse activities. It was gratifying to engage with medical physicists from around the world who visited our booth. One particularly memorable encounter was with a physicist from the USA who fondly reminisced about attending

EFOMP schools years ago and wanted to convey his appreciation to the organizers. His enthusiasm underscored the lasting impact of EFOMP initiatives.

Young physicists, eager to explore paths for professional development, passed by our booth seeking information about EFOMP's activities. Their keen interest in joining our Special Interest Group for Early Career and spreading the word among their peers was truly heartening. We also had enriching interactions with radiation oncologists and residents, many of whom were familiar with our profession and kindly offered to relay our greetings to colleagues in their respective hospitals.

Figure 3. EC SIG and Antonio Lopez Medina.

The ESTRO experience provided an invaluable opportunity to meet with EFOMP's leaders in person, including President Efi Koutsoufeli, Chair of European & International Matters Antonio Lopez Medina, Physica Medica Editor Luliana Toma-Dasu, and European Congress of Medical Physics (ECMP2024) President Yolanda Prezado (figure 1). This venue was also an occasion for EFOMP leaders to catch up on the latest progress in various projects.

During our time at ESTRO, we explored the exhibition, which featured over 100 companies and start-ups from across continents, showcasing cutting-edge technologies and solutions for every step in patient care. During the Networking evening, some companies took this gathering opportunity to unveil new products, further increasing the excitement of the participants. A big number of companies we visited expressed their excitement to take part in the exhibition of the upcoming ECMP 2024.

Finally, we extend our gratitude to everyone who stopped by our booth at ESTRO. We eagerly anticipate reuniting with the medical physics community and industry partners at ECMP 2024 in Munich from September 11-14. Let's reconvene to exchange fresh ideas and expertise, fostering collaboration and growth. See you there!

Antonio Jreije works as a Medical Physicist in the Clinical Radiation Surveillance Division of Vilnius University Hospital Santaros Klinikos, Vilnius, Lithuania. He is also a final year PhD student in Material Engineering at Kaunas University of Technology, Kaunas, Lithuania and the Vice Convener of the EFOMP Early Career SIG.

Get Ready for the Early Career Section at ECMP 2024!

Several rooms from the venue of the ECMP 2024 congress

Excitement is building for the Early Career (EC) Section at ECMP 2024 (Munich, 11-14 September). After the success of the previous edition held at ECMP 2022 in Dublin, the EC Section returns this year in an innovative format, overseen by EFOMP Early Career Special Interest Group in collaboration with the German young MP group jMP from DGMP (Deutsche Gesellschaft für Medizinische Physik).

Taking place on September 12th and 13th, the EC section promises a dynamic lineup of sessions tailored specifically for the scientific and professional development of young physicists, along with engaging opportunities for networking and collaboration.

While the full program will soon be available on the ECMP website, we're thrilled to give you a sneak peek into what awaits you during this conference. The EC section will include multiple sessions between September 12th and 13th, which are briefly described below.

Europe Session: Explore the diverse landscape of medical physics across Europe as experts discuss the roles and responsibilities of MPs in different countries. Gain insights into the efforts of promoting professional harmonization and mobility within the continent. Plus, access an interactive QR code map detailing MP and MPE certification requirements, accredited master programs and residency programs, and more in each country.

Meet the Expert: Join the discussion about hot topics with three leading experts from various subgroups, covering radiotherapy, nuclear medicine, and laser/non-ionizing radiation. Confirmed speakers for this session include Efi Koutsouveli (EFOMP president) and Irene Polycarpou (Associate Professor in Medical Physics at European University Cyprus). Stay tuned for the announcements of our full expert lineup!

Software as a Medical Device: Learn about the regulations that surround software development

and usage in clinical settings. Confirmed speakers for this session include Cristine Zacharatou (Senior Physicist at St Luke's Radiation Oncology Network) and Renat Madru (Medical Physicist at Skåne University Hospital). More speakers will be announced soon.

Newcomer Presentations: Showcase your research and projects during a dedicated session for EC attendees. Make your work more visible by presenting it as an oral contribution and receive valuable insights on perfecting your presentation skills from Danielle Dobbe, a Senior Learning Specialist at the Dutch Expert Centre for Screening (LRCB). All EC attendees that has a poster at the congress are invited to contribute to this session.

EFOMP Sustainability Initiative: Learn about EFOMP's sustainability efforts and how they impact the future of our profession. Discover opportunities for young MPs to get involved in EFOMP activities and contribute to shaping the field. This session will feature the latest EFOMP statistics and updates, along with insights into how young MPs can actively engage in EFOMP initiatives. Additionally, the second portion of the session will be dedicated to the EFOMP Mentorship Program (a new program that will be unveiled soon), which will offer mentees a unique opportunity to conduct brief, 5-minute interviews with their chosen mentor candidates. This will allow mentees to gain a better understanding of each mentor's background and expertise, aiding them in making informed decisions regarding their mentorship selection.

More networking opportunities await you!

Join us at our Chill Out Area, a meeting point where you can connect with fellow young physicists over lunch and coffee. Engage in trivia games and contests while you recharge and unwind. And don't miss our social evening on September 12th, hosted by our colleagues from jMP. Enjoy an evening of friendship and drinks as we celebrate our shared passion for medical physics. As organizers of this section, we want to remind you that young MPs will be the center of this section, so don't miss out on this opportunity and join us during the ECMP EC section to connect with peers, interact with experts, and share your insights and ideas. For more information do not hesitate to directly contact us or simply write to board.sig_frec@efomp.org

Antonio Jreije works as a Medical Physicist in the Clinical Radiation Surveillance Division of Vilnius University Hospital Santaros Klinikos, Vilnius, Lithuania. He is also a final year PhD student in Material Engineering at Kaunas University of Technology, Kaunas, Lithuania and the Vice Convener of the EFOMP Early Career SIG.

Special Interest Group for Radionuclide Internal Dosimetry (SIG_FRID)

The objective of the SIG_FRID is to establish a network of medical physicists working in radionuclide dosimetry. The SIG_FRID aims to fulfil the need for networking, education, research and professional exchanges in this field.

The number of SIG_FRID members is currently 209. New applications are always welcome (see below for instructions on how to become a SIG member).

Last term, the Steering Committee (SC) had virtual meetings on March 18th and April 9th.

The SIG_FRID SC priorities are:
- Priority 1. Scientific meetings.
- Priority 2. Focus group management and follow-up.
- Priority 3. Teaching/Education/Dissemination.
- Priority 4. Communication.
- Priority 5. Professional/Regulatory/Economic matters.

A summary of the last activities performed in those priorities is provided below. Note that some priorities may not be mentioned when there is no recent advance.

Changes in the Steering Committee
After the voting process, nine steering committee members were elected or re-elected for a second term. The composition of the renewed steering committee is:
- Manuel Bardiès (Chair)
- Julia Brosch-Lenz
- Carlo Chiesa
- Gerhard Glatting
- Silvano Gnesin
- Pablo Mínguez Gabiña (Vice-Chair)
- Steffie Peters
- Katarina Sjögreen Gleisner (Secretary)
- Lidia Strigari

We want to thank the outgoing members of the Steering Committee — Ernesto Amato, Ana Denis Bacelar, Glenn Flux and Caroline Stokke — for their dedication and invaluable contribution in the early steps of the SIG_FRID.

Priority 1. Scientific meetings & Case reports.
The SIG_FRID organises a series of scientific meetings and case reports. As a reminder:

- a scientific meeting usually includes 3 x 30 min talks, followed by a general discussion (30 min),
- a case report is a 30-minute presentation followed by a general discussion (30 min).

All scientific meetings and case reports are available at the EFOMP's e-learning platform: https://www.efomp.org/index.php?r=pages&id=e-learning

The next scientific meeting will be held on June 19th from 15:00 to 17:00 CEST, and the topic will be "Radiobiology for radionuclide therapy & dosimetry".

The next case reports will be held on September 3rd from 12:00 to 13:00 CEST and on December 3rd from 12:00 to 13:00 CET. The topics of the case reports have still to be announced.
Priority 2. Focus Group (FG) management and follow-up.

