

International Schools, Research Progress...and Marie Curie

Highlights

- OMA School on Medical Accelerators at CNAO
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Our first International School on Medical Accelerators has been very successful. We are very grateful for the hospitality of the CNAO team and all the effort that our lecturers put into the preparation of their sessions. The noise level during the scientific poster session on the Thursday was only one indicator of just how much needs to be discussed when targeting an overall optimization of medical accelerators. The School also helped link our Fellows to a much wider research community and allowed them to showcase their projects – a fantastic start into our network-wide training programme.

OMA has only just started and yet our Fellows already make contributions to International meetings. Several of them contributed to the International Particle Accelerator Conference IPAC, whilst others joined the PTCOG meeting. These contributions are very remarkable and rather unusual at such an early stage of the OMA project. Of course we want more of this, so OMA Fellows, please keep doing your excellent work!

The Marie Skłodowska-Curie Actions (MSCA), named after the double Nobel Prize winning Polish-French scientist famed for her work on radioactivity, support researchers at all stages of their careers, irrespective of their nationality. Researchers working across all disciplines, from life-saving healthcare to 'blue-sky' science, are eligible for funding. MSCA also support industrial doctorates, combining academic research with work in companies, and other innovative training that enhances employability and career development.

On 7th November we are going to celebrate the 150th birth anniversary of the scientist Marie Skłodowska-Curie, as well as the many achievements of MSCA projects. We will do this with our OMA Fellows, other training networks, and many institutions from all around the world. I hope that you will join us in this celebration and that we can all contribute to making an impact through "Marie Curie".

Prof Dr Carsten P Welsch
OMA Coordinator

Network News

OMA School on Medical Accelerators at CNAO



Participants of the OMA School on Medical Accelerators.

The first scientific school of the OMA Project took place at CNAO in Pavia, Italy between 4th and 9th June, gathering 75 delegates from across Europe, including all OMA Fellows and their supervisors. Along the OMA School, CNAO also hosted a school of the Medicis-Promed project, providing opportunities for networking between two major European Training Networks that are supported within the Horizon 2020 Marie Skłodowska-Curie Actions (MSCA).

The event kicked off for both schools on Sunday afternoon with a tour of the CNAO synchrotron and treatment rooms, guided by local experts, Dr Monica Necchi and Sergio Gioia, who explained the technical details of the facility and the patient treatment process. The OMA School talks on Monday morning started with an opening word by Dr Sandro Rossi, and the school programme overview by Dr Monica Necchi, both representing CNAO. They were followed by the OMA network introduction by Magda Klimontowska from the University of Liverpool. The scientific part of the school started with lectures on the History of Medical Accelerators by Dr Tomas Vrba (Czech Technical University in Prague), and an Introduction to Radiation Therapy given by Prof Roberto Orecchia of CNAO. Monday continued with a focus on beam physics and diagnostics, with talks by Drs Javier-Resta Lopez and Ralph Fiorito, both from the University of Liverpool, and Dr Adam Jeff representing the company A.D.A.M. The day concluded with a dynamic questions &



answers session, with contributions from the speakers of the day.

The second day focused on accelerator technology relevant for medical applications. Gabriel Gaubert (Pantechnik) initiated the day with a lecture on Ion Sources, followed by Dr Simon Jolly (UCL) contributing a lecture on Low Energy Beam Transport including the RFQ. The extensive programme of the day included sessions on Beam Manipulation by Dr Angeles Faus-Golfe (LAL-CNRS), the Cyclotron by Dr Eric Forton (IBA), the Synchrotron by Dr Fadmar Osmic (MedAustron) and Beam Extraction by Dr Adriano Garonna (TERA Foundation). The topics covered in the lectures were further discussed during the study sessions, where participants in small groups worked with supervisors on solving problems linked to lectures.



The day finished off with a public lecture 'At the forefront of radiotherapy' by Dr Marco Pullia of CNAO, which gathered participants of both, the OMA and Medicis-Promed Schools and an external audience from CNAO and the University of Pavia.

