NEWS letter

MIRROR

Issue 21 December 2021

Highlights

Dear friends of low energy antimatter and ion physics,

Another challenging the year is coming to a close. Whilst our AVA project officially ended at the beginning of this year, our communication and also some networking events continued and will continue in the future. All Fellows successfully completed their training within the network, some have already completed a PhD and others are currently busy writing up their theses. The research output of the network has been very impressive and continues to impress: In this MIRROR you find an overview of the work done by Bruno Galante, based at CERN. In a paper just published in Phys Rev AB, he shows the detailed characteristics of Carbon Nanotubes as innovative electron emitters. This is the first time that such a comprehensive study was done and provides an excellent basis for the generation of high quality electron beams.

You will also find news about prestigious awards (Congrats, Klaus!!), teaching material we created for school teachers to communicate cutting edge science to their pupils and a summary of an MSCA workshop that was held between CERN, the UK Research Office and us in Liverpool on Marie Curie networks in September. AVA has been a wonderful experience and has provided an excellent basis for training the next generation of researchers. The workshop has helped communicate our experiences to a much wider community. I am sure that this will help shape the training of postgraduate researchers across Europe and would like to thank everyone who contributed to the event.

I would like to use this opportunity to wish you all a wonderful Christmas time and good start into 2022!

Prof Carsten P Welsch
AVA Coordinator

Research News

Carbon nano tubes effectiveness proven in new paper

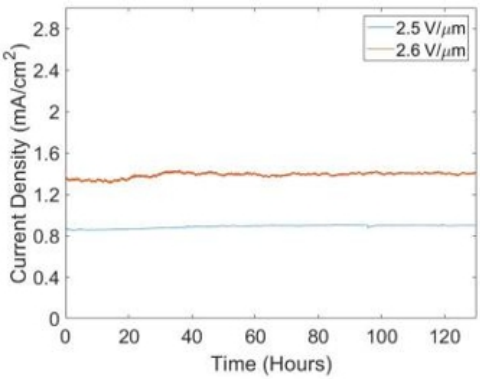


Figure1: Current density over time from CNT array

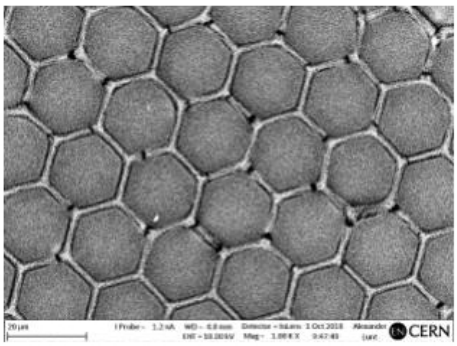


Figure 2: Honeycomb structure array of CNT's

AVA Fellow Bruno Galante working at CERN has recently had a paper published titled "Stability and lifetime study of carbon nanotubes as cold electron field emitters for electron cooling in the CERN extra low energy antiproton ring".

As Electron cooling is a fundamental process to guarantee beam quality in low energy antimatter facilities such as ELENA. The electron cooler is used to reduce emittance blow up of the low energy antiproton beam, requiring a supply of a monoenergetic relatively intense electron beam. In the paper an optimization of the ELENA electron cooler gun involving a cold cathode is studied, with the aim of investigating the feasibility of using carbon nanotubes (CNTs) as cold electron field emitters. CNTs are considered among the most promising field emitting material. However, stability data for emission operation over hundreds of hours, as well as lifetime and conditioning process studies to ensure optimal performance, are still incomplete or missing.

Within the paper several CNT samples are characterised focusing on two main arrangement geometries, with the aim of assessing if they can be considered good candidates for being used operationally in ELENA as cold electron field emitters. The samples tested so far have shown promising results if operated in optimal conditions i.e. low pressure and vacuum bakeout greater than 200°C which match perfectly the requirements of ELENA.

Concerns around CNT's still exist around their lifetime and stability and as such a honeycomb structure is examined which reached the 1500h mark still whilst still maintaining emission. Within the tested arrays the honeycomb structure proved to have the best performance, whilst also allowing for the maximal space optimization.

