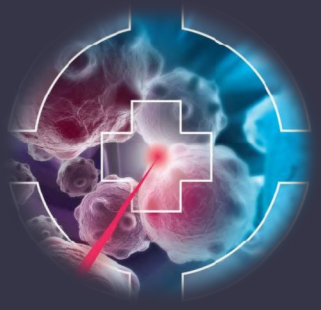


OMA Express
March 2022
Issue 18

Highlights

Science for innovation and peace

OMA has been a fantastic example of how bringing the most talented researchers from around the world together to tackle a major research challenge can produce outstanding results. In fact, this has been a central outcome of all the international training initiatives that I had the pleasure to lead over the years. I consider myself lucky that amongst our Fellows were many outstanding early-stage researchers from around the world, including Ukraine and Russia.

I am therefore shocked and saddened by the actions taken by the Russian state against the people of Ukraine. I am appalled by the terror and senseless loss of life that has resulted and hope that a peaceful resolution of this crisis can be achieved as soon as possible.

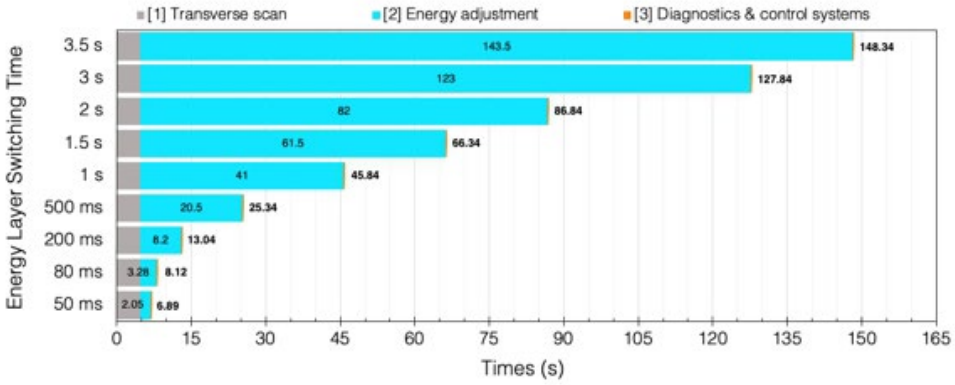
International collaboration is one of the great strengths of science and I am sure that research will continue to build bridges, enable peaceful collaboration and progress.

It is hard to follow with any other news, given the magnitude of the current crisis and suffering, but on a much more positive note, I am happy to announce the brand-new Liverpool Centre for Doctoral Training for Innovation in Data Intensive Science (LIV.INNO) which I will have the pleasure to lead at the University of Liverpool, together with our colleagues with Liverpool John Mores University, and many national and international partners. LIV.INNO's will train dozens of PhD students in Data Intensive Science over the next few years and provide a comprehensive training programme where several elements have originated directly in OMA. This will offer exciting opportunities to train the next generation of data science experts and should also make a contribution to increasing the attractiveness of science in general. Onwards and upwards, as they say…

Prof Dr Carsten P Welsch
OMA Coordinator

Research News

OMA Fellows make their mark on special issue of Frontiers in Oncology



Impact of energy layer switching time on beam delivery time for an example head & neck case.

Two years after its official conclusion, the OMA project is still leaving an imprint on the medical science community through the continuous research of its former fellows and the steady publication of their work.

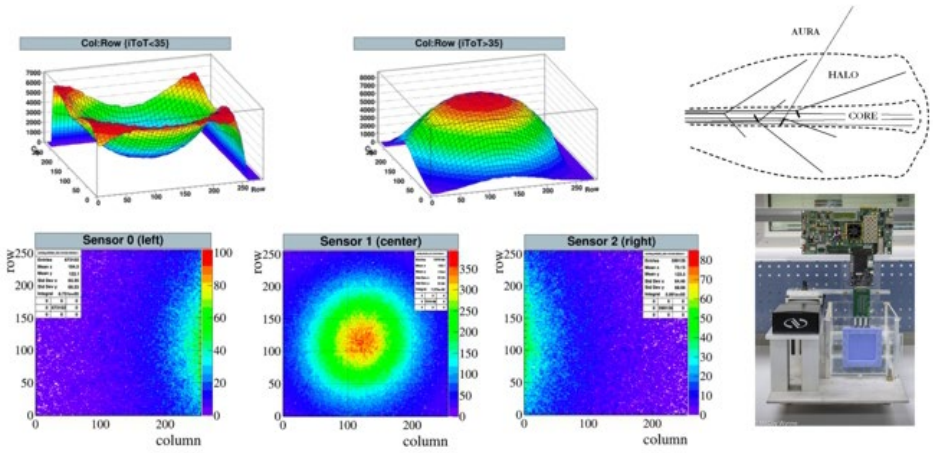
The journal Frontiers in Oncology (with an impact factor of 6.244) has produced a special issue on Next Evolutions in Charged Particle Therapy, with contributions from four former OMA Fellows.