NOTE: To clarify the difference between an EFO-

MP Working Group and a SIG_FRID Working Group, the name of the latter is now changed to "Focus Group".

The updated FGs and leaders are as follows:

- FG1 TAC fitting
  Gerhard Glatting
- FG2 Treatment Planning Systems
  Lidia Strigari
- FG3 Absorbed dose-effect relationship
  Lidia Strigari
- FG4 Voxel S-Values
  Julia Brosch-Lenz/Marta Cremonesi
- FG5 DICOM Standard
  Manuel Bardiès

Priority 3. Teaching/Education/Dissemination.
A proposal for educational courses in nuclear medicine dosimetry has been accepted by the EFOMP board. This includes a series of webinars or recordings on the basics of dosimetry to be organised throughout the second half of 2024, followed by an in-person ESMPE School course on the practical uses of clinical dosimetry in 2025.
Dates and format are being discussed for the first webinars. More to follow soon! Stay tuned!

Priority 4. Communication.
The SIG_FRID members are all invited to distribute relevant information directly using the SIG_FRID email list or through Slack.

Priority 5. Professional/Regulatory/Economic matters.
The EU council request of clarification regarding dosimetric optimisation of nuclear medicine therapy— SIMPLERAD SAMIRA Study on the Implementation of the Euratom and EU legal bases with respect to the therapeutic uses of radiopharmaceuticals—resulted in a project by a consortium composed of EIBIR-EANM-EFOMP representatives. It aimed to improve the understanding of the links and interdependencies between European pharmaceutical legislation and Euratom radiation protection requirements and to highlight potential barriers to the implementation of radiopharmaceutical therapies in clinical practice. A summary of the results is available on the website of the EANM. The final report with recommendations will be released within the next few weeks.

The Cancer Patient Europe Association asked for help from SIG_FRID to increase public awareness about nuclear medicine therapy and its optimisation through dosimetry.

How to become a SIG_FRID member:
The SIG_FRID 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_FRID sub-page of the EFOMP website:

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

Past Meeting on "Symposium on Molecular Radiotherapy Dosimetry"
The abstract book and the presentation slides from the 1st Symposium on Molecular Dosimetry now can be accessed in the EFOMP e-learning system.

Pablo Mínguez Gabiña is a senior medical physicist at the Gurutzeta/Cruces University Hospital in Barakaldo, Spain and a part-time professor at the faculty of engineering of the University of the Basque Country in Bilbao. He is also a member of the Steering Committee of SIG_FRID.

EFOMP
TRAVEL SUSTAINABILITY AWARDS

For those travelling to ECMP 2024 in Munich we encourage you to Go Green! In order to reflect the sustainability program of the current presidency of EFOMP and the trination hosts of ECMP, we are delighted to announce that we will be making three sustainability awards of free registration for ECMP 2026 in Valencia, Spain . Two free registrations will go to the most imaginative low carbon footprint physical journeys to the congress. The third registration will be awarded to the greenest company stand . The awards will be judged by the members of the EFOMP board and presented during the ECMP congress. The winners will be expected to write a brief article about their ECMP 2024 experience in the 2024 winter issue of EMP news.

How to apply:

Please use this form to apply for the EFOMP Travel Sustainability Awards.

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European Congress of Medical Physics

Munich, Germany
11–14 September 2024

www.ecmp2024.org

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Art to Challenge and Inspire: Images and Reflections for Medical Physics (12)

Professor Jim Malone looks at Rene Magritte's works. Two helped get traction for addressing serious issues in justification of diagnostic imaging. Two others, less well known but charming, are also discussed.

René Magritte (1898 – 1967) is a Belgian surrealist artist whose work explores unsettling disparities between image and reality. His defining work, The Treachery of Images, is a painting of a Sherlock Holmes pipe and a caption stating Ceci n'est pas une pipe. Of course, it's not a pipe; the image shouldn't be confused with reality.

Magritte's paintings look realistic, some with a cold deadpan beauty uncharacteristic of surrealists. They can undermine perception and provoke unsettling thoughts. He is a master of the hidden, the mystery and contradiction at the heart of things. His work often provokes the question: what is this about? He creates poetic/ provocative titles, and it can take time to decode their connection with the images. In this he was astute, as a challenging mystical title can improve a painting's sale price.

I used two of Magritte's images, Perspicacity (1936) and later The Domain of Arnheim (1962), to notable effect from circa 2009-13. At the time, the effectiveness of justification of radiological imaging was beginning to be challenged. In Perspicacity the artist is observing an egg but paints a bird. The Domain of Arnheim is a dominating image of a large bird in full flight, but it also appears to be fused into the landscape.

The connection with justification arose in a 2009 joint IAEA/EC workshop. There was a strong feeling that justification, though legally required, was not being implemented. But, the available data was incomplete. An image whose significance is grasped in a single glance was required to challenge participants' reluctance to address the topic. Magritte's looking at the egg and seeing the bird fitted the bill. Thereafter, data rapidly emerged that allowed the image of the large bird in full flight be used, indicating there was a serious problem with justification in practice.

Jim Malone is Professor (Emeritus) of Medical Physics/ former Dean of Medical School, Trinity College/ St James's Hospital, Dublin. He works/ed regularly with WHO, IAEA, IEC, ICRP and the EC. Publications include books: Ethics for Radiation Protection in Medicine, Mystery and the Culture of Science, and Tales from the Ivory Tower, an unusual memoir.

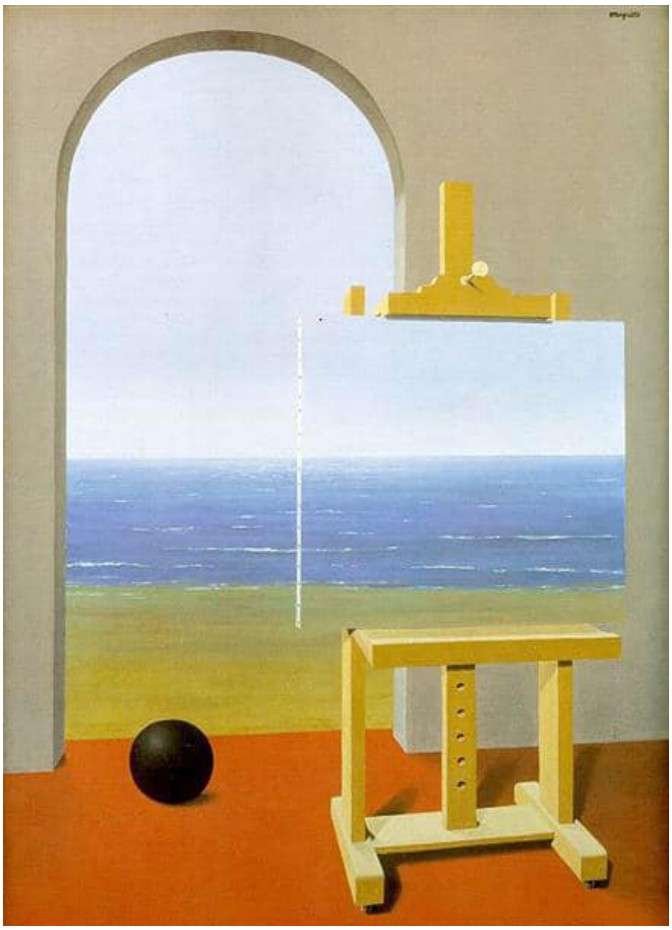
Rene Magritte: Perspicacity, also known as La Clairvoyance (1936). Private collection. Oil on Canvas 54.4 x 60 cm.

The Domain of Arnheim (1962). Royal Museums of Fine Arts of Belgium, Brussels. Gouache, paper 35 x 27 cm. Both creative commons and © Estate of René Magritte, ADAGP Paris/IVARO Dublin, 2022

After using Magritte's work in justification papers, I came to know it in its own right. I greatly enjoy two lesser-known paintings, The Human Condition, and The Art of Conversation. The names reflect his sometimes-exotic choice of titles. Both echo experiences we respond to but also host the unease of illusion.