The results achieved open the way for designing a new style of electron gun for the ELENA electron cooler, further tests are planned for the near future to further confirm this approach. These results will help to inform about introducing a new CNT based gun over the currently existing thermionic electron gun.

Further information:
Bruno Galante, et al., Phys. Rev. Accel. Beams **24**, 113401 – Published 9 November 2021
https://doi.org/10.1103/PhysRevAccelBeams.24.113401

ELENA at CERN's Antimatter Factory is back in action

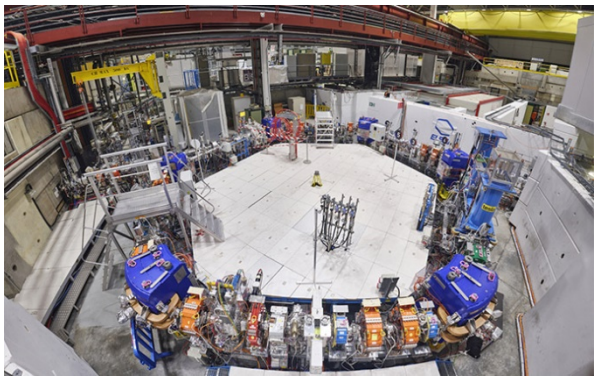
The Extra Low Energy Antiproton ring (ELENA) ring has started delivering antiprotons at an energy of 100 keV to all low energy antiproton experiments.

ELENA, a small 30m synchrotron ring designed to cool the 5.3MeV antiprotons from CERN's Antiproton Decelerator (AD), is part of CERN's antimatter factory. It slows down antiprotons from the AD and this allows experiments to increase the number of antiprotons that they can capture.
Within AVA, Fellows have worked closely together as part of the Design and Optimization work package to target improvements in the performance of the ELENA and FLAIR low energy antimatter facilities. For example, Bianca Veglia's project focussed on *Beam Stability and Lifetime in low energy Storage Rings* and Bruno Galante worked on the *Generation of Cold Electrons for an eV Electron Cooler*. Electron cooling of the antiproton beam is essential to reduce or eliminate any emittance growth caused by the deceleration process of antiprotons – the smaller the emittance, the higher the quality of the beam.

ELENA is improving the conditions for antimatter experiments dramatically. The less energy antiprotons have, the easier it is to study and manipulate them. The ELENA ring has been designed to reduce antiproton energies to below 100 keV. An electron cooling system also increases the beam density. With ELENA, the number of antiprotons that can be trapped increases by a factor of 10 to 100, improving the efficiency of the experiments and paving the way for new experiments.

After successful installation and commissioning of new transfer lines at the ELENA ring, the facility has now started delivering antiprotons at an energy of 100 keV to the physics experiments. In the last week of August, the GBAR and ALPHA experiments have already taken beams and other experiments will follow soon.

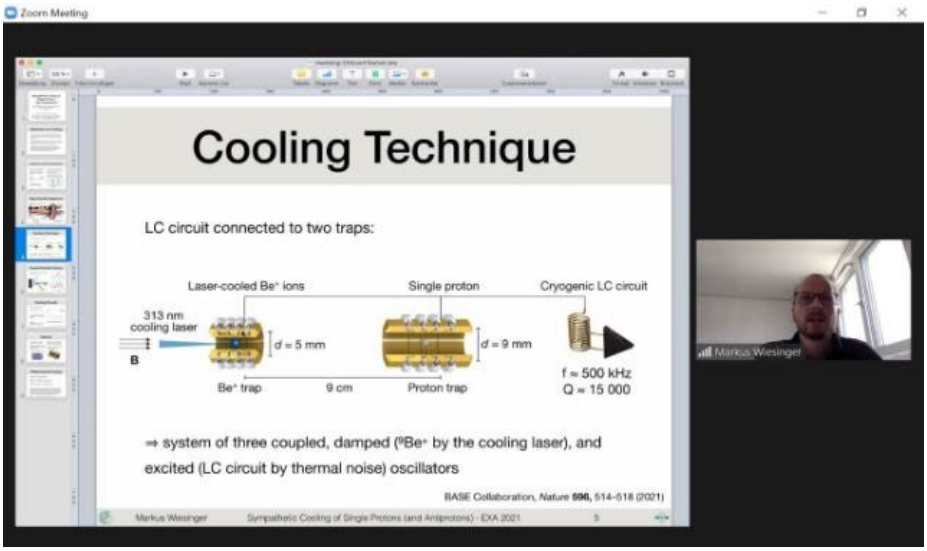
You can watch ELENA in action in this short video:
https://youtu.be/BNd2c8tVWjw