Jacinta Yap and **Andrea de Franco** lead the special issue with a review article on the Future Developments in Charged Particle Therapy. In this article, the authors review the recent literature and latest developments on beam delivery and the factors which contribute to treatment time. They study the limitations of current technologies, and avenues for improvements in the area of accelerators, energy layer switching time, beam delivery systems, motion management and treatment efficacy. New developments and improvements are necessary to delivery faster and more effective treatments and they discuss emerging applications like FLASH and arc therapy.

In another article in the same issue, **Laurent Kelleter** and co-workers investigate the suitable detection angles for carbon-ion radiotherapy monitoring. The monitoring of inter-fractional anatomical changes is crucial to ensure the dose conformity, to potentially reduce the size of the safety margins around the tumor and ultimately to reduce the irradiation of healthy tissue. In this work, the detection and localization of a small 2mm-thick air cavity on a PMMA head phantom using secondary-ion tracking were investigated at different detection angles.
The significance of the cavity detection was found to increase at smaller detection angles, while the accuracy of the cavity localization was improved at larger detection angles. Detection angles of 20° – 30° were found to be a good compromise for accessing both, the detectability and the position of the air cavity along the depth in the head of a patient.

Finally, **Michelle Lis**, is the first author of a paper on the dosimetric validation of a system to treat moving tumors using scanned ion beams. The researchers validated a dose delivery system that synchronizes the movement of the ion beam to that of a moving target in a test phantom. Measured and calculated dose distributions revealed that this system satisfactorily compensated for target motion in the presence of beam range changes due to target motion. The implication of this finding is that the prototype system is suitable for additional preclinical research studies, such as irregular anatomic motion.

Water Phantoms for particle therapy using technology from CERN



Selection of images showing the Timepix3 water phantom system and measurements made on a clinical proton beam of 200 MeV. (copyright: University of Liverpool, McCoy Wynne)

University of Liverpool physicists Professor Gianluigi Casse and Dr Jon Taylor developed a proof-of-concept water phantom with pixel detectors that could be applied in medical devices and diagnostics, bringing it closer to full commercialisation.

This outcomes of this project have just been published in a special brochure on STFC Impact Acceleration Account (IAA) success stories which is available here.

Imaging phantoms are used as stand-in for human tissue in medical physics to ensure that imaging equipment is working correctly and to undertake quality control. The additional funding that was provided by the STFC IAA enabled the development of further enhancements to the water phantom that was originally developed in collaboration with Rutherford Cancer Centres and Rutherford Diagnostics.

The project is a good example of technology transfer from fundamental science to healthcare applications in the Department of Physics: It brings together technology developed for High Energy Physics (Timepix3) and sensors designed at Liverpool for the LHCb experiment at CERN. These sensors were manufactured by Micron Semiconductor Ltd.

Rutherford Cancer Centres in the UK provided the clinical beams of protons to carry out experimental tests. The project also connects to a number of wider R&D studies in the department and capitalises on existing national and international networks coordinated by Liverpool experts, such as the STFC Cancer Diagnosis Network+ and the pan-European OMA network.