Magritte has several works entitled The Human Condition. In this version, we see an easel and canvas at the window/door, and a painting of the sea that appears continuous with the sea outside. This is a good visual metaphor for observational science. But Magritte fools us into forgetting that the sea outside is just a painting also. A conceit we readily fall for, even in science, when we look at the theory rather than reality, i.e. assuming the map is the territory.

The Art of Conversation is a charming picture. Two colleagues are absorbed in conversation about their latest work. They are completely unconscious of the world around them and are strolling along insulated in a bubble. This phenomenon also happens in restaurants and bars. However, The Art of Conversation and The Human Condition can also create unease.



René Magritte, 1935, The Human Condition (1935). Oil on canvas, 100 cm × 81 cm (39 in × 32 in). Simon Spierer Collection, Geneva, Switzerland.

René Magritte, L'Art de la Conversation (The Art of Conversation) (1963). Oil on canvas, 46.4 x 38 cm. (private collection) Both creative commons, © Estate of René Magritte, ADAGP Paris.

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ESMPE European School for Medical Physics Experts: Quantitative MRI

Quantitative MRI: basic principles, optimization, quality assurance

24th-26th October 2024, Milan, Italy

Metropolitan Cathedral-Basilica of the Nativity of Saint Mary

EFOMP and the European School for Medical Physics Experts (ESMPE) in collaboration with the Italian Association of Medical Physics (AIFM) would like to invite you to a comprehensive 2.5-day school designed to provide in-depth knowledge on the fundamental principles, optimization techniques, and quality assurance practices in Quantitative MRI, which will be held in beautiful Milan, Italy.

MRI is unquestionably the most complex but also the richest and most versatile imaging method. Although inherently quantitative, MRI has been used largely as a qualitative imaging technique, with the main limitation being the subjective nature of the results. An increasing number of diagnostic problems in clinical medicine require a quantitative assessment of tissue structure, physiology and function, which demand in-depth and systematic training.

Quantitative MRI (qMRI) is a specialized branch of magnetic resonance imaging that focuses on quantifying the above mentioned physical, chemical, and biological properties of tissues, and unlike conventional MRI, qMRI aims to measure specific parameters that can provide detailed information about tissue composition, architecture and function.

This course is addressed to medical physicists who seek both a general overview of the basic principles of MR imaging, from signal generation to image reconstruction, as well as a special focus on optimization and quantification techniques.

Technological advances in hardware as well as in software will be presented, including advanced MR sequences used in clinical routine and artifact management. The importance of standardization in clinical quantitative MRI will be underlined and an emphasis will be placed on quality assurance and multicenter comparison, including safety aspects.

Quantitative MRI represents a powerful tool in modern medical imaging, providing detailed and objective data that enhances the capabilities of conventional MRI and supports more precise clinical decision-making.

The program includes:

- MRI physics and Technology
- Clinical sequences and fast imaging techniques

- Quantification in MRI, quantitative advanced techniques
- Quality assurance in quantitative MRI
- Metrology and intercomparison

This two-and-half day event will be accredited by EBAMP (European Board of Accreditation).

This event is an unparalleled opportunity for medical physicists to advance their knowledge and expertise in Quantitative MRI. With a carefully curated program, expert faculty, and a focus on the latest technological advancements, it is guaranteed that participants will gain valuable insights and practical skills benefiting their professional practice.

Do not miss the chance to be part of this exceptional learning experience in the beautiful city of Milan.

Join Us in Milan!

Luisa Altabella, medical physicist at the Azienda Ospedaliera Universitaria Integrata Verona, Italy

Ioannis Tsougos, medical physicist at the University of Thessaly, Medical School, Greece and King's College London, UK

SIG
ARTIFICIAL INTELLIGENCE

NEW SPECIAL INTEREST GROUP (SIG)!

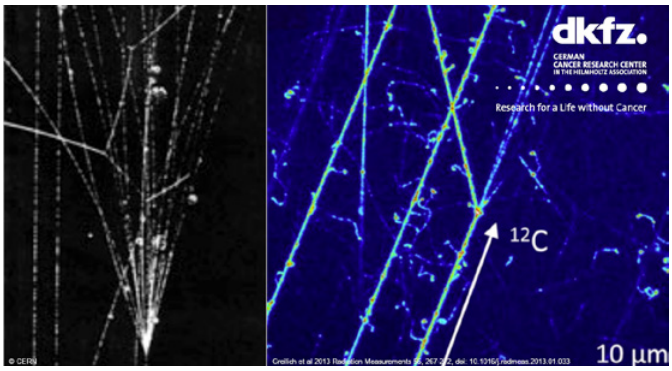
ARTIFICIAL INTELLIGENCE

- Call for members is OPEN!
- Kick-off meeting in June 2024!
- Hurry up and get a chance to join the AI-SG or the steering committee!

Learn More

AI

6th Summer School in Medical Physics 2024: Radiation Detector Concepts for Medical Physics



Nuclear interaction as seen in particle physics at CERN (left) and in today's particle therapy application (right)

Radiation detectors are instruments, which we encounter everywhere in our daily life as medical physicists – in dosimetry, imaging, as monitors in radiation therapy and radiation protection. There are some exciting new developments coming from high energy physics and materials research, which we would like to present and discuss with you in our upcoming 6th Summer School in Medical Physics 2024: Radiation Detector Concepts for Medical Physics.

The course is subdivided in an online phase of about four weeks and an attendance phase in Heidelberg, Germany of one week, following the hybrid mode, so all sessions of the attendance phase are additionally available online as live online phase via Zoom. Participants can decide to follow the course online and on site or 100% virtually.

The online phase with pre-recorded lectures and online sessions introduces the basics in medical physics for radiation therapy and radiology with ca. 7 pre-recorded lectures (each lasting 45 minutes) as well as 4 live online sessions via Zoom (each lasting 90 minutes) with experts from Germany and other countries. The most important mechanisms and applications of radiation detectors for medical physics will be explained in a broad context ranging from high-energy physics to newest developments in medical imaging. The hybrid attendance phase will then focus on specific detector applications for dosimetry & QA in radiotherapy, for image guidance and last but not least for research, e.g. related to FLASH therapy, photon-counting CT or measuring radiation quality for advancements in dosimetry.

Scheduled interactive sessions during the course will allow attendees to exchange thoughts and ideas with each other and the lecturers. Furthermore, the poster session and the science slam during the hybrid attendance phase allow participants to present their current research projects to foster scientific exchange within the group. Based on our long-lasting experience with fully online or hybrid teaching settings, we ensure interactive learning experience, no matter if participants attend 100% virtually or on site in Heidelberg.

The summer school is dedicated to national and international students on different levels (BSc, MSc or PhD). Participation is limited and we look forward to receiving your application.

Dates:

1. Application Deadline: June 17th 2024
2. Online Phase: Aug. 26th – Sep. 22nd 2024
3. Attendance phase in Heidelberg or live online phase via Zoom: Sep. 23rd – Sep. 27th 2024

Program:

The program can be downloaded from the website: www.dkfz.de/summer_school2024

Contact:

Local Organizing Team
Anna Moshanina, Simone Barthold-Beß, PhD, Marcel Schäfer
Division of Medical Physics in Radiation Oncology (E040)
German Cancer Research Center
Im Neuenheimer Feld 280
DE-69120 Heidelberg, Germany
E-Mail: symposium.medphys@dkfz-heidelberg.de
Web: www.dkfz.de/summer_school2024

Bio-sketches of Hosts:

Prof. Oliver Jäkel is head of the Division of Medical Physics in Radiation Oncology at the German Cancer Research Center. He holds a PhD in Physics and since 2014 he has been a full professor at the Medical Faculty Heidelberg of Heidelberg University.

Prof. Jürgen Debus is a Medical Doctor in radiation oncology and holds a PhD in Physics. Since 2003 he has been a full professor at the Medical Faculty Heidelberg of Heidelberg University. He is also Chairman of the Department "Radiation Oncology" at the Heidelberg University Hospital.