General view of the ELENA decelerator with the new beamlines visible. (Image: CERN/M.Brice)

Network News

International Conference on EXotic Atoms and Related Topics



In one of the virtual poster rooms, AVA Fellow Markus Wiesinger presented his poster followed by a Q&A discussion with other EXA2021 participants.

EXA2021 took place online, 13th – 17th September 2021 and brought experts together from around the world to discuss the latest developments on EXotic Atoms (EXA) and related topics. Over 100 delegates participated in the weeklong event whereby invited speakers presented their R&D during plenary sessions. Poster sessions on the Thursday allowed 40 researchers to present and discuss their work with colleagues in individual breakout rooms.

EXA is a series of international conferences which takes place every 3 year with this edition taking place online and being organized by AVA Partner Stefan Meyer Institute (OEAW) for Subatomic Physics of the Austrian Academy of Sciences. The conference series focusses on muonic, pionic, kaonic, and antiprotonic atoms and related topics. AVA Coordinator Prof Carsten P Welsch (University of Liverpool) has been a member of its International Advisory Committee.

The scientific program comprised topics such as: Antihydrogen (CPT and gravity), Precision experiments with cold neutrons, Hadron physics with antiprotons, and Future facilities and instrumentation. The week opened with plenary talks including *Is the proton charge radius puzzle solved* (Prof Randolf Pohl) and *Measurement of the positron fine structure* (Prof David Cassidy). Talks on subsequent days focused on various topics such as *Muon g-2* (Status of theory and experiment), *Laser cooling of antihydrogen atoms* (ALPHA collaboration), *Measurements of hadron-hardon interactions* (ALICE), and Low-energy kaon-nuclei interactions studies (experiments at DAΦNE and J-PARC). Slides of these and other talks can be found on the event's website.

A delegation from AVA also attended this conference and one of the Fellows, Markus Wiesinger, presented his work during the poster

session. Markus, based at the Max Planck Institute for Nuclear Physics and a member of the BASE collaboration, has been working on advanced cooling techniques for protons and antiprotons in penning traps with the aim of improved measurements of the proton and antiproton magnetic moment. This was also the focus of his poster presentation *Sympathetic Cooling of Single Protons (and Antiprotons)*, which is based on work recently published in Nature.

AVA Steering Committee member Prof Eberhard Widmann (OEAW) and Chair of EXA2021 said: "*This instance of the EXA conference was special since – due to the Covid pandemic – it was held in an unusual format: not only was it accessible by video only, but we also decided to have just 4-5 talks a day to make it easier for participants from many continents to attend virtually. Likewise, the poster session was held remotely in parallel virtual rooms between which participants could freely move. It was the first time for us to use this format, and in my opinion, it was very successful as indicated by the number of participants, which was at the same level of previous in-person issues of EXA".*

The proceedings of the EXA2021 will be published in the European Physical Journal Web of Conferences: https://www.epj-conferences.org/

Fellows Activity

AVA Fellow Interviews – Spotlight on Jeffrey Klimes

Image credit: Jeffrey Klimes

For this interview we have spoken with Jeffrey Klimes who joined the AVA network at GSI / University of Heidelberg (Germany) in May 2018.

During his Fellowship he was working on the ARTEMIS experiment, which focuses on the measurement of nuclear magnetic moments in highly charged ions. His project studied a reservoir trap to deliver single antiparticles to penning trap experiments.

What did attract you to the AVA network? Has it fulfilled your expectations?