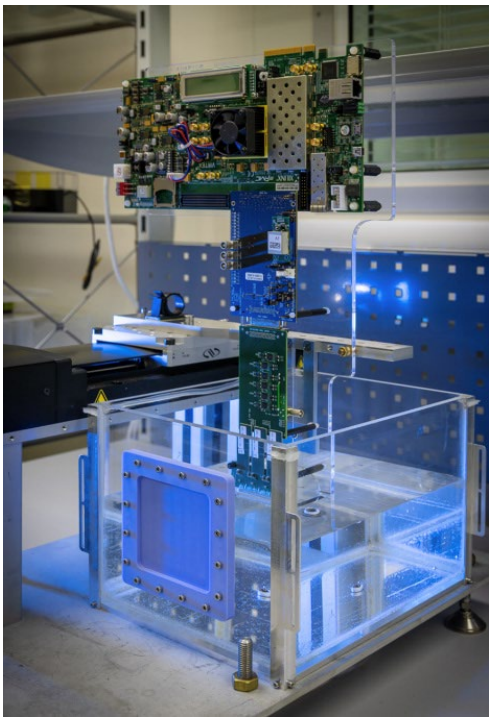
The project enhancements to the monitors allowed additional detectors to be added that provide accurate calibration of dose to water for clinical beams, allowing realistic clinical fluences to be used with the device during measurements.

Additional parts for sensing of neutrons in clinical environments were also added to measure the neutron flux generated by clinical beams with greater precision than is currently available.

Below is a selection of images showing the Timepix3 water phantom system and measurements made on a clinical proton beam of 200 MeV. The measurements show the central core of the beam and the 'halo' structure surrounding this.

Planned future developments include the design and fabrication of a new HV-CMOS detector with features that are optimised for data taking in a clinical proton beam. The new detector will also be tested in other types of clinical beams e.g. FLASH radiotherapy where the dose rate compared with conventional radiotherapy is extremely high and also carbon ion therapy where the LET is much higher than in proton therapy. Tests are also planned in X-ray and electron radiotherapy beams where the depth-dose of the treatment beams is very different.

The project was supported by the STFC Impact Acceleration Account (IAA) funding and forms part of a wider portfolio of initiatives and projects within the Department of Physics to develop innovative healthcare instrumentation.



Silicon pixel sensor and timepix3 (copyright: University of Liverpool, McCoy Wynne)

Fellows Activity

Catching up with the Fellows - Anna Baratto Roldán

Anna Baratto Roldán

Now that the formal period of the OMA project has come to an end we were very keen to find out which routes our Fellows have taken, their plans for the future and how they reflect on their time as OMA Fellow.

For this interview we have spoken to Anna Baratto Roldán. Anna did her PhD as an OMA Fellow in the National Center of Accelerators in Sevilla, working on the design of a beam line for radiobiology experiments. She is currently working as a beam physicist at CERN in the BE-EA-LE department.

What have you been working on since the end of OMA?

"*Following the obtention of my PhD in November 2020 I worked as a PostDoc at the CNA in Sevilla for another six months, continuing the project I started with OMA. Then, after some months of maternity leave, in November 2021, I joined CERN as a senior fellow of the Beams department in the Liaison to experiments section (BE-EA-LE). At CERN I will be participating in the operations of the North and East areas, where my section is responsible for providing the adequate beam conditions for various experiments and test beam lines. Furthermore, I will take part in some Physics Beyond Colliders projects, for the design of new experiments with conventional beams at CERN, to exploit the full scientific potential of CERN's accelerators complex besides LHC.*"

Did the networking opportunities within OMA help you to get your present job?

"The networking opportunities within OMA were very useful to get my present job, as they put me into contact with various people that could guide and help me through the selection process."

What are the skills that you learned in OMA that are most valued in your current job?

"Besides the technical and specific knowledge, the skills that I am finding more valuable in my current job are the communication and networking skills that I learnt and perfected during my time in OMA."

Are you still in contact with the OMA Fellows?

"Sure! And we are slowly building a small OMA community in the area of Geneva with Ewa, Sud and Anna. With the other fellows we keep in touch through various channels both for professional and personal reasons and I would personally love to have another opportunity to meet all of them in the future."

What will be your most cherished memory from OMA?

"There are so many cherished memories that it is difficult to choose. We really created a nice group of colleagues and friends, and a strong network of support and collaborations. And we had a lot of fun during the OMA schools and meetings too! I cherish every single moment I spent with the OMA Fellows, and I think it was a one-of-a-kind opportunity to be part of such an outstanding project."

And the one you'd rather forget?

"A PhD of whatever kind is always challenging, full of obstacles and difficult times. But seeing them from my perspective now, I can say that even my worst moments and memories are worth remembering. All of them, with the help of the amazing people I was so lucky to meet in my path, taught me something valuable about being persistent, believing in myself and have courage."