Dr. Tim Gehrke has gained extensive experience with pixel detectors for applications in the field of Medical Physics. He is deputy group leader in the Division E040 at DKFZ. Before his PhD project, he obtained his Master degree in the field of accelerator physics at DESY / Hamburg University.

Dr. Laurent Kelleter is a postdoctoral research scientist at the German Cancer Research Center within the Division of Medical Physics in Radiation Oncology. He was previously awarded a PhD in Experimental Particle Physics by University College London. His current research focuses on in-vivo monitoring and quality assurance techniques in ion-beam radiotherapy.

Dr. Maria Martisikova is a research group leader in the Division E040 at DKFZ, focusing on development of novel detection and imaging techniques for ion beams. Her group works mainly with pixelized semiconductor detectors developed at CERN for applications in ion tracking in ion beam radiotherapy and imaging with ion beams.

Dr. José Vedelago leads the research group "Translation Research for Ion Beam Therapy" within the Division E040 at DKFZ. Additionally, he holds a Principal Investigator position at Heidelberg University Hospital. The main research project aims to assess the impact of secondary radiation during proton and light ion beam therapy.

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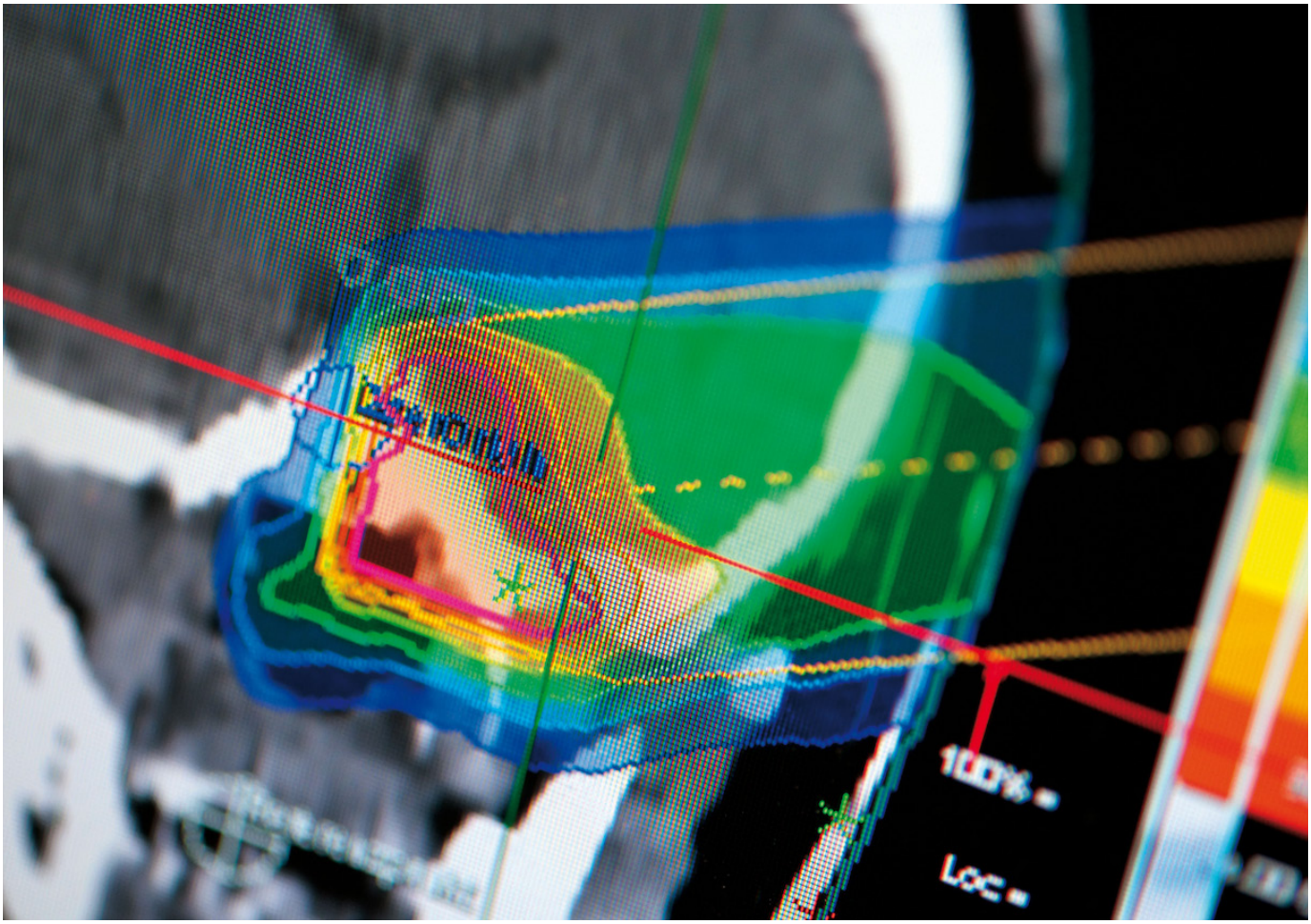

Particles therapy irradiation plan

For several years, the German Cancer Research Center in Heidelberg, Germany, has successfully offered courses in the field of Particle Therapy. The courses are organized under the auspices of the Heidelberg Institute of Radiation Oncology (HIRO) in close cooperation with the Heidelberg Ion-Beam Therapy Center (HIT) as well as the University Hospital Heidelberg.

All three courses are subdivided in an online phase of about six weeks (from Oct. 14th to Nov. 24th 2024), followed by online sessions on Zoom on Nov. 25th and 26th 2024 (courses 2 and 3 only). The hybrid attendance phase in Heidelberg or on Zoom is scheduled for Nov. 28th and 29th 2024. During the online phase participants get access to the virtual learning platform Moodle with learning materials such as pre-recorded video lectures, PDF scripts as well as short tasks to work on in small groups. The online sessions as well as the hybrid attendance phase provide interactive sessions such as case-based scenarios or pro and contra discussions as well as live lectures. It allows for exchange between our experts and national

and international participants to strengthen collaboration and the individual learning progress. The courses are dedicated to Radiation Oncologists, Medical Physicists as well as national and international students or Post-Docs.

As one of the largest radiation therapy centers in Europe, the unique Ion-Beam Therapy Center with its isocentric gantry as well as many years of experience in online-enhanced teaching, Heidelberg is an excellent place for further education of physicians and physicists and young scientists.

Dates:
1. Registration Deadline: Sept. 25th 2024
2. Online Phase: Oct. 14th – Nov. 24th 2024
3. Online Sessions on Zoom (only for courses 2 and 3): Nov. 25th and Nov. 26th 2024
4. Hybrid Attendance Phase in Heidelberg or via Zoom: Nov. 28th – 29th 2024

Programs and further information:
www.dkfz.de/particle_course_en

Course Leaders:
Prof. Oliver Jäkel, PhD
Division of Medical Physics in Radiation Oncology, German Cancer Research Center, Heidelberg, Germany

Prof. Jürgen Debus, MD, PhD
Department of Radiation Oncology and Radiotherapy, Heidelberg University Hospital, Heidelberg, Germany

Local Organizing Team
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Division of Medical Physics in Radiation Oncology
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E-Mail: spezialkurs.partikeltherapie@dkfz-heidelberg.de
Web: www.dkfz.de/particle_course_en

Prof. Oliver Jäkel is head of the Division of Medical Physics in Radiation Oncology at the German Cancer Research Center. He holds a PhD in Physics and since 2011 he is a full professor for Medical Physics at the Medical Faculty Heidelberg of Heidelberg University.

Prof. Jürgen Debus is a Medical Doctor in radiation oncology and holds a PhD in Physics. Since 2003 he is a full professor at the Medical Faculty Heidelberg of Heidelberg University. He is also Chairman of the Department "Radiation Oncology and Radiation Therapy" at the Heidelberg University Hospital.