"I anticipated the AVA network to be, as its name indicates, an innovative approach to doctoral training. Fortunately, this turned out to be correct. The social and professional experience of AVA, in parallel to the traditional doctoral education at my university and research work at my institution, was both challenging and rewarding. those goals would have come in extremely handy. "

Why did you choose to go to GSI?

"I was attracted to Universität Heidelberg by the many opportunities to work in fundamental physics research with cold stored matter. From there the close association with the ARTEMIS project at GSI was a natural fit while also allowing me to gain more experience working within a larger institution, which I think will be a pervasive experience for many research physicists of my generation."

Can you explain in a few words what your project was about and what have you achieved?

"ARTEMIS is a so-called Penning trap whereby exotic matter can be confined for observation. It uses a technique of multiple, simultaneous spectroscopic stimulations to measure the intrinsic magnetic interaction strength of electrons bound in atoms. In the heaviest and most highly charged atoms, such as those produced at GSI, this interaction has few benchmarking measurements for theories of strong-field quantum electrodynamics. Within AVA, the dynamics of ions within a secondary storage trap were studied as well as procedures for extracting them to precision traps for measurements. Such storage traps will likely play an important roll in the near future for end uses at accelerator facilities which produce antimatter. As the production and research of antimatter often need to be decoupled."

What has AVA provided you professionally?

"For me AVA was an opportunity to build the skills and connections that are equally important for a research career as scientific rigor. I consider the fellows to be friends as well as peers, and look forward to the seeing how these global connections could be harnessed further in the future. In addition, AVA provided training opportunities of frequency and caliber that I don't often see among other doctoral students, such as guidance on soft-skills, organizing and hosting scientific workshops, and even opportunities to teach young new scientists."

Can you say something about your next career move?

"After AVA I am continuing to work at ARTEMIS, focusing on the injection of externally produced heavy, highly charged ions. This work will culminate for me in May of 2022 with a beamtime where the first ions from the accelerator facility will be trapped in ARTEMIS as well as the subsequent defense of my dissertation.

From there I plan to look for post-doctoral research positions in North America, continuing to study fundamental physics in particle traps."

Can you say something about your next career move?

"I actually joined AVA relatively late compared to most of the other fellows in the network. By the time I met many of them at CERN for the first physics school, there were established roles, connections, and even friendships. Nonetheless, I was immediately welcomed among them. The thing that I will remember the most will be, my friends, the fellows."

AVA Workshop at GSI.

Innovative particle cooling technique studies among top 10 for Physics Breakthrough of the Year award

Image: Physics World

Each year, Physics World announces their TOP 10 Breakthroughs of the Year. They revealed the 10 finalists for 2021 on 7 December 2021. In addition to having been reported in Physics World in 2021, selections must meet the following criteria:

- Significant advance in knowledge or understanding
- Importance of work for scientific progress and/or development of real-world applications
- Of general interest to Physics World readers

It is great that two projects that were cornerstones of AVA were part of this top 10 list.

Researchers from the Antihydrogen Laser Physics Apparatus (ALPHA) and the Baryon Antibaryon Symmetry Experiment (BASE) collaborations at CERN, both of which hosted AVA Fellows, were shortlisted for their separate studies into new ways to cool particles and antiparticles.
Their advanced techniques could pave the way for precision studies examining the matter–antimatter asymmetry in the universe.

The ALPHA collaboration demonstrated laser-cooling of antihydrogen atoms for the first time. To achieve this, the physicists developed a new type of laser, which produces 121.6 nm laser pulses, to cool the antiatoms. They then measured a key electronic transition in antihydrogen with unprecedented precision, a breakthrough that could lead to improved tests of other key properties of antimatter.
The BASE researchers, meanwhile, showed how to extract heat from a single proton via a superconducting circuit connected to a cloud of laser-cooled ions several centimetres away – a technique, they say, that could easily be applied to antiprotons.

Whilst these studies were unfortunately not crowned as the overall winner in 2021, being shortlisted in the top 10 is a fantastic achievement.

Huge congratulations to both collaborations!