Partner News

Quality Assurance Detector for Proton Beam Therapy

A team of researchers from University College London, led by Professor Simon Jolly, has obtained a research grant from the UK's Science and Technology Facilities Council (STFC) to fund the project *QuADProBe*: Quality Assurance Detector for Proton Beam Therapy.

Campus of University College London (Image credit: UCL)

In order to ensure that Proton Beam Therapy treatment is carried out safely, a range of quality assurance (QA) procedures are carried out each day before treatment starts. This means checking that the proton beam is in the correct position, is the right shape and size, and travels the correct depth: this must be checked for a range of different beam positions and energies to ensure treatment is safe. These QA measurements take significant time to set up and adjust for different energies: the full procedure can take over an hour.

QuADProBe is developing a detector that can make faster and more accurate measurements of the proton beam size, position and range than existing systems. The detector is made of two parts. The first is a profile monitor made of two arrays of scintillating optical fibres, mounted at right angles to each other, which emit light when the proton beam passes through. This light can be measured with photodiodes to determine the beam size and position. The second part, behind the profile monitor, is a detector built from layers of plastic scintillator. Protons passing through this scintillator stack deposit energy in each layer that is converted into light: by recording the light from each layer, the amount of energy the protons deposit along their path can be measured. Such a system provides a direct measurement of the range of protons in tissue, since the absorption of the plastic is virtually identical to human tissue.

This detector could allow the full morning beam QA procedure to be carried out in a few minutes, with an accuracy well below a millimetre in size, position and range. This would translate into being able to treat an extra 12 – 18 patients every day at the two new UK centres for Proton Therapy (at University College Hospital in London and The Christie in Manchester).

The *QuADProBe* project builds on the success of the QuARC scintillator range calorimeter, which was funded by an STFC grant and was originally developed through the work of OMA Fellow Laurent Kelleter. The project also benefited immensely from several OMA partners, including Cosylab and MedAustron. The grant was awarded through the Challenge Led Applied Systems Programme (CLASP), which was established to support the application and commercialisation of STFC research in four key global research challenge areas: Energy, Environment, Healthcare, and Security.

fondazione CNAO

CNAO joins the "EURACAN" network for rare tumours

OMA partner Centro Nazionale di Adroterapia Oncologica (CNAO) has joined EURACAN-European Rare Adult Cancers Network, the network for solid tumours in adults promoted by the European Union, which brings together 75 highly specialized cancer centres from 24 countries.

With the experience gained over the years in the treatment of rare head and neck tumours, bone and soft tissue sarcomas, CNAO was selected to be part of the EURACAN network, which comprises important treatment and research centres such as the Centre Léon Bérard (Lyon, France), the Istituto Nazionale dei Tumori (Milan, Italy) and Institut Curie (Paris, France).

EURACAN's goal is to improve the diagnosis, therapies and research on rare adult cancers with attention to the assistance and care of those affected. Within the network, CNAO will collaborate with other institutes focusing on bone and soft tissue sarcomas, as well as on rare head and neck tumors.

EURACAN is part of the European Reference Networks (ERNs), virtual networks for collaboration and sharing of specialist skills on rare or complex pathologies, promoted by the European Commission since 2017.
More information: https://euracan.eu/

Treatment room at CNAO. (Image credit: CNAO)

Introducing cutting-edge accelerator science to school children

Public engagement lies at the heart of the University of Liverpool's Quantum Systems and advanced Accelerator Research (QUASAR) Group. Their wide-ranging outreach activities take an imaginative approach to make the benefits of accelerator research fascinating and understandable.

Accelerator research is of great value to science, society and industry, but this technology does not traditionally feature in mainstream media, nor is it part of school curricula. The Group's outreach activities and strategic communication have engaged millions of people around the globe, improving public awareness about particle accelerators and their applications.

Several OMA Fellows joined the innovative 'Physics of Star Wars' events in the past years to explain to the participants how proton beams are used to target cancer cells hidden deep inside the body of a patient.
For the students to experience for themselves the problems of controlling a beam you can't see to hit an invisible target, OMA Fellows have created a Star Wars themed proton mini golf challenge.

Within our OMA project, accelerator and clinical experts have been exploring ways to better control proton beams to improve cancer treatment. These beams can be used to destroy a tumour hidden deep inside the body. The different imaging technologies developed by the OMA Fellows will help monitor these beams better than anything currently available, improving cancer care in the future.