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Annual meeting report 2024 from the Danish Society of Medical Physics

The annual symposium of the Danish Society of Medical Physics (DSMF) took place April 23-24 in Middelfart on the island Fyn located in the center of Denmark. Some 75 people from the hospitals, universities and industry participated. The scientific sessions were complimented by an industrial exhibition and poster area, the general assembly, social events, mingling and "hygge".

Figure 1. EFOMP's president at the Danish congress of medical physics.

Plenary sessions and themes.

The main theme of this year's meeting was research career pathways within the field of medical physics. One motivation for this subject is that no straightforward tenure track within medical physics exists in Denmark. Therefore, professors Kari Tanderup (RT), Ivan Vogelius (RT), and Adam Espe Hansen (DR) presented their career pathways from university, through medical physics residency ultimately leading to their respective professorships. Different aspects such as mentorship, (unconscious) prejudices, active research areas, opportunities, expectations and work/life balance were covered from various angles. The joint experience of these excellent talks gave a real insight into the research aspects of medical physics and hopefully offered some constructive points for participants who have thoughts of entering such a career.

Figure 2. Keynote lecturers and awardees of the congress.

Other plenary talks included an overview of the status of radionuclide therapy covering different radiopharmaceuticals and isotopes presented by senior researcher Johan Ruben Gustafsson from Medical Radiation Physics at Lund University, Sweden. A summary of the analysis of reported adverse healthcare events within both radiotherapy, diagnostic radiology and nuclear medicine was presented by Anders Beierholm from the Danish Health Authority. Last, but not least, EFOMP President Efi Koutsouvel presented an overview of EFOMP and the EFOMP perspective on the role and requirements of the medical physicist.

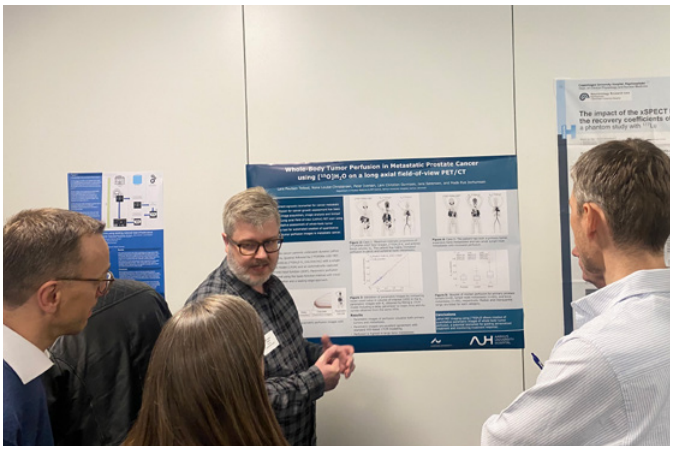

Figure 3. Poster session and social event of the congress.

Breakout sessions.

The general session on adverse events was followed up by a breakout session where a special interest group (SIG) shared their experience on adverse events in radiotherapy. A lively discussion followed a presentation shared by multiple members of the SIG.

The breakout session in Diagnostic Radiology was about clinical experiences of the high resolution and spectral Photon Counting CT (PCCT) scanner that has been in use for about a year in a hospital in the southern part of Denmark. A radiographer and a thorax radiologist gave a very inspirational lecture on the advantages of using this scanner with improvements in diagnostics, dose, and workflow. There was also the mention of some of the challenges and so far, unfulfilled potentials.

The nuclear medicine breakout session was focused on personalized radionuclide therapy, highly relevant with the success of, for example, Lu-^{177} based treatment of neuroendocrine tumors and metastatic prostate cancers. Following the plenary introduction to radionuclide therapy, a more in-depth discussion was given by Professor Michael Ljungberg, also from Medical Radiation Physics at Lund University, who gave an excellent talk on (some) of the complications for personalized radiation therapy in practice, highlighting the current standard and the impact of some of the limitations for personalized dosimetry in practice.

The annual meeting ended with an interesting plenary session on innovations in healthcare were alternative approaches to implement novel solutions in a joint venture between public hospitals and industry were presented and discussed. All in all, we believe that the meeting was successful and expectations from participants were met both scientifically and socially.

Jens M. Edmund is the radiotherapy member in the symposium committee. He received his master's degree in biophysics in 2003 and PhD in radiation dosimetry in 2007. He obtained a diploma of the American Board of Radiology and became a certified medical physics expert in 2014.

Thomas Lund Andersen is one of two members for nuclear medicine in the symposium committee. He received his master's degree in engineering in 2007, a PhD in physics in 2011 and became a certified medical physicist in 2019.

Christine Voetmann is one of two diagnostic radiology members in the symposium committee. She has a background in biomedical engineering (MScE) and has been working at the University Hospital of Copenhagen since 2014. She is just about to finish her training as a medical physicist in diagnostic radiology.

Peter Frøhlich Staanum is the other member for nuclear medicine in the symposium committee.He received his masters degree in physics in 2001 and PhD in 2004, entered nuclear medicine in 2010 and became a certified medical physicist in 2013 and medical physics expert in 2018.

European Congress of Radiology 2024: EFOMP session on Artificial Intelligence

Figure 1. The winner of the EFOMP quizz with Schrödinger's cats.

The European Congress of Radiology, focused on Next Generation Radiology, took place in Vienna from February 28 to March 3. According to the statistics, this year's attendance was 18,861 people, representing an increase of 8% compared to the previous year. However, it still falls short of pre-COVID attendance figure, which exceeded 30,000 people.

The congress was dominated by AI and photon-counting CT lectures, which are currently among the most dynamic and influential topics in the field of radiology today. Additionally, several sessions were proposed also by our Physics in Medical Imaging subcommittee. Five refresher courses were offered, covering topics such as radiation doses and associated risks in case of oncological patients, high- and low-field MRI, interventional procedures, on photon-counting CT, and last but not least, on communicating the risk and benefits of the use of protective shielding.

As usual, attendees had the opportunity to choose from a variety of session types and topics, including plenary lectures, refreshing courses, and research presentation sessions etc. The

Figure 2. Participation in the EFOMP workshop.

program was quite extensive, allowing attendees to spend entire days at the congress center or participate in sessions remotely from home.

Consistent with previous years, their congress featured the EFOMP workshop focusing on AI – What you need to know, do, and say? The workshop commenced with a quiz prepared by Paddy Gilligan, challenging participants to guess the contents of a small black box passed around the lecture hall. The EFOMP workshop included an introduction by radiologist Peter Joseph Macmahon, followed by a presentation by Mika Kortesniemi on setting up a multidisciplinary AI evaluation service. Afterwards, we could listen to the talk of a lawyer Mary Kirwan about the ethical, patient, and legal perspective of AI. And finally, a syllabus for AI training was conveyed by Irene Hernandez-Giron. The workshop concluded with the revelation that the black box contained a 3D printed Schrödinger's cat (Fig. 1). And the winner of the quiz, who correctly guessed the content of the black box, admitted to consulting AI for assistance. The workshop drew significant attendance (Figure 2), indicating interest not only from physicists but also from radiologists and radiographers in the latest developments in AI from a medical physics perspective.

We eagerly anticipate the next ECR, scheduled to be held again in Vienna from February 26 to March 2, 2025, with the theme Planet Radiology.

Lucie Sukupowa is a medical physicist at the Institute for Experimental and Clinical Medicine (IKEM), Czech Republic.