Starting from Wednesday the programme focused on medical applications of accelerators. Simulation Codes were discussed by Dr Sven Reiche of PSI, followed by a lecture on Accelerator Control Systems

by Prof Luigi Casalegno from CNAO. The talks on that day finished with Beam Delivery System presented by Dr Oxana Actis (PSI), and Marko Mehle from Cosylab introducing the public to regulations applying to the use of medical accelerators. The afternoon included a social hike with a guided tour of a vineyard, providing an opportunity for further networking in the picturesque surroundings of Casteggio hills.

The talks on Thursday focused on Radiobiology (Dr Emanuele Scifoni, INFN), Treatment Planning System (Dr Adam Aitkenhead, Christie) and Image-guided Radiotherapy (Prof Guido Baroni, CNAO), followed by another study session in small groups supervised by the experts of the school. In the afternoon a poster session was organized, with fellows and students presenting their research projects, and joined by industry partners for a table-top industry display. The poster session was a joint event for both OMA and Medicis-Promed schools. The day was concluded with a seminar 'New X-ray sources and approaches for imaging during therapy and intervention' given by Dr Gil Travish from Adaptix.

On the final day of the school the audience learned about challenges and future perspectives for CNAO, presented by Dr Sandro Rossi and his team. The lecture on Patient Imaging was given by Dr Georgios Dedes from LMU. The event concluded with an industry session with contributions from OMA industry partners: ViALUX, Cosylab and IBA. OMA project coordinator Prof Carsten Welsch finally drew proceedings to a close summarising the week's main outcomes and successes.

All talks are available via the following website:

<https://indico.cern.ch/event/595518/>

OMA Stars in IPAC'17



University of Liverpool's stand at IPAC'17

The OMA project has starred once more on the stage of the world's largest gathering of accelerator scientists and industries, the International Particle Accelerator Conference – IPAC 2017. The conference was hosted by the European Spallation Source, MAX IV, and Aarhus University at the BELLA centre in Copenhagen, attracting more than 1,300 delegates.



There were several contributions from OMA to the scientific programme. OMA Fellows Andrea De Franco, Ewa Oponowicz, and Anna Vnuchenko, were all presenting posters with their latest results.

Project coordinator Prof Carsten Welsch also presented a poster about the overall OMA project, and participated in a special session on industry-academia collaboration, sharing the extensive experience accumulated after coordinating no less than five large European Training Networks.

The Fellows were joined by OMA Project Manager Magda Klimontowska who participated in the industry exhibition with the booth of the University of Liverpool. The booth showcased the OMA project along with many other projects led or participated by the University of Liverpool, including [AVA](#), [LIVDAT](#), [EuPRAXIA](#), and [EuroCirCol](#).

The brand-new OMA [brochure](#) was officially launched at IPAC and became an instant hit among the visitors.

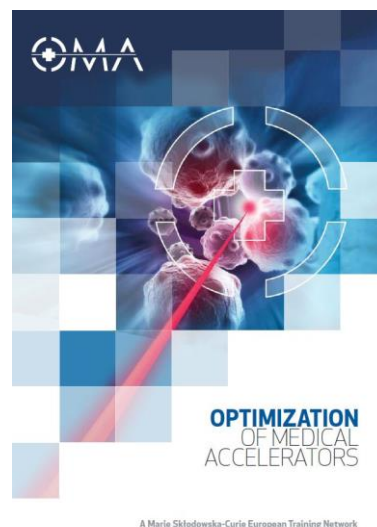


OMA Brochure now Published

The brand-new brochure of the OMA project has just been published and is now available for download. It presents all OMA Fellows and their individual projects, as well as details about the project's broad research and training programme, outreach activities and partner institutions.

The OMA brochure was produced in close collaboration with all network partners and it was launched at the industrial exhibition of IPAC'17 in Copenhagen.

Download the brochure [here](#)



OMA Training Programme Presented at UK Learning and Teaching Conferences

The purpose of the annual Learning and Teaching Conference at the University of Liverpool is to share good practice from around the institution, raise awareness of the quality of teaching taking place and provide a forum for staff to present new ideas on learning, teaching and assessment for discussion with fellow practitioners.

