

Express

Issue 5 December 2017

November 2017 - what a month!

We already had a number of highlights in our project in the past, but last month surely topped it all. Starting with our 2nd scientific international School, this time on Monte Carlo simulations, all our Fellows came to Munich to learn the basics of FLUKA, Geant4 and PENELOPE through lectures, tutorials and hands-on workshops. They were joined by all students in the newly established Center for Doctoral Training [LIV.DAT](#) to establish links between two major new training initiatives. It was a pleasure to see our Fellows collaborate actively and apply what they learned in the course. All training material is now available via our School indico site, so others can benefit from the well-rounded program.

On Tuesday, 7th November, we organized an international outreach event between CERN, Ludwig Maximilian University in Munich and the University of Liverpool to celebrate the 150th birth anniversary of Marie Skłodowska Curie and the 20th anniversary of the Marie Skłodowska Curie Actions which support our OMA project. The

event saw hundreds of school children and students join lively poster sessions and hands-on activities at the three locations, as well as talks that were video-streamed for a global audience. The European Commission contributed a special video message to our event which was particularly well received by all participants.

Just days later, I was very proud to listen to our Fellows as they presented their remarkable research and training progress during our mid-term review meeting with the EC on 13th November. It was also a great pleasure to meet all of our project partners and review the excellent progress made so far.

Finally, the Force was strong with our project when we organised a *Physics of Star Wars* event in Liverpool on 27th November. This linked R&D within OMA with the science and fiction in the famous Star Wars movies and fascinated hundreds of high school children, university staff and students. It also reached 100,000s via various online channels.

Prof. Carsten P. Welsch,
Coordinator

Highlights

- First peer-reviewed paper publication within OMA
- OMA school on Monte Carlo Simulations
- OMA review Meeting
- Fellows Activity
- Partner News





Research News

First peer-reviewed paper publication of Johannes Petzoldt within OMA project

Johannes Petzoldt, OMA Fellow from IBA, is happy to announce his first peer-reviewed paper publication within the OMA project. He co-authored the sensitivity study of the prompt-gamma (PG) camera of IBA, which has been published by Lena Nenoff et al., Johannes' collaboration partners at OncoRay in Dresden, Germany. The paper is being published in a special issue of "Radiotherapy & Oncology", one of the most prestigious journals in radiation therapy.

Lena Nenoff et al. investigated the limitations of the PG slit camera, delivering clinical treatment plans on an anthropomorphic phantom. During the experiments, local and global range variations of different magnitude were introduced and the ability of the PG camera to detect those range shifts was challenged and further investigated. Johannes contributed mostly with a calibration measurement of the PG camera, which he performed in December 2016 in his first secondment at OncoRay. Based on his results, the PG simulation accuracy could be highly improved and the robustness of the data analysis was increased. The results of the study further strengthen the confidence in range verification measurements using the PG camera.

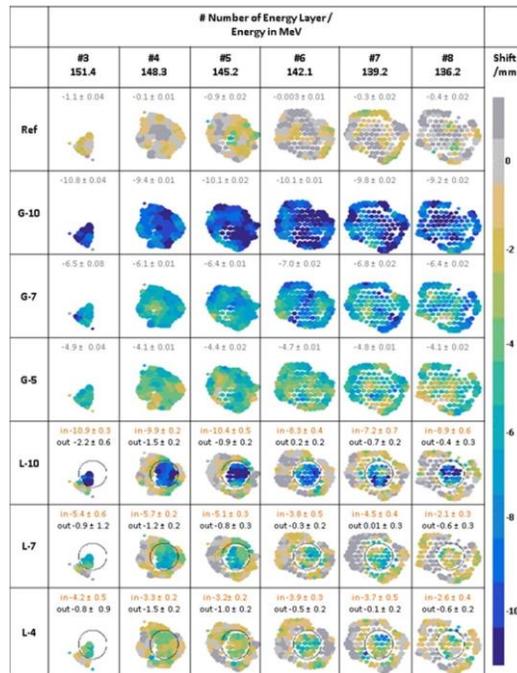


Fig. Detected range shifts between measurement and simulation for separate spots in 6 consecutive energy layers of the IMPT 1Gy field. Spot size correlates with the number of protons. For each layer, the layer-averaged shifts \pm standard deviations are given. For local shifts (black circle), this is done separately in- and outside of the affected area. Source: 'Sensitivity of a prompt-gamma slit-camera to detect range shifts for proton treatment verification', Lena Nenoff et al., Radiotherapy and Oncology, Article in press.