EVENT

ENEN2Plus Cross-YGN Initiative: Networking Activities Among Nuclear YGNs

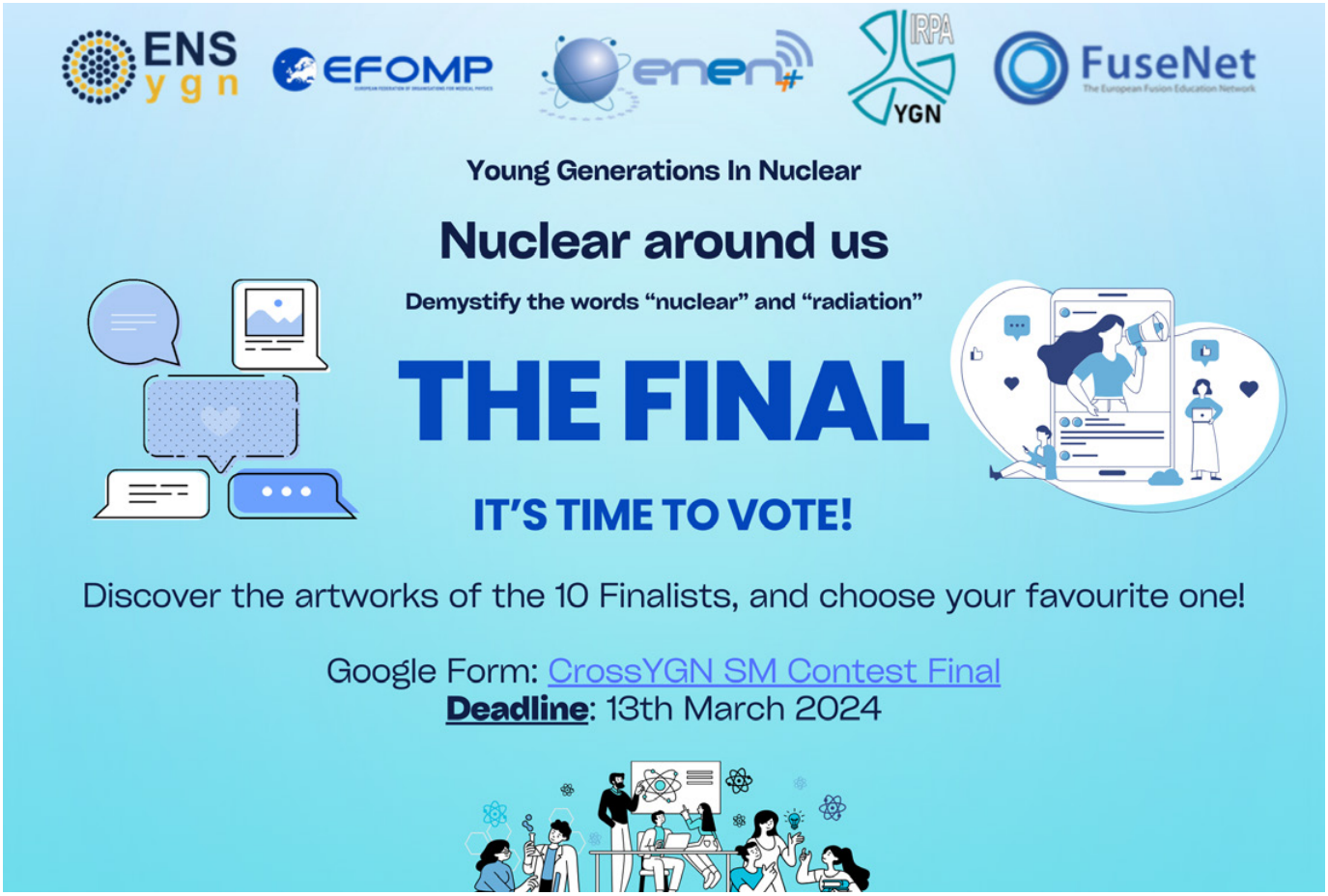

Figure 1. Nuclear YGN poster.

The cross-sectional cooperation between the young members of the European Federation of Organisations for Medical Physics (EFOMP), the International Radiation Protection Association (IRPA), the European Fusion Education Network (FuseNet), and the European Nuclear Society (ENS) has culminated in the Social Media Competition "Nuclear Around Us." This initiative, part of the ENEN2plus work package WP3 - Task 3.4, was inaugurated in the first quarter of 2024.

The contest invited students and young professionals (35 years or younger) to create innovative content—such as visuals, videos, posts, and multimedia—that aimed to demystify the terms 'nuclear' and 'radiation.' A jury composed of members from the various young sections selected ten finalists to advance to the next round. The final stage involved public online voting, which was open from March 5th to 13th and garnered over 1.1k votes.

Cross-YGN Workshops

1 July 2024

Slovak Technical University in Bratislava (STU)

Youth at the core!

JOIN us in Bratislava! APPLY for the 1st BSc & MSc Nuclear Competition, PARTICIPATE in the Summer School 2024, and don't miss these two special workshops!

Workshop I

Your Future in Nuclear: Exploring a World of Career Opportunities

Workshop II

Youth & Nuclear: The Network of YGNs

Extended Deadline

15th May 2024

Registration:

Link in the post

Funded by the European Union

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Figure 2. Presentation of the award.

The winner of the contest is Jishant Talwar, who received 35.5% of the votes. Jishant is an MSc student in Fusion Energy and Physics Engineering at the University of Stuttgart. He submitted a short video clip explaining the basics of fission and fusion energy. As the winner, Jishant's contribution will be published on all the young sections' social media platforms. Additionally, he has been awarded a travel and participation grant for the European Research Reactor Conference (RRFM) in Warsaw, Poland, from April 21 to 25, 2024, along with an Amazon voucher. "I am very grateful for this opportunity. I attended interesting sessions and had several networking occasions with other delegates, students, and experts in the field of nuclear research," said Jishant in Warsaw.
Alongside this initiative, the cross-YGN cooperation is continuing working on future projects such as meetings, sponsorships, working groups, etc. The group is currently discussing the organisation of workshops at different conferences and targeting different audiences.

The first workshops will take place in Bratislava, Slovakia, on July 1, 2024, during the 1st BSc and MSc Nuclear Competition and Summer School 2024. Representatives from the Young Generation Networks (YGNs) involved in the project will share their stories with the attending BSc and MSc students. This event aims to showcase the diverse opportunities within nuclear education and to present the active networks connecting nuclear youth across Europe.

Workshop I: "Your Future in Nuclear: Exploring a World of Career Opportunities" will highlight the numerous job opportunities in the nuclear sector. YGN representatives will share their personal experiences and career paths, illustrating the various educational routes and career prospects available. This workshop aims to emphasise the interconnections between the many sectors of nuclear science and technology.

Workshop II: "YGNs in Nuclear" will introduce the Young Generation Networks and their activities, which unite nuclear students and young professionals across Europe. This session aims to inform students about these organisations and their role in supporting and empowering young generations. By engaging with the young participants, we hope to encourage them to share their expectations, interests, and future goals, fostering a discussion about the potential of youth in nuclear energy.

Furthermore, the Cross-YGN team is planning to organise another workshop in September during the 5th European Congress for Medical Physics (ECMP) and the parallel ENEN PhD Event & Prize,

which will take place in Munich, Germany. The goals of this session are to engage with the community and discuss the numerous opportunities available in the fields of research and innovation. Additionally, Leticia Irazola, representing EFOMP in the cross-sectoral initiative, will present the Cross-YGN project and its activities during one of the Early Career sessions. Finally, the Cross-YGN team is expected to sign a Memorandum of Understanding (MoU) to solidify a common vision and strategy for attracting the next generation to nuclear studies and professions.

Mattia Baldoni is Communications Officer at the European Nuclear Society, which brings together more than 12,000 nuclear professionals and promotes the development of nuclear science and technology and the understanding of peaceful nuclear applications. ENS participates in the ENEN2Plus project, leading the Task 3.4. (Setting up networking cross-YG and cross-professional organisations).

ICTP School of Hadron Radiotherapy - abstract prize

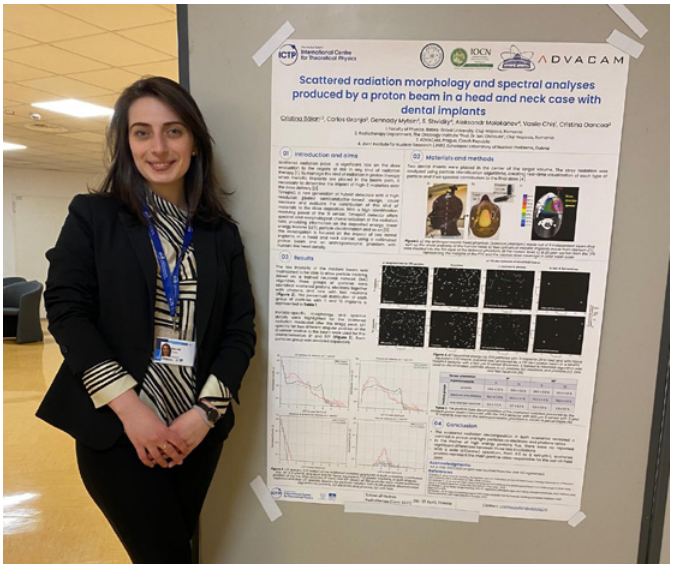

Figure 1. Cristina Bălan is at the poster session.