OMA partners from the Universities of Liverpool and Manchester led a session on 'Accelerating researcher careers'. Dr Ricardo Torres and Dr Alex Alexandrova, both from the University of Liverpool/Cockcroft Institute, were joined by Ms [Ewa Oponowicz](#), OMA Fellow from the University of Manchester, to discuss the training and career of early stage researchers.

In the session chaired by Ewa Oponowicz, Dr Torres presented an overview of the postgraduate training model developed within several Marie Skłodowska-Curie European training networks that have been initiated and coordinated by Prof Welsch, as well as discussed different career models chosen by young researchers from these

networks. Dr Alexandrova, a former LA³NET Fellow presented her own career path, which combines experiences in academia and industry, as she decided to set up the start-up company [D-beam](#).

In a similar spirit Prof Welsch with Dr Alexandrova and Dr Gil Travish (Adaptix Ltd) contributed a session on PGR researcher training to the Higher Education Academy's annual conference in Manchester on 6 July.



Ewa Oponowicz and Dr. Ricardo Torres presenting at the Learning and Teaching Conference

Upcoming OMA Events

2nd OMA School – Monte Carlo Simulations

6th -10th November 2017, LMU Munich, Germany

The **OMA Monte Carlo School** will focus on the theory of simulation tools, analysis and data visualisation in relation to treatment planning, and it will focus on hands-on training. The School is obligatory for all OMA Fellows and will be open to a very limited number of external participants.

Venue: LMU campus in Garching, Germany.

Accommodation from 5th November will be provided in Garching. For the OMA Fellows accommodation will be provided in the same hotel also during the weekend following the school and during the Mid-term Review Meeting, see below.

OMA Mid-term Review Meeting

13th November 2017, LMU Munich, Germany

Our **Mid-term Review Meeting** will take place on the Monday of the week following the School on Monte Carlo Simulations. It is an important meeting that will evaluate the overall project progress. It will be attended by the Project Officer on behalf of the European Commission and an externally appointed expert reviewer.

The meeting is obligatory for OMA beneficiary partners and all OMA Fellows. Associate and adjunct partners have been invited to attend. Each OMA Fellow will present their project progress during the meeting.

Venue: LMU building in Munich, Gesch.-Scholl-Platz 1, room F 107.

Accommodation for OMA partners will be provided in Munich for two nights with arrival on 12th November, departure 14th November.

Participation is by invitation only. An indico registration page will be directly communicated to all OMA partners.

Outreach Event: Marie Skłodowska-Curie's 150th Birth Anniversary

On the 7th November 2017 we will organize an international celebration, coordinated by the University of Liverpool, presenting the life and research of Marie Skłodowska-Curie and the successes within the Marie Skłodowska Curie Actions. **On the day outreach lectures will be organized in Liverpool, Munich and at CERN. Our OMA Fellows will present their research in the form of posters to the general public in Munich.**



Other Events

OMA at IBIC'17

The 2017 International Beam Instrumentation Conference (IBIC) takes place in Grand Rapids, Michigan, USA, on 20th-24th August 2017.

IBIC is a gathering of the world's beam instrumentation community and is dedicated to exploring the physics and engineering challenges of beam diagnostic and measurement techniques for particle accelerators worldwide.

The OMA coordinator will represent the project at the conference (poster) and industrial exhibition (University of Liverpool stand).

Please visit us at booth #107

Science is Wonder-ful!

The "Science is wonder-ful!" events will take place on 25th – 27th September 2017 in Brussels with two main activities:

- Monday 25th September: the 1st MSCA Falling Walls Lab contest at the House of European History;
- Tuesday 26th+Wednesday 27th September: European Researchers' Night event at the Parliamentarium.

Giersch International Symposium

Registration will be open soon for the Giersch Symposium, which this year will be held at FIAS in Frankfurt between 16-20 October. The main focus will be on cancer therapy with particle beams.

