NEWSLETTER

Issue 13, February 2019

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- National Technical University of Athens (NTUA), Greece
- EPFL, Switzerland

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GSI - 50 years of growth and world-class achievements

The interview:

Dr. Tobias Engert, Head of Technology Transfer at GSI and new Chairman of HEPTech presents his vision about the Network

HEPTech upcoming events

First Call for proposals for commissioning experiments at ELI Beamlines

The ELI Beamlines Facility (https://www.eli-beams.eu/en/) invites the scientific community to submit proposals for commissioning experiments in its E1 Experimental Hall that serves experiments for Applications in Molecular, Biomedical and Materials Sciences.

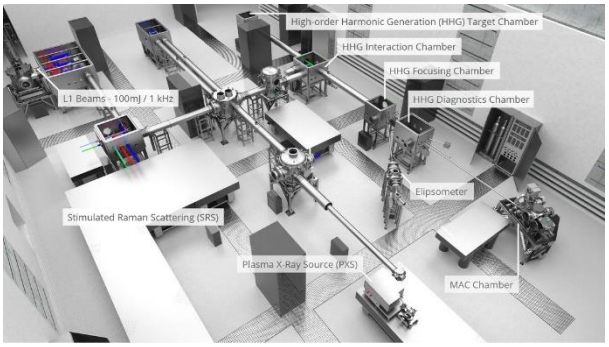
Experimental hall E1 houses laser-driven secondary sources and experimental end-stations for applications in molecular, bio-medical, and materials sciences. Experiments in the E1 hall exploit synchronized laser beams and photon beams in the VUV and hard X-ray range.

The commissioning experiments of new experimental stations will take place between February 15 and August 30, 2019.

The aim of the call is:

- to perform high-level instrument commissioning and to initiate high-level user experiments, using the capabilities already in operation in the E1 experimental hall.
- to increase the future value of the experimental capabilities of E1 for the broader user community by ensuring that the final development and commissioning steps are completed in collaboration with leading international experts.
- to train ELI Beamlines scientific staff, user office personnel and support teams together with experienced users in the interactions necessary for efficient user operations.

More information and details of this call

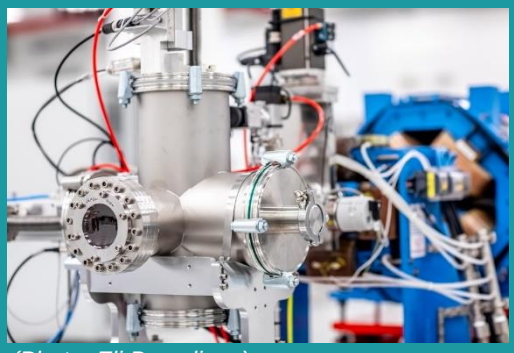


The ELIMAIA user beamline is launched

The ELIMAIA ion acceleration user beamline with its key system, the ELIMED ion beam transport and dosimetry section, was launched recently at the ELI Beamlines research facility. The mission of ELIMAIA (ELI Multidisciplinary Applications of Laser-Ion Acceleration) is to provide stable, fully characterized and tunable beams of particles accelerated by multi-PW lasers and to offer them to the user community for multidisciplinary applications, with the ultimate goal of demonstrating a compact approach of laser-driven ion acceleration for application in cancer therapy. Medical treatment belongs to key technologies of ELI Beamlines in the technology transfer activities.

The “Laser Accelerator” which is part of the ELIMAIA beamline was designed and developed at the Institute of Physics of the Czech Academy of Sciences in Prague, while the ELIMED beam transport and dosimetry line was designed and built at the National Laboratories of Southern Italy of the National Institute for Nuclear Physics (LNS-INFN) in Catania. ELIMED represents a key technology of the entire ELI Beamlines facility since it will enable users to carry out pre-clinical research for future applications in cancer therapy, such as irradiation of biological cells with short bunches of protons/ions accelerated by the laser system L3-HAPLS.

ELIMAIA will be fully operational by the end of 2019 and will be open for international scientific users interested in future applications of laser-driven ions for hadron therapy and other fields.