Full article:

'Sensitivity of a prompt-gamma slit-camera to detect range shifts for proton treatment verification', Lena Nenoff, Marlen Priegnitz, Guillaume Janssens, Johannes Petzoldt, Patrick Wohlfahrt, Anna Trezza, Julien Smeets, Guntram Pausch, Christian Richter, Radiotherapy and Oncology, Article in press, DOI: <http://dx.doi.org/10.1016/j.radonc.2017.10.013>

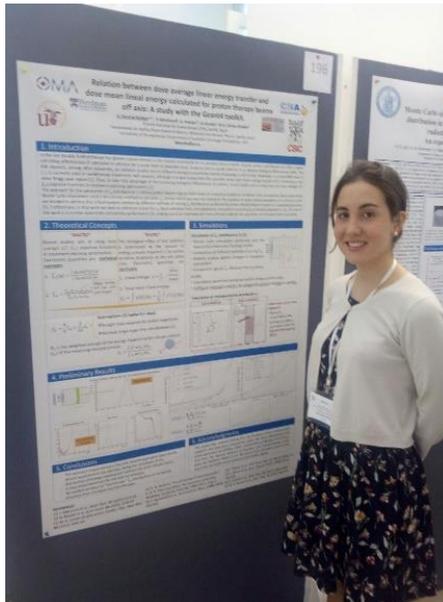
Iba





Anna Baratto Roldán's work presented at international conferences

Between October and November 2017, OMA Fellow Anna Baratto Roldán (US/CNA) attended two international conferences to present her work within the OMA project.



Anna presenting her poster at MCMA2017

From the 15th to the 17th of October, she participated in the International Conference on Monte Carlo Techniques for Medical Applications (MCMA2017) in Naples, where she presented a poster entitled Relation between dose average linear energy transfer and dose mean lineal energy calculated for proton therapy beams off axis: A study with the Geant4 toolkit.

The abstracts of the conference were recently published in a supplement to Physica Medica.

From the 17th to the 18th of November, Anna attended the 1st ESTRO Physics Workshop in Glasgow, where she joined the symposium on micro- and nanodosimetry for radiotherapy.

This workshop had the aim to promote a new and unique concept for scientific exchange, facilitating networking and new ideas. In her work group, Anna gave a talk on the preparation of beam lines at CNA (Seville, Spain) for Radiobiology experiments, where, besides her own project in OMA, she also presented the work done by Dr. Cristina Battaglia, former oPAC fellow.



Anna giving a talk at 1st ESTRO Physics Workshop

Proceedings:

'Abstract ID: 196 Relation between dose average linear energy transfer and dose mean lineal energy calculated for proton therapy beams off axis: A study with the Geant4 toolkit', Anna Baratto-Roldán, Peter Kimstrand, Álvaro Perales Molina, Alejandro Carabe, Miguel Antonio Cortés-Giraldo, Physica Medica: European Journal of Medical Physics, Volume 42, 42 – 43, International Conference on Monte Carlo Techniques for Medical Applications – 2017 (Naples, Italy, October 2017).
<http://dx.doi.org/10.1016/j.ejmp.2017.09.104>





Network News

OMA School on Monte Carlo Simulations at LMU Munich



Participants of the OMA School on Monte Carlo Simulations

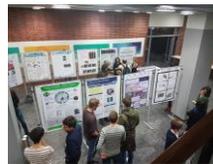
The second scientific school of the OMA project took place at Ludwig Maximilian University of Munich, Germany, between 6th and 10th November. The school programme was developed and coordinated by Dr. Alfredo Ferrari from CERN and delivered by international experts. It covered the fundamentals of Monte Carlo simulations and combined lectures with hands-on training. School participants were familiarized with Monte Carlo on the specific examples of FLUKA, PENELOPE and Geant4 codes throughout the week. The event brought together fellows from two Liverpool-coordinated networks: OMA and Liv.Dat, providing opportunities for networking between major training initiatives.

The school kicked off on Monday morning with an introductory talk by Dr. Alfredo Ferrari, followed by a talk on principles of Monte Carlo calculations and codes by Prof. Francesc Salvat from the University of Barcelona. The extensive programme of the day included an overview of various codes:

Geant4 was presented by Dr. George Dedes (LMU Munich), PENELOPE by Prof. Francesc Salvat and FLUKA by Dr. Alfredo Ferrari. Mr. Eleftherios Skordis from University of Liverpool/CERN introduced the participants to FLAIR (FLUKA Advanced Interface).