Partner News

Professor Klaus Blaum receives prestigious award

Prof Dr Klaus Blaum (© Stefanie Aumiller / Max-Planck-Gesellschaft)

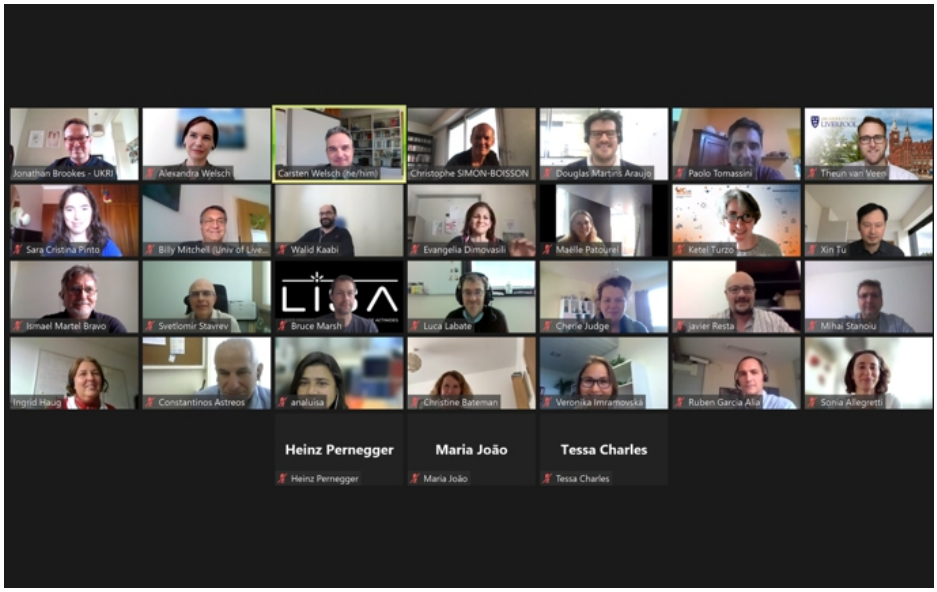
A press release has gone out by the German Physical Society to announce that Prof Dr Klaus Blaum, Director at the Max Planck Institute (MPI) for Nuclear Physics in Heidelberg, will be awarded the Otto Hahn Prize 2021. This Prize is awarded to promote science in particular in the fields of chemistry, physics and applied engineering by recognizing outstanding scientific achievements and is awarded every two years. The award is endowed with €50,000 and is jointly borne by the City of Frankfurt am Main, the Society of German Chemists (GDCh) and the German Physical Society (DPG). The award ceremony will take place on 5 November in Frankfurt, Germany.

The MPI for Nuclear Physics is one of the partners in the AVA Network and Klaus Blaum has been one of the supervisors for AVA Fellow Markus Wiesinger who conducts his research on *Sympathetic Cooling of Antiprotons* there.
Klaus Blaum has already been awarded with numerous prizes for his ground-breaking research and last year he was appointed Vice President of the Max Planck Society Chemistry, Physics and Technology Section. Blaum and his group have developed a large number of sophisticated techniques and often only carry out the experiments on individual particles at the lowest temperatures. Using brilliant ideas and extraordinary experimentation skills, he combines sophisticated techniques from atomic, nuclear and accelerator physics. Blaum has published his scientific results in more than 450 scientific articles in the leading and internationally recognized physics journals. He is one of the world's most productive and most cited researchers in the field of precision physics and measurement technology.

Read the full press release (in German) by the German Physical Society here.

Congrats!

Liverpool experts help shape the training of the next generation of researchers



Participants at the online MSCA workshop.

Marie Skłodowska-Curie Actions (MSCA) target the development of excellent researchers through international and cross-sector mobility. MSCA networks support joint doctoral programmes, implemented by European partnerships of universities, research institutions, industry (incl. SMEs) and other non-academic organisations.

An expert workshop on 'MSCA Networks - Training the next generation through collaborative programmes' was held on 29 September 2021, hosted by the University of Liverpool's QUASAR Group. The online event attracted staff at academic and non-academic organisations from across Europe, who are planning to participate in one of the next MSCA Doctoral Networks.