Building on the success of the 'Physics of Star Wars' events, the QUASAR Group recently published three articles in *Science in School* Issue 54 and Issue 55 to support teachers in the delivery of their STEM curricula and to introduce cutting-edge accelerator science to school students. The articles first give a general introduction to accelerator science, before moving to the use of augmented reality to explain a number of frequently used concepts and proton beam therapy as one of the main societal applications of accelerators.

Issue 54 - Inspire article: The physics of Star Wars: introducing accelerator science
Science fiction can be an engaging starting point for scientific discussions. Learn how one research group is using Star Wars to introduce students to accelerator science.
https://www.scienceinschool.org/article/2021/the-physics-of-star-wars/

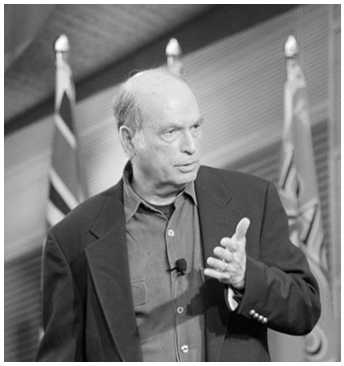
Issue 55 - Understand Article: Death Star or cancer tumour: proton torpedoes reach the target
A real-life version of proton torpedoes, popularized in Star Wars, offer an alternative to radiotherapy for the treatment of cancer.
https://www.scienceinschool.org/article/2021/proton-torpedoes-reach-the-target/

Issue 54 - Teach Article: Build your own virtual accelerator
Build your own virtual particle accelerator with the aid of the acceleratAR app and gain a hands-on, immersive understanding of how these machines work.
https://www.scienceinschool.org/article/2021/build-your-own-virtual-accelerator/

Science in School is published and funded by EIROforum, a collaboration between eight of Europe's largest inter-governmental scientific research organizations. The journal is a non-profit project and is hosted by the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany.
The journal supports science teaching across Europe and across disciplines: highlighting the best in teaching and cutting-edge research. The contents include classroom experiments and teaching materials, up-to-date information on cutting-edge science and real-world applications, projects in science education, and other useful resources for science teachers.
By sharing these teaching resources through Science in School, the QUASAR Group hopes that more teachers will incorporate Star Wars into physics teaching and that many more pupils will be inspired to expand their knowledge about accelerator science.

Dr Ralph B Fiorito (1941 – 2021)

It is with great sadness that I have to report the passing of my colleague and friend, Dr Ralph B Fiorito. Ralph was an internationally recognized expert in beam diagnostics and radiation sources. He has a very long and successful track record of innovation, independent thinking and educational activity. He held several patents for beam diagnostics and was the author or coauthor of over 100 publications in leading journals, conference proceedings and technical reports.



Dr Ralph B Fiorito

In 1993 he was the co-recipient of the international Faraday Cup Award for the invention and development of Optical Transition Radiation Beam Emittance Diagnostics; in 1995 he received the Navy Civilian Service Award for his work in charged particle beam technologies of interest to the Navy; and In 2003 he was elected Fellow of the American Physical Society (Division of Beams) for his contributions to the fundamental understanding and applications of transition, diffraction and parametric x-radiation from charged particles. In 2014, he was awarded a Marie Curie Senior Fellowship which allowed him to join my QUASAR Group for two years initially. He would stay an active member of the group and work with me on various aspects of beam diagnostics until his passing only two months after his 80th birthday. I was lucky enough that I could speak with him for over an hour just a few days before I received the sad news.

Ralph was a supporter of frank, direct and (sometimes brutally) honest debate. I enjoyed every single discussion we have had over the years and have always appreciated his "no-nonsense" approach. He has successfully collaborated with researchers at many European and international laboratories, including the Paul Scherrer Institute, the Cockcroft Institute, FERMI@Elettra at the Sincrotrone Trieste, the Tomsk Polytechnic University and the Kharkov Institute. In the US, he worked closely with colleagues from Los Alamos, Lawrence Berkeley, Livermore, SLAC, Argonne, Oakridge, Brookhaven National Laboratories and of course the University of Maryland. He has served as a research advisor, graduate school lecturer and expert at the US Particle Accelerator School. He also presented many invited talks and seminars at major accelerator conferences, laboratories and universities. The above photograph was taken when he gave an invited talk at IPAC18 in Vancouver, Canada.