The second day provided more insight into PENELOPE, with lectures by Prof. José M^a Fernández Varea from the University of Barcelona and Dr. Lorenzo Brualla from Universitätsklinikum Essen. The afternoon was devoted to a hands-on session and included exercises with PENELOPE and Geant4.

The day finished off with participation in an international outreach event 'Marie Curie Day' <https://marie-curie-day-2017.org/>. All OMA fellows contributed to an outreach poster session, which was followed by a talk 'The impact of Marie Skłodowska-Curie Actions to support education and research in ion beam cancer therapy' by Prof. Katia Parodi of LMU.





Exercises with FLUKA – hands-on session

The talks on Wednesday focused on the FLUKA code, with Geometry in FLUKA by Eleftherios Skordis, FLUKA models by Dr. Alfredo Ferrari, Ionization and transport in FLUKA by Dr. Francesc Salvat Pujol and Accelerators in FLUKA by Eleftherios Skordis. Thursday provided further understanding of

this code, with lectures by Dr. Andrea Mairani from Heidelberg Ion Beam Therapy Centre, covering heavy ion beams and radioactivity, scoring and medical applications in FLUKA. The talks were followed by a computer exercises session on FLUKA and its medical applications.

On the final day of the school the participants learned about Geant4 advanced examples, presented by Dr. Marco Pinto and Dr. George Dedes (LMU). The talk on Outlook in Penelope was given by Dr. Francesc Salvat Pujol and the talk on Outlook in FLUKA by Dr. Alfredo Ferrari. The participants also received an overview of GeantV, with Dr. Andrei Gheata (CERN) presenting Outlook in GeantV and Dr. Sofia Vallecorsa (Gangneung-Wonju National University) giving a talk on GeantV: machine learning techniques.

All talks and exercises are available via <https://indico.cern.ch/event/656336>

OMA achievements showcased at the Mid-term Review Meeting

The OMA Mid-Term Review took place on 13th November 2017 in the historical building of the Ludwig Maximilian University of Munich, Germany.

The meeting started with a welcome from the Project Coordinator, Prof Carsten Welsch, followed by an introduction by the EC representative from the Research Executive Agency (REA), the external reviewer and all Scientists-in-charge. Prof Welsch then presented an overview of progress made in research, training and networking, as well as aspects of the management of the contract. He spoke about the OMA training model, the events delivered so far, unique collaborations with other training initiatives and their impact on the fellows' training.



Prof Welsch presenting an overview of progress made in research, training and networking





He also presented a summary of the project wide communication and significant outreach involvement, to conclude with plans for the remaining two years. The fellows' representative in the Steering Committee Michelle Lis delivered a presentation of the fellows' perspective, which emphasized the exceptional opportunities that OMA network provides to its fellows, such as networking, training and secondments, as well as highlighted the peer mentor scheme in OMA and the experience of leading own research project.

The individual presentations of the OMA fellows were a central part of the meeting. All 15 ESRs delivered talks on their project progress in such aspects as research, training and dissemination, as well as their experiences in the network. Remarkable achievements were presented by all OMA fellows, only one year after the start of their individual projects. All fellows then met with the reviewers to discuss their experiences and views on the project in more detail. Meanwhile the consortium representatives gathered for a Supervisory Board meeting to discuss project reporting and plan future events.



The meeting finished with a brief summary by the project officer, who recognized a very good progress of the OMA project and congratulated all fellows on their results and achievements.

Thank you to all who contributed to a highly successful meeting in Munich! Special thanks to Prof Katia Parodi and LMU Munich for hosting the event.





OMA Partners and Fellows lead Marie Curie Celebrations across Europe



The 7th November was the 150th anniversary of the birth of Marie Skłodowska Curie. In order to celebrate her life and achievements, as well as the EU funding program that bears her name, researchers from three OMA partner institutions organised a simultaneous event at the University of Liverpool, CERN in Geneva, and Ludwig Maximilians University in Munich. Prof Carsten Welsch, who organised the event, said: *"The event was a great success. We had hundreds of school children, students and researchers participate across the three sites, as well as more than half a Million people who read about the event via internet and social media on the day."*