Particle therapy stands at the forefront of modern cancer treatment, offering precise targeting of tumours while sparing healthy surrounding tissues. However, the efficacy of particle therapy hinges upon overcoming numerous technical and physical challenges.

The advancement in treatment planning and clinical situations underscore the need for dosimetric equipment and detectors tailored to address the needs of advanced treatment techniques. By using advanced new detectors treatment verification and monitoring is now possible. The novel semiconductor pixel Timepix detectors are able to perform single particle detection and imaging. The Czech company ADVACAM, a key member of the Medipix collaboration from CERN, manufactures this new generation of detectors dedicated to radiation monitoringThe MiniPIX Timepix3 is a pixelated detector with a read-out chip that can be used in radiotherapy for spectral and temporal characterization of particles that hit the sensor, offering real-time visualisation of particles that reach the sensor's surface. Particle's deposited energy, type, and linear energy transfer (LET) represent only one short list of particle parameters that these detectors can.

The prize for the best poster at the first School of Hadron Radiotherapy organised by the ICTP was won by the PhD candidate Cristina Bălan, a medical physics expert from Cluj-Napoca, Romania. Her PhD thesis research is carried out at University Babeș-Bolyai, under supervision of Prof. Dr. Vasile Chiș and Dr. Cristina Oancea focused on particle therapy using pixelated detectors for scattered radiation characterization. The addressability of proton therapy for head and neck cancer patients is increasing due to its remarkable radiobiological and physical advantages over those specific for conventional radiotherapy. The treatment plan and dose delivery become complicated when materials with high Z densities are placed near the tumour. For that reason, an experimental setup was carried out by placing two dental implants made from titanium, inside an anthropomorphic head phantom, in the middle of the irradiated volume. A Minipix Timepix3 detector close to the phantom edge, the scattered radiation resulting from treatment delivery was compared to that obtained from the same setup, but without metallic inserts, behind a spread-out Bragg peak (SOBP). Based on morphological aspects of each particle interaction with the detector's sensor analysed by the machine learning algorithms from the Data Processing Engine (DPE) tool, decomposition of the mixed field of radiation was performed in both

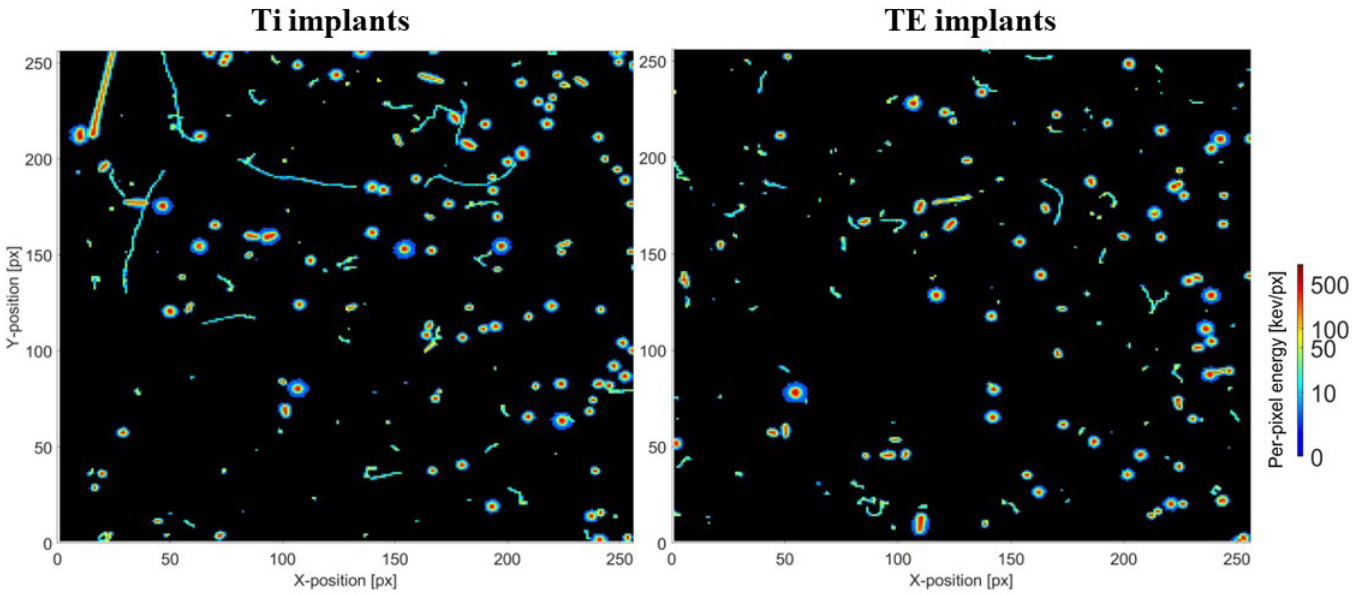

Figure 2. Mixed field produced by 200 particles from scattered radiation in both cases: with Ti implants and the other with tissue equivalent (TE) materials.

cases. Three groups of particles were identified: (i) protons, (ii) electrons together with photons and (iii) ions with fast neutrons. The contribution of all three groups of particles to the percentage composition of the stray radiation behind SOBP in the healthy tissue, including a biological impact by measuring the LET, was reported. Placing the Ti implants into the field led to an increased number of scattered protons. The spectral fingerprint of each group of particles has a different contribution to the LET spectra. Directional maps of scattered high and low-energy protons show a more spread-out morphology when Ti implants are present.

The scattered radiation produced by dental implants was characterised using spectral and morphological concepts. Their influences over a proton-based treatment are presented as a novel modality to highlight the impact of the metallic inserts in a head and neck case. Further investigations will describe the contribution of each particle type to the deposited dose behind the target volume.

Cristina Bălan is a PhD candidate and a medical physics expert from Cluj-Napoca, Romania.

European School for Medical Physics Experts (ESMPE): Advances in PET Imaging and Quantification

Science Congress Center of Munich

September 11, 2024 | Munich, Deutschland

The ESMPE European School for Medical Physics Experts presents an advanced one-day course focused on the latest developments in Positron Emission Tomography (PET) imaging and quantification. The course promises to offer a comprehensive understanding of PET/CT instrumentation, encompassing its diverse applications in medical imaging and oncology research and practice.

Cutting-Edge PET Technology

This course is designed to provide participants with an in-depth knowledge of the state-of-the-art advancements in PET technology. Attendees will gain insights into the design and functionality of advanced clinical PET systems, including novel hardware such as long axial field-of-view scanners and innovations in crystal/detector coupling. The exploration extends beyond hardware to image reconstruction methodologies, encompassing conventional iterative methods with detector and noise modeling as well as the latest deep learning techniques.

Quality Assurance and Standardization

A critical aspect of the course is the focus on quality assurance protocols, ensuring the reliability and reproducibility of quantitative measurements. This segment emphasizes the importance of standardizing imaging protocols across different sites to maintain consistency and promote inter-institutional collaboration. Attendees will learn the essentials of harmonizing PET/CT

scanners, which is crucial for the advancement of medical imaging practices globally.

Quantitative Analysis and Biomarkers in Oncology

The course delves into quantitative PET analysis techniques, including semi-quantification and dynamic imaging with kinetic modeling. Special emphasis is placed on PET imaging biomarkers in oncology, providing valuable insights into their application in diagnosis, treatment planning, and response assessment. This knowledge is pivotal for medical physicists aiming to enhance their expertise in oncological imaging and improve patient outcomes.