The Symposium is linked to the 1st Marburg Symposium on Particle Therapy that will be held at MIT, Marburg on 23-24 October 2017. With the start of the first clinical facility with dual ion options (protons and carbon) in Heidelberg, Germany in 2009 the interest in

hadron therapy has been constantly growing. New facilities for patient treatment are emerging across Europe: MIT in Marburg, MedAustron in Wiener Neustadt and CNAO in Pavia.

The Symposium will bring together leading international experts in the field of hadron therapy to discuss the present status and to identify future challenges. Further details can be found [here](#).



Fellows Activity

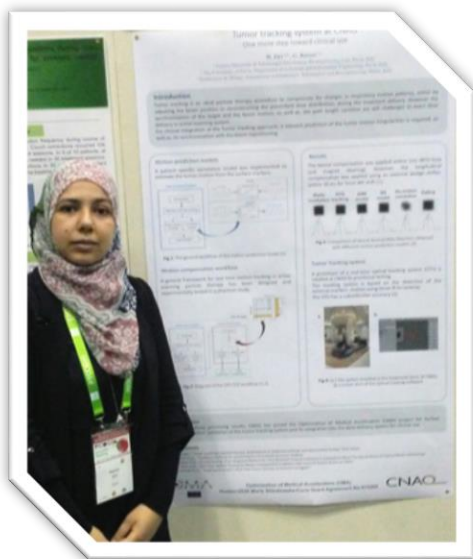
OMA Fellows Present their Research at PTCOG 56 Conference

The Particle Therapy Co-Operative Group is a non-profit organization focused on proton, light ions and heavy charged particles used for radiotherapy. The [PTCOG conference](#) is organized every year to gather physicists, biologist, physicians and other researchers from all over the world. This year the event took place in Japan, in the cities of Chiba and Yokohama, from the 8th to the 13th of May.

range verification and uncertainties, treatment planning and dose calculations, as well as investigation of particle therapy clinical outcomes.



[Dr Giulia Aricò](#), OMA Fellow hosted by CERN, gave a talk and presented a poster on her PhD research. In this work she investigated the secondary radiation arising during radiotherapy treatments. This secondary radiation can cause a mismatch between the planned and the delivered dose, and can lead to unwanted side effects in the patients. Therefore, higher accuracy and quality in the treatment planning and in the dose calculations can be achieved with a deeper understanding on the nuclear interaction processes.



Hanan Ziri

[Hanan Ziri](#), OMA Fellow based at CNAO, presented a poster on “*Tumor tracking system at CNAO: one more step toward clinical use*”, which is the focus of her project in OMA. She presented a summary of preliminary experiments performed at CNAO for moving tumour’s motion compensation using the tumour tracking approach. Hanan also enjoyed attending the motion management session, physics track, which was very useful for the development of her project. She also had a chance to explore other areas of research, such as dosimetry and beam delivery, beam biological effects,



Giulia Aricò

Overall, both Hanan and Giulia enjoyed the experience and appreciated the opportunity of meeting experts and students from all over the world and learn about ongoing research in their field.

Jacinta's Tour to France

IN2P3 held its annual Geant4 School at the Laboratoire de l'Accélérateur Linéaire (LAL), supported by CNRS and The Doctoral School PHENIICS at the University of Paris-Sud in Orsay, France. Aimed primarily towards PhD students and researchers based at collaborating institutes in France, this was the first year the school was run in English, providing a timely and useful opportunity for [Jacinta Yap](#) OMA Fellow from the University of Liverpool, to attend.

The school delivered lectures combined with exercises for participants to develop as well as bolster their skills with Geant4, a Monte Carlo simulation toolkit which is widely used for many physics applications – including but not limited to, high energy physics, astrophysics, hadronic physics and medical physics. In many fields and especially physics, Monte Carlo simulations are used as an approach to generate an accurate approximation of processes based on probabilities. More specifically, when considering the effects of radiation and interactions with matter, events are random but their probabilities of occurrence can be calculated. In fact, the accumulation of their possibilities may lead to an outcome which can be precisely determined. In this way simulations are very useful in predicting and investigating complex interactions and can provide a computational projection of the outcomes expected of real life events. This allows for the comparison between results obtained in practice experimentally, with

those determined by simulations and calculations.