Ralph's contributions have impacted and continue to influence the development of sources and diagnostics at virtually every accelerator facility in the world. The diagnostics community has lost a real forward-thinker and innovator who has successfully trained students over several decades. I have lost a true friend and mentor and am grateful for the time we spent together.

- Carsten P Welsch

Upcoming Events

13th International Particle Accelerator Conference (IPAC'22)

12th – 17th June 2022, Bangkok, Thailand

The 13th International Particle Accelerator Conference (IPAC'22) will be held in Bangkok, Thailand on 12-17 June 2022 at IMPACT Exhibition and Convention Center, located in Muang Thong Thani, Nonthaburi Province in the northern part of Bangkok, Thailand. The Center is Thailand's largest and one of Asia's biggest and most modern exhibition and convention centers. It is a world-class commercial complex consisting of an arena, convention center and exhibition halls. Surrounded by a wide range of hotel options with standard of service and facilities, choices of top restaurants, food courts, cafes and fast food outlets, supporting facilities, and its convenient location for local transport, the Center is the most appropriate and best option for the IPAC'22.

IPAC is the main international event for the worldwide accelerator community and industry. Attendees will be presented with cutting-edge accelerator research and development results and gain the latest insights into accelerator facilities across the globe. Over 1,000 delegates and 70 industry exhibits are expected to attend this remarkable and noteworthy event. This is a unique opportunity to meet, interact and network with accelerator scientists, engineers, students and industrial vendors.

For registration and more information visit:
https://www.ipac22.org/

LINAC2022 will take place in Liverpool

28th August – 2th September 2022, ACC Liverpool, UK

In 2022, the linear accelerator conference (LINAC) will come to England, the birthplace of accelerator science, and take place at the Arena and Convention Centre in beautiful Liverpool, UK on 28 August - 2 September 2020.

LINAC is the main bi-yearly gathering for the worldwide community of linear accelerator experts. The conference will provide a unique opportunity to hear about the latest advances in research and developments on hadron and lepton linacs and their applications.

Following a long and successful tradition, LINAC2022 will feature invited and contributed talks, as well as poster sessions and an industry exhibition. The scientific programme will be complemented by social events that promote informal knowledge exchange. There are a number of sponsorship opportunities for all those who would like to support the event and gain visibility.

LINAC encourages in particular students to participate and a number of scholarships will be offered.

For registration and more information visit:
https://linac2022.org/

Vacancies

Job opportunities at IBA

IBA is searching for two people to join the company as R&D research experts. Based in Louvain-la-Neuve, Belgium, IBA has become the **global leader** in proton therapy. To date, more than 58 world renowned medical institutions have built a Particle Therapy Center with IBA across 3 continents.

The successful candidates will join the *Clinical Research & Application* group within the *Innovation & Development* department of IBA's *Proton Therapy* business unit at their Belgian headquarters.

One of the research experts will work in close collaboration with customers and industrial partners on the design of the next generations of a **Cone Beam Computed Tomography (CBCT)** device, the volumetric imaging system that is embedded within the treatment rooms of IBA's proton therapy facilities.

The other expert will integrate IBA's leading research and development programs, primarily the one for **ConformalFLASH®** proton therapy. They will support the customers' research efforts to pioneer this new promising modality by leveraging and advancing applications of IBA's OpenPATh initiative.

The identity of IBA is characterized by a group of colleagues driven by motivation, curiosity, creativity, the desire to learn on a daily basis, by technical challenges and above all by a highly developed team and family spirit that makes the daily life smoother and more enjoyable!

By joining a team of about 40 nationalities and working on more than 45 different sites on 3 continents, IBA offers you the opportunity of a meaningful career with a direct impact in the fight against cancer.

For a full job description and application process visit:
www.iba-careers.com/,,,job_id=25320
www.iba-careers.com/...job_id=25312

Lectureship in Accelerator Physics at the University of Manchester

The University of Manchester has opened a new lectureship in accelerator physics at the Cockcroft Institute (UK).

The university is seeking to appoint a scientist with an established record of research excellence in the field of accelerator physics, particularly (but not limited to) developing medical applications of accelerators.

The successful candidate will contribute to undergraduate and postgraduate teaching and to management and administration within the Department.

The position is permanent, starting 1 September 2022, and the closing date for applications is 15 April.