Since 2008, the QUASAR Group, founded by Prof Carsten P. Welsch, has led no less than five MSCA and has been in charge of the training of almost 100 Fellows. The AVA project has received nearly 4M€ funding from the European Union's Horizon 2020 research and innovation programme. Over 30 partners from universities, research centres and industry contributed to the training of 16 Fellows in the network.

The QUASAR Group has extensive experience in the specific needs of large-scale collaborations and is responsible for the day-to-day management of research and training projects, partner contracts, science communication and outreach. Formal project evaluations have commended the communication and outreach as "*exemplary*" and "*outstanding in disseminating project results to the general public*", and have been highlighted by the European Commission as "success story".

This places the Group in an ideal position to share best practice and provide participants at the workshop with a detailed understanding of the opportunities (and challenges) that the MSCA Doctoral Networks scheme offer.

The workshop programme included speakers from UK Research Office (UKRO), several experts from CERN and experts from the QUASAR Group.

Rubén García Alía (CERN) gave an overview about the RADSAGA ITN project at CERN.

Prof Welsch, AVA Coordinator and Head of Liverpool's Physics Department, said: "*MSCA networks are ideal to enable cutting edge collaborative research. They are based on close collaboration between universities, research centres and industry. We have clearly seen that the innovative and extensive training, development and research opportunities our MSCA Fellows received could simply not be offered by a single university.*"

MSCA networks are intended to provide doctoral students with excellent research skills, coupled with experience outside of academia to develop their innovative capacities and boost their employability. The latest call for MSCA Doctoral Networks closed on 16 November 2021. This year, the Research Executive Agency received 1,077 proposals from 56 different countries.

More information about the MSCA programme and future calls can be found here: https://ec.europa.eu/research/mariecurieactions/

AVA project manager Theun van Veen presented a talk about 'Researcher training – benefits from a cohort approach'.

Subscribe to the "EU Projects at CERN" newsletter

CERN's EU Projects Office announces a relaunch of its newsletter starting in November 2021. The "*EU Projects @ CERN*" newsletter will provide readers with a quarterly digest of news about European projects in which CERN is involved.

Each issue will focus on a specific topic related to European projects: the creation of project consortia, the search for suitable funding, etc.

The newsletter will not only provide information on EU support services and resources at CERN, but also particulars on deadlines and funding opportunities, such as open or upcoming calls for proposals of potential interest to CERN.

CERN's long-standing cooperation with the European Commission is based on a Memorandum of Understanding signed by the two parties in 2009, and on the very successful participation of CERN in the EU Framework Programmes for Research and Innovation (100 projects in FP7 and 110 projects in H2020).

Further info:
https://home.cern/news/news/knowledge-sharing/subscribe-eu-projects-cern-newsletter

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 AVA Fellows took part in the innovative 'Physics of Star Wars' events in the past years using the light and dark side of the Force in Star Wars as opportunity to talk about matter and antimatter interactions which the AVA network is exploring.

The event participants learned about how antimatter particles are trapped and prepared for precision experiments via optical and mechanical Paul traps and the AVA Fellows explained how they study the detailed properties of these exotic particles, for example how they react to the gravitational field of the Earth and how they interact with matter particles.

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 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/

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/

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.

Images credit The Cockcroft Institute

50 years of hadron colliders at CERN

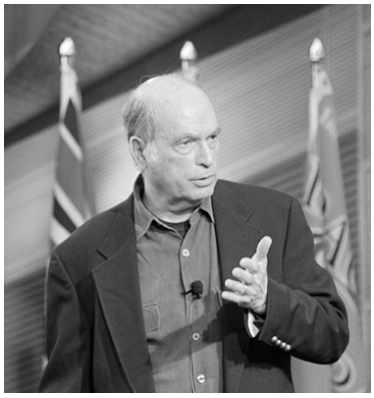
Image copyright CERN

On 27 January 1971, beams collided for the first time in the world's first hadron collider, the Intersecting Storage Rings (ISR), changing the course of high energy particle physics forever. A Symposium at CERN celebrated 50 years since the first collisions, welcoming a panel of world-class speakers that reviewed the rich history and achievements of hadron collider research.
The discussions and presentations of the event can be watched on the Symposium's dedicated YouTube CERN Lectures playlist.