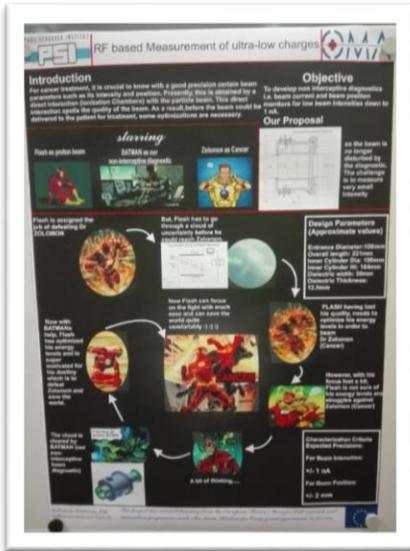
Marie Skłodowska Curie's research and discovery of radioactivity initiated the use of radiation in cancer treatment and significantly contributed to the development of modern cancer research, which is the central interest of the OMA project. OMA is funded by the European Union's Marie Skłodowska-Curie Actions (MSCA), which provide grants to train researchers, and encourage their

transnational, inter-sectoral and interdisciplinary mobility. The programme honours Marie Skłodowska Curie and spreads the values she stood for.

All OMA fellows contributed to the event by presenting outreach posters in a dedicated poster session at LMU Munich. The posters presented research topics in a non-scientific way, resulting in a very interesting material which brought medical accelerators research closer to general public.



Poster session at LMU Munich.



Outreach poster by OMA Fellow, Sudharsan Srinivasan from PSI

During the day there have been public talks and poster sessions in all three European locations. In Liverpool, more than 70 local high school students attended a series of activities at the University, including live-streamed talks and hands-on demonstrations, as well as a poster competition about Women in Science. Their activities were wrapped up with a talk about accelerating researcher training by Prof Welsch. At CERN there was a poster session presenting research and career paths of current and former MSCA fellows and a talk by Dr Marco Silari about the international impact of Marie Skłodowska Curie Actions on research at CERN.



Celebrations at the University of Liverpool.

The session was followed by a live-streamed talk by Prof Katia Parodi, Head of Medical Physics at LMU Munich, about the impact of MSCA on education and research in ion beam cancer therapy. A film contributed by the European Commission's DG EAC, Martine Reicherts, provided additional background information and the view of the EU.



Public talk by Prof. Katia Parodi, LMU Munich

Marie Curie remains an inspirational figure who has paved the way for many women in science, and today, 150 years on from her birth, still continues to inspire a new generation of scientists.

More information, such as Fellows' individual profiles and videos of all talks, can be found on the event home page:

<http://www.marie-curie-day-2017.org>.



OMA presented at IBIC 17



University of Liverpool stand at IBIC'17.

The annual International Beam Instrumentation Conference (IBIC) took place in Grand Rapids, USA between 20th - 24th August 2017. IBIC is a fruitful gathering of the world's beam instrumentation community and encourages international collaboration in the field of beam instrumentation for accelerators. The conference is dedicated to exploring the physics and engineering challenges of beam diagnostic and measurement techniques for particle accelerators worldwide.

OMA Project Coordinator Prof Carsten Welsch attended the conference to present an invited talk on "*Low energy, low intensity beam diagnostics*". He also contributed several posters to the scientific programme, including an update on recent results on medical diagnostics within our OMA project. Further project news were presented by Alexandra Welsch, a member of the [Project TEAM](#), via a dedicated industry stand. This included the brand-new OMA brochure

containing detailed information about the project and background information about all of our Fellows.



OMA Brochure presented at industry stand.



Upcoming OMA Events

1st OMA Topical Workshop - Facility Design Optimization for Treatment

12th -13th March 2018, PSI, Switzerland

The first Topical Workshop will link two OMA work packages WP3 and WP4, and cover facility design optimization for patient treatment. The workshop will present the state-of-the-art in beam delivery and link the Fellows R&D projects into a much wider international research context. It will discuss how different beam characteristics impact on dose delivery and how this is linked in return

to the efficiency of cancer treatment. The event will also include sessions on gantry and treatment room design and consider patient needs and preparation times before treatment sessions.

The workshop is mandatory for OMA fellows from WP3 and WP4.

A limited number of places will be offered to external participants.



2nd OMA Topical Workshop - Diagnostics for Beam and Patient Monitoring

4th – 5th June 2018, CERN, Switzerland

The second Topical Workshop will link diagnostics for beam and patient monitoring and hence connect the diagnostics efforts in two OMA work packages WP2 and WP3. In particular, it will discuss the role of online monitoring capability for patient treatment and how information from 3D online and patient tracking systems, as developed in work package 3, needs to be combined with

the general accelerator diagnostics, beam control systems and the specific monitors developed in work package 2, to achieve maximum treatment efficiency.

The workshop is mandatory for OMA fellows from WP2 and WP3.