(Photo: Eli Beamlines)

A Greek Institute of Technology paves the way to market of 15 research projects

The Eastern Macedonia and Thrace Institute of Technology - EMATTECH successfully paved the way to market of 15 research projects. The initiative was implemented owing to the generous donation of the private Stavros Niarchos Foundation that provided grants for 15 fellowships of up to 60 000 Euro each, consisting of a prize of 5000 Euro for the idea and 55 000 Euro for its development.

The EMATTECH 15 research fellows were selected by an international committee from a total of 59 applications where every candidate was proposing a research project of his/her research area. The selected projects there have been supervised and coordinated for 24 months by Professor Athanasios Mitropoulos, vice-rector of EMATTECH, with the support of the international committee.

Each fellow was given the opportunity to handle the budget of their own project and to distribute properly for their research needs in order to achieve their objectives.

Each project had to deliver the following outcomes:

1) Submission of a commercial logo to the Ministry of Commerce
2) Grant of a certificate of invention by the state Industrial Property Organization
3) Web link setup of the product
4) Presentation of the product
5) Pilot installation of the product in a productive unit of an industrial firm

The EMATTECH offered to the 15 fellows the following services, facilitating their work:

- Legal support
- Laboratory infrstructure
- Logistic support to the budget execution
- Guiding to the development of the business plan
- Dissemination of the research results

The 15 funded projects represented a large variety of research areas such as: agriculture, education, environment and civil engineering, food technology, IT applications, petroleum technology, advanced materials and mechanical engineering applications, life sciences.

All projects produced an innovative product getting the certification of invented patent from the state Industrial Property Organization and in parallel the young researchers were in connection with industry getting from companies a letter of interest for their research outcomes.

Most of the funded projects were developed and implemented at the well-equipped Hephaestus Advanced Laboratory of EMATTECH.

The follow-up of this effort is the further development of the research results in the incubating environment of the EMATTECH in cooperation with the respective companies interested in these innovative products, and/or their direct implementation for industrial use.

Project exhibition (Photo: EMATTECH)

Medical X-ray imaging made affordable

The GlobalDiagnostiX X-ray system is about to go into production. This robust machine, initially designed for the challenging conditions of countries in the Global South, has also turned out to be an attractive solution for industrialized nations owing to its low cost.

The project was launched in 2012 as part of the EssentialTech program at the Ecole Polytechnique Fédérale de Lausanne (EPFL) in Switzerland, and brings together a large number of European and African universities and university hospitals. The project engineers were guided by two principles – simplicity and robustness – to ensure the system could be maintained by relatively unskilled workers. The team also aimed at keeping the manufacturing and operating costs very low. “Even small hospitals, including in industrialized countries, will be able to afford this sophisticated X-ray equipment,” says Klaus Schönenberger, who runs the EssentialTech programme.

With the research and development phase now complete, the local start-up Pristem SA will be in charge of manufacturing and marketing the machine. This EPFL spin-off announced that it had raised 14 million francs in funding from a group of Swiss and African investors. “We are now prepared to tackle the challenges of this global, highly diversified market by combining Switzerland’s time-tested manufacturing expertise with cutting-edge digital technology,” says Bertrand Klaiber, Pristem’s CEO, who expects to deliver the first machines in late 2020.

More information

Project manager Romain Sahli presents the machine (Photo: EPFL, E. Barraud)

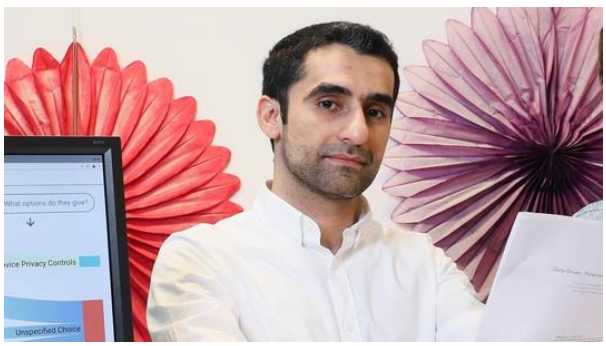
Software developed at EPFL enables personal data protection

A new EU regulation that went into effect in May 2018 has prompted consumers to pay more attention to how websites use the personal data they collect. With Polisis, an AI-based programme developed at EPFL, consumers can get quick, easy-to-read summaries of websites’ data protection policies. The program is becoming highly popular – EPFL’s Technology Transfer Office has received over 20 license requests in the past few months. Most of them come from companies offering web services, such as personal data protection software and data monetization applications as well as lawyers drafting data protection policies and disclaimers who want to test their texts. Hamza Harkous, a software developer, has entered into a license agreement with DuckDuckGo, a US search engine that stands apart for its commitment to protecting personal data.