Participants at the GEANT4 school.

Over the week, lectures covered fundamentals of the geant4 toolkit, definition of the geometry, materials, particles and processes, user interfaces, visualization and macros, progressing to more advanced topics such as scoring, analysis, multithreading and biasing. Each major topic was accompanied by a session of exercises where necessary files of coding were given with an outline and desired outcome of the task. Students worked through the lecture materials and online documentation, implementing changes to the script to achieve the given task. Overall, the school gave a good overview of the knowledge necessary to use the toolkit and the skills to develop further to build a user specific application. This was a good experience for Jacinta and she will utilise what she has learnt at this school for her OMA project.

Samuele Visits OncoRay and CNAO to Develop his Project

[Samuele Cotta](#), OMA Fellow based at [ViALUX](#), is currently studying the irradiation conditions inside the treatment rooms.

In order to get more data about the hadron therapy environment, he recently visited two OMA partners: [OncoRay](#) in Dresden and [CNAO](#) in Pavia.

The visit to OncoRay lasted only one morning, but was very useful for Samuele's project. Dr Daniela Kunath, a medical physicist, showed him the whole facility, including treatment and experimental rooms, and explained how the cyclotron works and how the beam is delivered to patients. Dr Wolfgang Enghardt, leader of the Medical

Radiation Physics department at OncoRay, was available for discussions about secondary radiation inside the treatment room and what problems they can cause to the electronics, which is the main topic of Samuele's project.

Afterwards Samuele spent two weeks at CNAO for his first secondment. During his stay he had a chance to discuss the hadron therapy environment with CNAO staff, including biomedical engineers, medical physicists and radiation protectionists, and obtain information which helps to have a complete and clear picture of the irradiation conditions in the treatment rooms. In particular, Samuele spent more than a week building and running a Geant4 simulation of the entire treatment room. The results were then discussed with Dr Michele Ferrarini, radiation safety officer at CNAO. The

irradiation conditions at CNAO turned out to be very different from the OncoRay facility, since at CNAO the beam is generated by a synchrotron and delivered with the active pencil beam scanning technique, which limits considerably the secondary radiations.

This secondment was very interesting for Samuele also because he had a chance to see how a hadron therapy facility is organized, and to observe the daily routine and assist in the quality assurance tests that are done every day before the treatments.

Special thanks go to CNAO for the possibility to organize the secondment and for the hospitality, in particular to Dr Monica Necchi, and to Hanen Ziri and Carlos Afonso, the two OMA fellows based at CNAO.

Physics Like Magic



Anna explaining the experiment of the Cartesian diver. (Photo credit: UCC+i Universidad de Sevilla)

[Anna Baratto Roldán](#), OMA Fellow based at the **Universidad de Sevilla/Centro Nacional de Aceleradores**, took part as a volunteer in the [15th Feria de la Ciencia of Seville](#), a three-day-long outreach event that attracted more than 20,000 people of different ages and backgrounds, especially from high schools. The event was created with the aim of disseminating science and bringing children and young students closer to the scientific

world. To this end, more than 100 stands were installed at the Exhibition and Conference centre FIBES of Seville, offering interactive activities and brief talks covering all the fields of science and technology, from health and environmental science to robotics. Anna participated in two of the three days of the event, collaborating with the stand of the Faculty of Physics of the University of Seville. She played with classical dynamics and thermodynamics to perform some simple but impressive experiments through which children had a possibility to experience and interact with phenomena illustrating basic physics principles, while having fun as well. Among the many experiments Anna took care of, the water glass trick (a one-meter plastic tube full of water used to show the action of atmospheric air pressure) and the spinning chair (to show angular momentum conservation) were those that impressed children most.

No special equipment is needed to make physics look like magic!

Partner News

State of the art Cancer-treating Cyclotron Arrives at The Christie in Manchester, UK



*State of the art cancer-treating cyclotron arrives at The Christie in Manchester, UK.
(Image credit: The Christie)*

A state of the art proton beam therapy machine, the ‘cyclotron’, was installed recently at the specialist cancer hospital The Christie in Manchester, marking a major milestone in a national NHS plan to provide high energy proton beam therapy in the UK from next year.