A limited number of places will be offered to external participants.



Cosylab Academy

6th – 8th June 2018, CERN, Switzerland

OMA Partner Organization COSYLAB is a world-wide leader in accelerator control systems. All diagnostics and detector work, as well as facility optimization studies will benefit from this training. The training will introduce participants to control systems,

with hands-on activities based on an example of EPICS.

The Academy is mandatory for all OMA Fellows.

Please note this event is not open to external participants.





Other Events

International Conference - Advanced Radiotherapy, Generated by Exploiting Nanoprocesses and Technologies

22nd -24th January 2018, CNRS, University Paris-Saclay, Gif-sur-Yvette (Paris region), France



Cancer remains a major European health concern. More than 50% of patients receive radiotherapy as part of their cancer treatment. The main limitations of this treatment are the lack of tumour selectivity, which causes severe side effects, and the radioresistance of tumours. Highly promising approaches to improve the performances of radiation-based therapies include advanced radiation protocols (such as fast ion beam radiation or ultra-high-dose rate radiation) and nanoparticles-enhanced therapies.

This international conference brings together World leading researchers of different

disciplines: physicists and medical physicists, chemists, biologists, medical doctors and SMEs with the aim of presenting their results of exploiting and understanding the nanoscale processes, towards the development and optimization of new nanodrugs together with novel radiation protocols – a high-excellence effort that should lead to a new era for radiotherapy with subsequent economic and quality of life benefits for the population.

<https://argent.sciencesconf.org/>

Joint Universities Accelerator School – JUAS

8th January – 16th March 2018, Archamps, France

Late applications are still welcome, subject to available places.

Courses cover the science and technology of particle accelerators. The programme offers lectures, hands on session and practical's at CERN and other specialized laboratories.

Applications are welcome from students

(second-year Master, PhD) and from physicists wishing to further their knowledge in this particular field.

Course 1 : The science of particle accelerators
Course 2 : The technology & applications of particle accelerators.

More details: www.juas.eu



PHOTOPTICS 2018 - 6th International Conference on Photonics, Optics and Laser Technology

25th -27th January 2018, Funchal, Madeira - Portugal



This 6th edition of PHOTOPTICS will feature 3 different tracks on Optics, Photonics and Lasers, covering both theoretical and practical aspects. Researchers, engineers and practitioners interested in any of these fields are welcome to join us in Funchal, Madeira

and present their work on new methods or technologies, advanced prototypes, systems, tools and techniques, as well as general survey papers indicating future directions.

Conference

<http://www.photoptics.org/>

AVA School on Antimatter Physics

25th – 29th June 2018, CERN, Switzerland

Antimatter experiments are at the cutting edge of science. They are, however, very difficult to realise. The AVA project aims at enabling new antimatter experiments, probing the fundamental laws of nature.

We are delighted to announce a week-long international School on Low Energy Antimatter Physics which will be held at CERN. It will cover the challenges in antimatter facility design and optimization, beyond state of the art beam diagnostics and

advanced detectors, as well as novel antimatter experiments.

In addition to lectures by research leaders, there will be study groups, a poster session and a dedicated industry session. There will also be opportunities for discussion and networking at evening events and a tour of CERN's unique accelerator facilities.

Registration is open now, we recommend to register early to secure a place:

<https://indico.cern.ch/event/677170/>

Applications now open! Summer Student Program at GSI/FAIR

23rd July – 13th Sept 2018

GSI will organize an International Summer Student Program together with the Helmholtz Graduate School HGS-HiRe. The Summer Program is offered to students on the advanced undergraduate level (Bachelor, Master or Diploma) in physics and related natural science and engineering disciplines from Europe and GSI/FAIR partner countries.

The majority of the offered projects will concern investigations and preparations towards our future project FAIR and its scientific experiments.

Further information for applicants can be found at:

<http://hgs-hire.de/summer-program>





Fellows News

Andrea de Franco obtains PhD degree



Dr Andrea de Franco at his graduation.

Andrea De Franco, OMA Fellow based at MedAustron, recently obtained his PhD from the University of Oxford with a thesis titled “Development of a camera for Tera-electronVolt Gamma-ray Astronomy”. At MedAustron, Andrea’s research is now focused on beam dynamics and accelerator technologies to improve synchrotron based ion beam therapy centers, with the main goal of reducing treatment time and hence increase patient throughput. The knowledge and expertise acquired during his work in astroparticle physics on hardware and software development and commissioning proved to be invaluable assets for his current project in OMA.