For more information, and to apply, visit:
www.jobs.manchester.ac.uk/...jobid=21914
or write Prof Rob Appleby at:
robert.appleby@manchester.ac.uk

Postdoctoral Research Fellow in Proton Beam Therapy at UCL

The High Energy Physics group at UCL invites applications for a Postdoctoral Research Fellow position in Proton Beam Therapy (PBT) diagnostics development.

A detector is currently under development within the group — the Quality Assurance Range Calorimeter (QuARC) — to make fast, accurate measurements of proton range and Water Equivalent Path Length at clinical PBT facilities as part of the Quality Assurance (QA) procedure required for safe treatment. The successful applicant will be expected to take a leading role in the detector development, with a focus on the data acquisition and readout, including the development of the FPGA-based DAQ system and front-end interface.

The successful applicant will have a PhD in high energy physics, medical physics or a related subject and will have detailed knowledge of high energy physics or medical physics detector systems, in particularly with data acquisition and detector readout, with hands-on experience of designing, simulating, building and commissioning such systems. The fellow will join the proton beam therapy detector group within High Energy Physics.
This fellowship is funded for 2.5 years in the first instance, with the possibility of extending to 3 years.

For further details about the vacancy and how to apply online please go to the online UCL Vacancies page, which also includes the Job Description and Person Specification. If you have any queries regarding the application process, please contact Shanice Thomas. Informal enquiries regarding the vacancy can be made to Dr Simon Jolly**.**
Closing Date: 15th April 2022.

Postdoctoral Fellowships at the University of Liverpool

The QUASAR Group, based at the Cockcroft Institute, is pleased to offer two 3-year Fellowship opportunities for talented scientists and engineers.

We are recruiting a **Fellow in Data Intensive Science**. This is a key role within our Centres for Doctoral Training in Data Intensive Science LIV.DAT and LIV.INNO which will support the cutting-edge research and training activities of our PhD students. Your work will include contributions to fundamental research across nuclear, particle and accelerator physics, as well as research that creates impact through technology transfer and commercialization. You will also contribute to industry days, data science training programs and other showcase events.

We are also recruiting a **Postdoctoral researcher in gas jet-based beam monitoring techniques**. You will contribute to the development of cutting-edge beam monitors for the High Luminosity LHC, in-vivo dosimetry systems, as well as novel microscopy techniques. Your research will include measurement campaigns at clinical and research facilities and you will also carry out simulation studies into gas jet generation, shaping and image optimization.

For further details about the two positions and to find out how to apply please go to Liverpool's job vacancies page to enter the recruitment portal.

The positions will go live on 1st April 2022. If you have any queries regarding the vacancy please contact Prof Carsten P Welsch**.**

Closing Date: 30th April 2022.

Selected Publications

Future Developments in Charged Particle Therapy: Improving Beam Delivery for Efficiency and Efficacy
Yap Jacinta, De Franco Andrea, Sheehy Suzie
Frontiers in Oncology 11, 780025 (2021)
https://doi.org/10.3389/fonc.2021.780025

Investigation of Suitable Detection Angles for Carbon-Ion Radiotherapy Monitoring in Depth by Means of Secondary-Ion Tracking
Ghesquière-Diérickx Laura, Schlechter Annika, Félix-Bautista Renato, Gehrke Tim, Echner Gernot, Kelleter Laurent, Martišíková Mária
Frontiers in Oncology 11, 780221 (2021)
https://doi.org/10.3389/fonc.2021.780221

Dosimetric Validation of a System to Treat Moving Tumors Using Scanned Ion Beams That Are Synchronized With Anatomical Motion
Lis Michelle, Newhauser Wayne, Donetti Marco, Wolf Moritz, Steinsberger Timo, Paz Athena, Graeff Christian
Frontiers in Oncology 11, 712126 (2021)
https://doi.org/10.3389/fonc.2021.712126

Upcoming Events

12th – 17th June 2022	IPAC'22, Bangkok, Thailand
25th/26th July 2022	IOP Particle Accelerators and Beam Group Conference, Liverpool, UK
28th Aug - 2th Sept 2022	LINAC2022, Liverpool, UK
11th – 15th Sept 2022	IBIC'22, Krakow, Poland

NOTICE BOARD

DEADLINE FOR THE NEXT NEWSLETTER **15th June 2022**

www.oma-project.eu

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