Proton beam therapy has been offered overseas to NHS patients who are eligible for treatment in England since 2008 in a programme that has to date supported approximately 1,000 patients. Together with the Department of Health, NHS England is funding the development of two world class centres in Manchester and London for NHS patients to be treated in the UK.

The arrival of the machine at The Christie is a major milestone in the delivery of the national service with the first patients due to

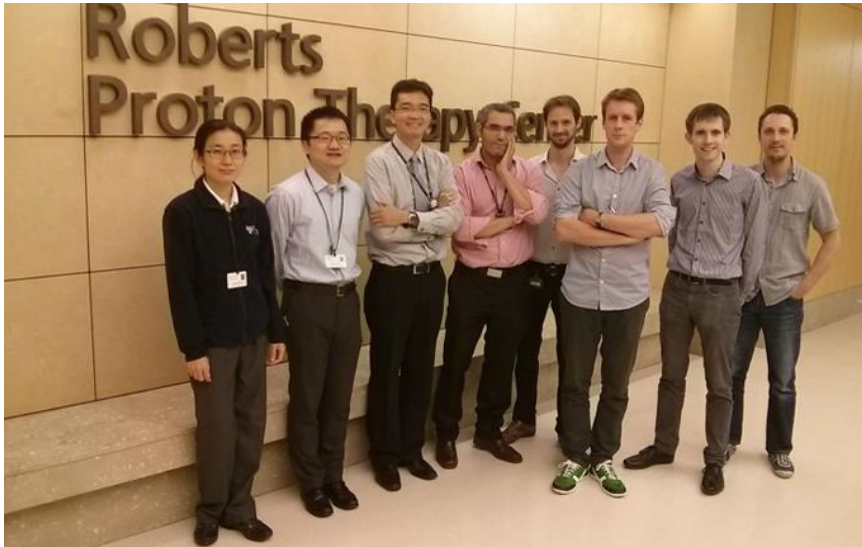
be treated from summer 2018, with University College London Hospitals NHS Foundation Trust following in summer 2020. When complete they will each treat up to 750 patients every year.

The cyclotron will supply protons to three treatment rooms at The Christie and also for research performed in collaboration with The University of Manchester.

Over the last century, The Christie radiotherapy department has pioneered many advances in radiotherapy. It already leads in advanced radiotherapy, delivering more complex treatments than any other centre in the country. The introduction of proton beam therapy will allow it to continue to make advances in this area and improve patient treatment and care.

[Read more](#)

First Clinical Prompt Gamma Measurement in Pencil Beam Scanning Proton Therapy



Researchers from the University of Pennsylvania and Ion Beam Applications (IBA)

Proton beam therapy offers a better dose conformity to the tumour volume and a lower overall dose to healthy tissue, compared to conventional photon therapy. However, the potential of protons cannot be fully exploited in clinical practice due to existence of the range uncertainties. Robust planning and beam-specific safety margins are tools to manage those range uncertainties coming from organ motion, patient position errors, and conversion from CT Hounsfield Units to proton stopping power. To fully exploit the potential of protons and to reduce the safety margins, researchers around the world are investigating different methods for an online range monitoring during the treatment.

Researchers from the University of Pennsylvania and Ion Beam Applications (IBA) have recently reported the first clinical prompt gamma (PG) measurement for range verification in actively scanned proton therapy (*Int. J. Radiat. Oncol. Biol. Phys.* doi: [10.1016/j.ijrobp.2017.04.027](https://doi.org/10.1016/j.ijrobp.2017.04.027)). Using the PG camera developed by IBA, the PG information

of each pencil beam spot was obtained for all three fields in six treatment fractions for a curative brain tumour treatment. By comparing the measured data to simulations, the range variations could be determined for each individual spot. The mean range shift of each field varied between -1 mm and 2 mm with an uncertainty of around 1 mm (1 sigma). This is well below the distal safety margins of 5 mm and shows the potential of the PG camera for online range monitoring. The researchers concluded that the system accuracy is mainly limited by the positioning accuracy of the present implementation of the PG camera. Therefore, [Johannes Petzoldt](#), one of the OMA Fellows, is working on a more reproducible positioning system for the PG camera within the treatment room. After the installation of such a system, a higher number of patient treatments can be monitored with higher accuracy than before. This would foster the applicability of PG range verification and therefore improve proton therapy in general.