Congratulations, Andrea!

Christoph-Schmelzer Award for Johannes Petzoldt

OMA Fellow Johannes Petzoldt (IBA) received the 19. Christoph-Schmelzer-Preis for his PhD thesis on „Toward the Clinical Application of the Prompt Gamma-Ray Timing Method for Range Verification in Proton Therapy“. With his thesis, Johannes brought the prompt gamma-ray timing method from a proof-of-principle phase closer to a clinical application. In his studies, he investigated the time resolution of scintillators, characterized the time structure of the proton beam at the therapy centre in Dresden, and further tested and deployed a novel prototype detection system under clinical conditions.

The Christoph-Schmelzer-Preis is annually awarded by the association for promotion of tumour therapy with heavy ions - Verein zur Förderung der Tumorthherapie mit schweren Ionen e.V. and honours outstanding master and PhD-theses in the field of ion beam therapy. The award ceremony took place at the Helmholtz Centre for Heavy Ion Research

(GSI) in Darmstadt, Germany. The event was also attended by Michelle Lis (OMA fellow working at GSI), who afterwards had an opportunity to discuss her work with other researchers in the field of ion beam therapy.



Johannes Petzoldt and Michelle Lis,
Image credit: Gabi Otto/GSI



Fellow's Outreach

OMA reaches India



Sudharsan Srinivasan visits a school in India.

Sudharsan Srinivasan, our Fellow based at Paul Scherrer Institut, gave a public talk on “Accelerators in daily life” at Kendriya Vidyalaya: 2, Kalpakkam, India in July 2017. His audience were 40 high school students. The talk focused on influence of particle accelerators on our routine life, with emphasis on the working principles and the history of accelerators. It created a lot of interest among the audience and resulted in students asking many questions to get a

deeper knowledge of accelerators. Sudharsan also briefed them about the OMA network at its objectives.

Not restricting the discussion to just accelerators, Sudharsan helped with suggestions on how the students can shape their approach towards science in general and also shared his experiences of being a researcher. A number of students is now in touch with Sudharsan for further discussions.

OMA Fellow guides tours at CERN

Since September 2017 OMA Fellow Giulia Aricó has been acting as a tour guide in her host institute, CERN. CERN is actively involved in outreach activities, with an average of 400 visitors per day registered at CERN.

In order to become a guide, Giulia carried out relevant training courses on health and safety procedures, as well as spent many hours learning about the various CERN experiments and detectors. Since she gained the required knowledge she started to guide groups of 16-19 years old students. As CERN tries to offer tours to the visitors in the most familiar language, Giulia has been welcoming mainly Italian students who come to ‘discover’ CERN. She has found that students are highly interested in experiments and scientific

projects, as well as every day work at CERN. Giulia finds the experience of a CERN guide very rewarding and she hopes to transfer her enthusiasm for research to young students, who may pursue their future career in science or simply gain more interest in science.



Image credit: CERN



Partner News

CNAO and GSI together for research and optimization in hadrontherapy treatments

Two OMA Partner organizations, the [GSI Helmholtz Centre for Heavy Ion Research](#) and the [CNAO National Center for Oncological Hadrontherapy](#), have forged a collaboration in developing the next generation of particle therapy. Their research is investigating methods to reduce irradiation time and to integrate motion management techniques, allowing a more precise treatment of tumors affected by respiratory motion.



Marco Donetti and Michelle Lis, CNAO

Both institutions have the common purpose of improving particle therapy and developing related cutting-edge technology, and CNAO and GSI signed a contract to improve the technology of cancer therapy with heavy ions. Within the collaboration, the established control system at CNAO will be installed and further developed at GSI in Darmstadt.

The control system at CNAO provides several advantages for the research group at GSI. The modern, industrially available components within the treatment rooms at CNAO, such as the dose detectors will be installed at GSI, expanding potential research and development projects, mainly in reducing irradiation time and integrating motion management techniques. The next generation of particle therapy will provide

sophisticated methods for motion managements, allowing for more precise treatment of tumors that move during respiration. One of the Marie Skłodowska-Curie OMA fellows, Michelle Lis, will play a key role in developing the software for the dose delivery system capable of motion management. The delivery system will be capable of dynamically treating tumors while the patient is freely breathing. This will be achieved by providing feedback on the tumor motion and using this feedback to direct the treatment delivery. Due to CNAO's CE-label certification, transferring the system into the clinical setting will be simpler.