More info:
https://home.cern/news/news/cern/relive-50th-anniversary-hadron-colliders-cern

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

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

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.

Registration will open soon
https://linac2022.org/

Position Vacancies

Beamline Scientist - X-ray spectroscopy / scattering

For our new high throughput Debye beamline at the **Swiss Light Source** we are looking for a Tenure Track Beamline Scientist - X-ray spectroscopy / scattering. Your tasks:

- Design, construction and operation of a high-throughput X-ray absorption spectroscopy / scattering beamline (Debye beamline)
- Establish a high-class research program centered on x-ray spectroscopy / scattering investigations of energy materials
- Method / software development for large spectroscopic, scattering or diffraction datasets

Application deadline: 19th December 2021

Further info

Project LightHouse – Several vacancies as System and Control System Engineers

Tasks at **RI Research Instruments GmbH** include:

- Plan infrastructure connecting main work packages as *System Engineer*
- Assist customers with the design of the building, radiation safety and licensing issues.
- Lead design and implementation of Control System for LightHouse project as *Control System Engineer*
- Supervise sub-suppliers coding the actual software.
- Collect requirements and information from the main work packages (RF, vacuum, beam dynamics, cryogenics, control system)
- Contribute to the electro planning.

To find out more, please contact Christoph.Quitmann@research-instruments.de.

Permanent job offer: Accelerator Physics and related research for international projects carried out at the IJCLab. R&D on innovative accelerator technologies, in particular on: ERLs

The physics of accelerators holds a pivotal and fundamental place at the IN2P3, allowing us to push the limits of facilities for research in the physics of the two infinities. The visibility of this theme is very strong both nationally and internationally. At the IJCLab, accelerators physics are of paramount importance, among other things the R&D on innovative accelerator technologies, in particular the ERLs and its associated flagship project: PERLE.

The BIMP team of the IJCLab accelerators pole is actively collaborating in the R&D on ERLs, in particular on beam dynamics studies of the PERLE project. In this context, the accelerator physics researcher will design, lead and carry an innovative and ambitious research program, playing a major role in the R&D of ERLs, in particular on the PERLE project and consequently for this type of future installations of new generation at the heart of IN2P3 themes.

For further information, please contact Dr. Angeles Faus-Golfe fausgolf@ijclab.in2p3.fr

Head of Accelerator Operations Division

GSI Helmholtzzentrum für Schwerionenforschung in Darmstadt operates one of the leading particle accelerator complexes for science. Over the coming years, the new FAIR (Facility for Antiproton and Ion Research), one of the world's largest research infrastructure projects, will be completed by an international consortium. GSI/FAIR offers you the opportunity to work with an international team of scientists and engineers committed to building and operating a world-class facility.

To fill a strategic key position, GSI is looking for a Head of Accelerator Operations Division (all genders). You will lead a team of about 160 people, which is expected to grow substantially in the next few years.

Application deadline: 20th December 2021

Further info

PhD opportunities at the University of Liverpool / Cockcroft Institute:

Optimization of low-dose, low cost mobile 3D X-ray Imaging
More info

Space charge dominated low energy beam dynamics in high current Energy Recovery Linacs
More info

Research and development of novel plasma targets for particle accelerators
More info

A novel optical fibre analysis system for particle accelerators
More info

Application deadline: 31st January 2022

The QUASAR Group also has several interesting postdoctoral vacancies for beam diagnostics and Monte Carlo experts. For further information, please contact Professor Carsten P Welsch c.p.welsch@liverpool.ac.uk

Events

12th – 17th June 2022	13th International Particle Accelerator Conference (IPAC'22), Bangkok, Thailand
28th Aug – 2nd Sept 2022	International Linear Accelerator Conference 2022 (LINAC 2022), Liverpool, UK
11th – 15th Sept 2022	IBIC'22, Krakow, Poland

Notice Board

DEADLINE FOR THE NEXT NEWSLETTER CONTRIBUTIONS: 5th March 2020

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

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