PENN RADIATION ONCOLOGY



An Important Milestone: Ground-breaking Ceremony for the FAIR Accelerator Facility

The construction of the international accelerator facility FAIR (Facility for Antiproton and Ion Research) has begun. The start of building construction and civil engineering work is a crucial moment for one of the largest construction projects for scientific research worldwide. On July 4th, 2017, the ground-breaking ceremony was held for the large ring accelerator SIS 100, which will be the key component of the future accelerator facility FAIR. The construction site is located to the northeast of GSI Helmholtzzentrum für Schwerionenforschung in Darmstadt. FAIR will be a unique particle accelerator facility with an investment volume of more than €1 billion. The facility is being constructed by nine partner countries and is scheduled to go into full operation in 2025. Around 3,000 scientists from all over the world will work at FAIR, where they will gain insights into the structure of matter and the development of the universe. The key component of FAIR will be an underground ring accelerator with a circumference of 1,100 meters. Connected to it is a complex system of storage rings and experimental stations.

Over the past few weeks and months, extensive preparations have been made for the huge construction project. For example, work is already under way to connect the existing accelerator facilities of the GSI Helmholtzzentrum to the new FAIR complex. Retaining walls are being built and contracts have been awarded for the excavation and installation of the ring tunnel following a successful call for bids. These were important preparatory steps for the large-scale work on the FAIR infrastructure, which has now begun with the ground-breaking ceremony for the SIS 100 ring accelerator. The cutting-edge accelerator and experiment facilities will be installed after the new buildings are completed.

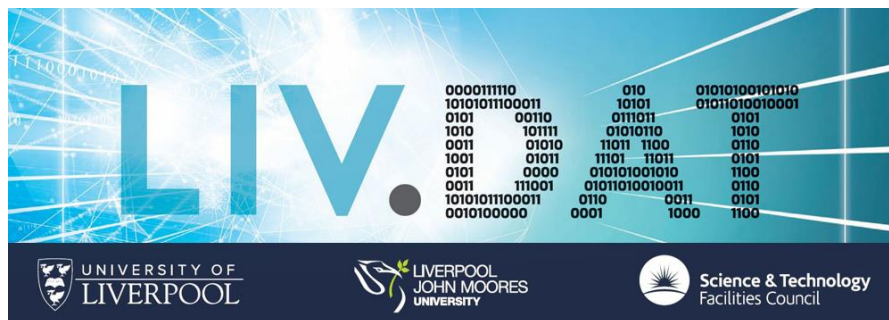
At the ceremony, government officials and scientists from Germany and abroad symbolically broke the ground with a shovel. This crucial milestone was attended by representatives from all nine partner countries.

[Read more](#)



Ground-breaking ceremony on the FAIR construction site. Photo: Gabi Otto/GSI Helmholtzzentrum für Schwerionenforschung GmbH

LIV.DAT Liverpool Big Data Science Centre for Doctoral Training – New Training Initiative



The Liverpool Big Data Science (LIVDAT) Centre for Doctoral Training (CDT) will be a hub for training students in managing, analysing and interpreting large, complex datasets and high rates of data flow.

The CDT promises a unique training approach addressing some of the biggest challenges in data intensive science to tackle a growing skills gap. It will provide training in Big Data science to a cohort of almost 20 PhD students to provide the necessary basis for a long term R&D programme. The training programme has been developed to create future leaders in data intensive science. The projects will address R&D challenges in astronomy, nuclear, particle and accelerator physics and involve Monte Carlo studies, Deep Learning

and High Performance Computing, as well as Data Analysis.