GSI has played a pioneering role in the establishment of heavy ion therapy in Europe, beginning in 1997, with a pilot project that treated over 440 patients with carbon ion beams, and concluding in 2008. The raster scanning technique was developed there, and which remains the state of the art technology in modern particle therapy centers throughout the world. GSI has also been the forerunner in the development of treatment methods for moving targets, such as lung tumors. Several new technologies in this area, such as beam tracking and 4D-optimization were pioneered and experimentally tested here.

The very foundation of the Italian National Center for Oncological Hadrontherapy (CNAO) is the product of important network of national and international collaborations, including GSI. Accordingly, many groups throughout the world have looked to CNAO as a model in international collaboration, and have sought the opportunity for collaboration with CNAO in developing their own research or establishing similar particle therapy centers.



fondazione **CNAO**
Centro Nazionale di Adroterapia Oncologica





Advanced Medical Physics for Image-guided Cancer Therapy – a DFG-funded Research Training Group

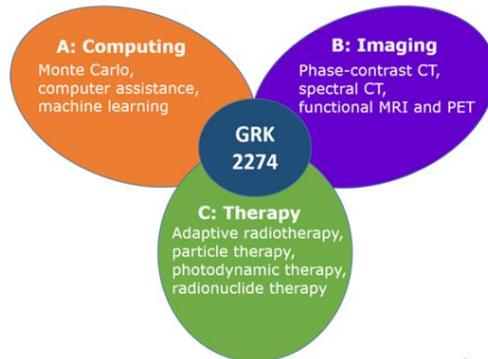


Image © LMU



The Research Training Group / Graduiertenkolleg GRK 2274 “Advanced Medical Physics for Image-Guided Cancer Therapy” is a joint initiative of the Physics and Medical Faculties of the Ludwig-Maximilians-Universität München (LMU) and the Technische Universität München (TUM) as well as the Helmholtzzentrum München (HMGU). The training programme, funded by the German Research Foundation (DFG) for an initial period of 4,5 years, has become operational on October 1st, 2017 (Speaker: Prof. Dr. Katia Parodi/ LMU, Vice Speaker: Prof. Dr. Franz Pfeiffer/ TUM).

Mission and research programme

Cancer is a major societal challenge, where the combination of novel imaging and computational techniques with advanced therapeutic strategies is key to early diagnosis, exact tumour characterization and successful treatment. The goal GRK2274 is to promote young scientists from natural sciences and medicine in this rapidly growing field of medical physics. GRK2274 covers

basic, translational and clinical research, building upon a long tradition of excellence in biomedical research in Munich from the two universities (LMU, TUM) and the research center HMGU. The multi- and interdisciplinary research programme will touch upon innovative areas of computing (research area A), imaging (research area B) and therapy (research area C), addressed in synergistic Ph.D. and M.D. projects with the common goal to advance image-guided cancer therapy. The original qualification concept features a broad spectrum of compulsory and eligible training activities, to ensure not only academic excellence and scientific independence, but also the development of fundamental personal effectiveness. GRK2274 thus provides an ideal platform to promote innovations in oncology with a potentially high societal impact, and to form the next generation of scientists with excellent career prospects in academia, clinic and industry.

Further details:

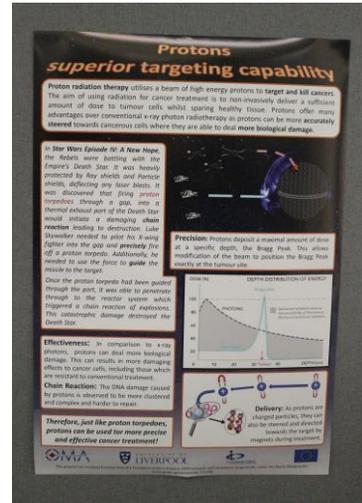
<http://www.med.physik.uni-muenchen.de>



Physics of Star Wars event at the University of Liverpool

Hundreds of local secondary school students attended the Physics of Star Wars event hosted by the University of Liverpool Department of Physics. The event, which was a celebration of Star Wars' 40th anniversary, discussed what is science and what is fiction in the famous films. OMA Coordinator Prof Welsch linked the Star Wars universe to research activities within the OMA project in an informative and entertaining event.

[Merseyside](#) attending on the day and interviewing organiser Prof Carsten Welsch. The interview is available to listen to (from 1:26:11) [here](#).



'Proton torpedoes beat the Death Star – proton beams beat cancer.'



Prof Welsch talking about the Physics of Star Wars.