Accreditation and Expert Faculty

This intensive course is accredited by the European Board of Accreditation for Medical Physics (EBAMP) as a Continuing Professional Development (CPD) event for Medical Physicists at EQF Level 8. The event will feature lectures and demonstrations by renowned experts in the field:

- **Stephane Chauvie** from Santa Croce e Carle Hospital, Italy
- J**örg Peter** from Deutsches Krebsforschungszentrum, Germany
- **Dimitris Visvikis** from the National Institute of Health and Medical Research (INSERM), France

Event Schedule

The event kicks off with registration at 8:00 AM, followed by a welcome and introduction by Stephane Chauvie. The morning sessions cover fundamental PET principles, advanced clinical PET systems, and image reconstruction techniques. After a brief coffee break, the focus shifts to image corrections, motion management, and segmentation.

The afternoon sessions will include discussions on the harmonization of PET/CT scanners, dynamic imaging, kinetic modeling, dosimetry, and quantification. The event concludes with an insightful lecture on the application of artificial intelligence in PET imaging.

Additional Information

- Course Language: English
- Level: MPE – Level 8
- Maximum Participants: 80
- Date: September 11, 2024
- Study Load: 6 hours of lectures and demonstrations
- CPD Points: To be confirmed (EBAMP Accreditation)

Join Us in Munich!

This event is an unparalleled opportunity for medical physicists to advance their knowledge and expertise in PET imaging and quantification. With a carefully curated program, expert faculty, and a focus on the latest technological advancements, participants are sure to gain valuable insights and practical skills that will benefit their professional practice. Do not miss the chance to be part of this exceptional learning experience in the beautiful city of Munich.

Stephane Chauvie is an Italian physicist with a post-graduate degree in medical physics at university of Torino and in healthcare management at university of Roma “La Sapienza”. He is one of the main organizers of the ESMPE on Advances in PET imaging and quantification.

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**

Aug 26th, 2024 - Sep 27th, 2024
6th Summer School in Medical Physics 2024: Radiation Detector Concepts for Medical Physics
Virtual or Heidelberg Germany

Sep 3rd, 2024 - Sep 6th, 2024
STP Computing in Healthcare Course
Guildford, Surrey, United Kingdom

Sep 11th, 2024 - Sep 14th, 2024
5th European Congress for Medical Physics
Munich, Germany

Oct 7th, 2024 - Oct 11th, 2024
Joint ICTP-IAEA Workshop on Radiation Protection in Image-Guided Radiotherapy (IGRT) | (smr 3972)
Trieste, Italy

Oct 14th, 2024 - Nov 29th, 2024
Hybrid Courses in the Field of Particle Therapy 2024
Virtual or Heidelberg, Germany

Oct 24th, 2024 - Oct 26th, 2024
Quantitative MRI: basic principles, optimization, quality assurance
Milan, Italy

Nov 7th, 2024 - Nov 11th, 2024
Radiation Dosimetry, Imaging for Radiotherapy, Treatment Planning and Patient Specific Dosimetry with workshops
Chelsea, UK

Nov 20th, 2024 - Nov 22nd, 2024
Workshop on X-ray imaging dosimetry
Helsinki, Finland

Apr 28th, 2025 - Apr 30th, 2025
Optimisation in X-ray and Molecular Imaging (OXMI) 2025
Gothenburg, Sweden

Sep 29th, 2025 - Oct 4th, 2025
IUPESM World Congress on Medical Physics and Biomedical Engineering 2025
Adelaide, South Australia

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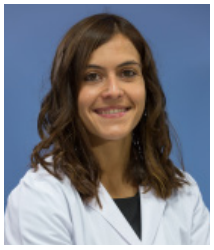

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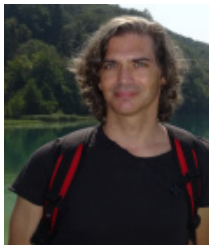

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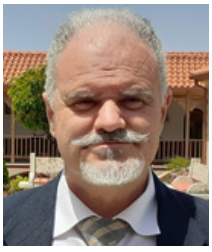

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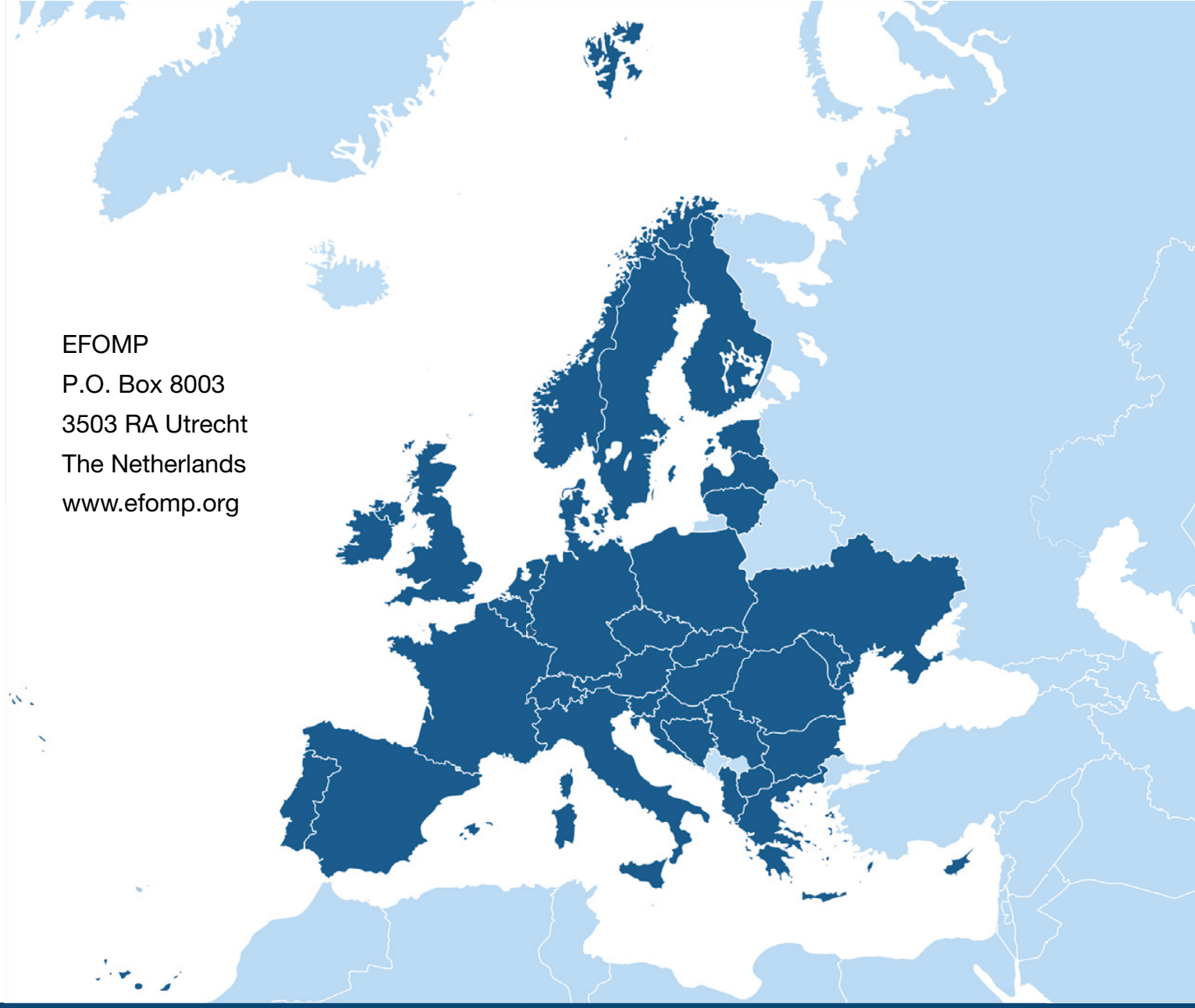

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EFOMP

EUROPEAN FEDERATION OF ORGANIZATIONS FOR MEDICAL PHYSICS

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 office moved to Utrecht, the Netherlands, in January 2021.

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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