The new training centre is supported by the [Science and Technology Facilities Council](#) (STFC) and will be hosted by the [University of Liverpool](#) and [Liverpool John Moores University / Astrophysics Research Institute](#). It was proposed and will be directed by Prof Welsch from the University of Liverpool.

LIVDAT will offer a comprehensive training in data intensive science through cutting edge research projects and a targeted academic training programme, complemented by secondments to national and international partners. [More information](#)

Marie Skłodowska-Curie Individual Fellowship for the Project HIPPOCRATE

New Marie Skłodowska-Curie Fellowships are emerging in areas related to OMA. We congratulate Dr Vasiliki Anagnostatou on obtaining a prestigious Marie Skłodowska-Curie Individual Fellowship from the European Commission for her project HIPPOCRATE (Hybrid Imaging of PET and PrOmpT gamma for preCision RAnge- and biological-guidance in proton ThErapy).

Dr Anagnostatou joined the Medical Physics team at LMU Munich in June 2017, and will work on the project for the next 24 months. The project aims at the development of an

innovative hybrid detection system that combines PET and prompt gamma imaging to promote biological and dose guidance for personalized, high-precision proton therapy. It will explore a revolutionary imaging approach for cancer and at the same time contribute to the development of health.

Dr Anagnostatou's work could also provide a new means to exploit the new planning concepts that are being developed by [Liheng Tian](#), OMA Fellow at LMU.

[Read more](#)



FleX-ray Project

A real-time, adaptive, spectral, x-ray CT system (coming soon!)

FleX-ray is an exciting new project which is a collaboration between four different institutions: XRE, Nikhef, ASI and CWI contribute their respective expertise in x-ray CT systems, detector R&D and advanced CT reconstruction algorithms.

FleX-ray will enable very fast CT scans simultaneously with superior low contrast imaging and spectral sensitivity. The goal is to be able to identify elements per voxel (3D pixel), providing a new energy dimension of information for analysis! In medical applications, this system has several benefits, including:

- Reducing or eliminating beam hardening artefacts with the spectral information. This effect is very obvious whenever any metal is in the scan

- Identifying concentrations of specific contrast agents such as iodine or gadolinium
- Reducing dose significantly due to the speed of the detector and imaging at several energies simultaneously

Once this proof of concept machine is realised, large area Medipix3 based detectors can be developed and integrated into a 2nd generation machine. Currently the size of the Medipix3 detector is too small for human scale use.

Currently the project is at the stage where we have all the hardware including the conventional working x-ray CT system from XRE and the Medipix3 detectors. Now, systems integration of the CT reconstruction system and the Medipix3 detector is the main focus.



Vacancies



Early Stage Researcher Fellowship within the AVA project at Cosylab d.d., Slovenia

More information can be found here: <https://www.liverpool.ac.uk/ava/vacancies/>

Studentships in the Liverpool Centre for Doctoral Training on Big Data Science (LIVDAT)

More information can be found here: <http://www.livdat.org>

Postdoc Opportunity

The High Luminosity (HL) upgrade of the Large Hadron Collider (LHC) at CERN requires advanced beam simulation studies to fully exploit the machine performance. There is currently a position vacancy at the University of Liverpool/Cockcroft Institute that will look into longitudinal and transverse beam motion in preparation of crab cavity tests at CERN. If you are interested in further details, please contact [Prof Welsch](#).

OMA Events

Nov 6 th – 10 th 2017	2 nd OMA School – Monte Carlo Simulations, LMU Munich, Germany
Nov 13 th 2017	OMA Mid-term Review Meeting, LMU Munich, Germany

Other Events

July 24 th – 26 th 2017	VHEE'17, Daresbury, UK
August 20 th – 24 th 2017	IBIC'17, Grand Rapids, MI, USA
September 25 th – 27 th 2017	Science is wonder-ful, Brussels, Belgium
October 16 th - 20 th 2017	Giersch International Symposium, Frankfurt, Germany

NOTICE BOARD

DEADLINE FOR THE NEXT NEWSLETTER **30th October 2017**



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