Almost 200 local high school students visited campus for the morning session, in addition to 150 staff and students from across the university attending the evening event at the university's award-winning Central Teaching Laboratory.

There was lots of social media engagement on the [@livuniphysics](#) twitter account and the Cockcroft Institute Facebook page, including retweets from OMA partners CERN, GSI and COSYLAB. There was also engagement with local press for the event with [BBC Radio](#)

Prof Welsch commented on a successful event: *"It was fantastic to see high school children, students and staff get engaged with our current research programmes through Star Wars. The event allowed us to highlight a number of research challenges we are currently facing and how technologies from the famous movie series relate to our day-to-day R&D. Everyone seemed to love the rather unique combination of hands-on activities, discussions with researchers and students, as well as the overview talk that featured scenes from the films and even saw Darth Vader himself appear in the lecture theatre!"*





Other News

Call for The European Young Researchers' Award now open

The prize is dedicated to post-doctoral fellows with maximum 5 years of experience. The Award consists of a certificate, waiving the participation fee to the [EuroScience Open Forum \(ESOF\)](#), a grant to cover travel and accommodation for the stay in the ESOF city and one year free [EuroScience membership](#).

The deadline for the 2018 call is Tuesday January 30, 2018.

More information on the award as well as on the qualification and eligibility criteria can be found [here](#).

Selected Publications

'Sensitivity of a prompt-gamma slit-camera to detect range shifts for proton treatment verification', Lena Nenoff, Marlen Priegnitz, Guillaume Janssens, *Johannes Petzoldt*, Patrick Wohlfahrt, Anna Trezza, Julien Smeets, Guntram Pausch, Christian Richter, Radiotherapy and Oncology, Article in press, DOI: <http://dx.doi.org/10.1016/j.radonc.2017.10.013>

'Abstract ID: 196 Relation between dose average linear energy transfer and dose mean lineal energy calculated for proton therapy beams off axis: A study with the Geant4 toolkit', *Anna Baratto-Roldán*, Peter Kimstrand, Álvaro Perales Molina, Alejandro Carabe, Miguel Antonio Cortés-Giraldo, Physica Medica: European Journal of Medical Physics, Volume 42, 42 – 43, International Conference on Monte Carlo Techniques for Medical Applications – 2017 (Naples, Italy, October 2017). <http://dx.doi.org/10.1016/j.ejmp.2017.09.104>

Paper on previous work by Giulia Aricó, OMA Fellow from CERN: 'Investigation of mixed ion fields in the forward direction for 220.5 MeV/u helium ion beams: comparison between water and PMMA targets', *G Aricó*, T Gehrke, J Jakubek, R Gallas, S Berke, O Jäkel, A Mairani, A Ferrari and M Martišíková, 2017 Phys. Med. Biol. 62(20) 8003-8025 <https://doi.org/10.1088/1361-6560/aa875e>

Vacancies

Project Manager for OMA at the University of Liverpool / The Cockcroft Institute

More information can be found here: <https://recruit.liverpool.ac.uk/pls/...>



OMA Events

Mar 12 th – 13 th 2018	1 st OMA Topical Workshop - Facility Design Optimization for Treatment, PSI, Switzerland
June 4 th - 5 th 2018	2 nd OMA Topical Workshop - Diagnostics for Beam and Patient Monitoring, CERN, Switzerland
June 6 th – 8 th 2018	Cosylab Academy, CERN, Switzerland

Other Events

Jan 8 th – Mar 16 th 2018	Juas, Archamps, France
Jan 22 nd – 24 th 2018	International Conference Argent, CNRS, University Paris-Saclay, Gif-sur-Yvette (Paris region), France
Jan 25 th – 27 th 2018	PHOTOPTICS 2018, Funchal – Madeira, Portugal
June 25 th – 28 th 2018	AVA School on Antimatter Physics, CERN, Switzerland
July 6 th 2018	Symposium: Quantum Leap towards the Next Generation of Accelerators, Liverpool, UK
July 23 rd - Sept 13 th 2018	Summer Student Program, GSI / FAIR, Germany

NOTICE BOARD

DEADLINE FOR THE NEXT NEWSLETTER **15th February 2018**

*Wishing you a wonderful
Holiday Season and a
Happy New Year!*



Project Coordinator
Prof Carsten P. Welsch
carsten.welsch@cockcroft.ac.uk

Project Manager
Magdalena Klimontowska
magdalena.klimontowska@cockcroft.ac.uk

Newsletter Editor
Alexandra Welsch
alexandra.welsch@cockcroft.ac.uk