DuckDuckGo’s developers plan to incorporate Polisis’ AI algorithms into the search engine’s Privacy Essentials extension. This extension already provides a summary of important data protection information but that summary is generated by hand based on the policies of just a few dozen websites. With Polisis’ algorithms, the summary generation process can be automated and expanded to include tens of thousands of websites. However, the summaries produced by Polisis’ software have no legal value – they are for information purposes only – but they have nearly 80% accuracy rate.

(The text is based on the interview of Hamza Harkous given to Cécilia Carron; source TTO of EPFL. Photo: EPFL)

More information



IN FOCUS

GSI – 50 years of growth and world-class achievements

In 2019 the GSI Helmholtzzentrum für Schwerionenforschung celebrates its 50th birthday.

The GSI Helmholtz Center for Heavy Ion Research was founded in 1969 under the name Gesellschaft für Schwerionenforschung mbH (GSI). Since its foundation, the research institution has gained international reputation. Ideas like the synthesis of super heavy elements and tumor therapy with heavy ions that GSI has realized and owes its renown to, existed already 40 years ago. But Germany lacked a laboratory for nuclear physics that bundled the capacities of the scientists and helped them to fulfill their visions. "In the 1960s nuclear physicists conducted their research on their own in their universities. Here in Hessen a strong desire for a central facility existed," says Professor Dr. Rudolf Bock, one of the founding fathers of GSI and prime mover of heavy ion research.

Nuclear scientists of the three Hessian universities in Darmstadt, Frankfurt and Marburg triggered the project in 1966: They founded the "Kernphysikalische Arbeitsgemeinschaft Hessen" (KAH) to strengthen science in the region. Hessen was supposed to be the birthplace of a research facility for heavy ion research in proximity to the universities, open for all scientist with good ideas. Later the universities in Gießen, Heidelberg and Mainz joined the KAH.

In 2003, the Federal Ministry of Education and Research gave a green light for the implementation of the new accelerator facility FAIR with international participation. The start of the FAIR project marked the beginning of a new era for GSI.

FAIR will deliver beams of antiprotons and ions with so far unparalleled intensities. Scientists from all over the world expect new insights into the building blocks of matter and the evolution of the universe, from the big bang till today. About 3,000 scientists from more than 50 countries are already working on the planning and implementation of the scientific program and the experiment facilities.

Recent developments of FAIR project:

- 450 crystals with in-kind value of 400,000 Euro for NUSTAR delivered and successfully tested
- Dipole magnets with integrated vacuum chambers for high energy beam transfer prepared for storage
- Testing facility for magnets of the FAIR Super Fragment Separator is ready to use at CERN

Construction works of GSI buildings at the beginning of the 1970s: In the foreground the experimental halls are being built, in the background facilities for the UNILAC accelerator (Photo: A. Zschau, GSI)

More information

Milestones of GSI History

1969: Foundation of Gesellschaft für Schwerionenforschung mbH

1970: Membership in the Arbeitsgemeinschaft der Großforschungseinrichtungen (AGF) (now the Helmholtz Association)

1975: First experiments with linear accelerator UNILAC

1981 until 2010: Discovery of six new chemical elements and their official recognition by IUPAC in the Periodic Table of the Elements: Bohrium, Hassium, Meitnerium, Darmstadtium, Roentgenium, Copernicium

1990: Commissioning of the ring accelerator SIS-18 and the storage ring ESR

1997: First patient treatment with carbon ions at GSI therapy facility

2003: Federal Ministry of Education and Research gives green light for the implementation of the new accelerator facility FAIR with international participation

2007: FAIR Start Event – official start of the project, FAIR partner-countries sign joint communiqué

2008: Commissioning of the PHELIX laser system

2008: Renaming into GSI Helmholtzzentrum für Schwerionenforschung GmbH (GSI Helmholtz Center for Heavy Ion Research)

2009: Opening of the Heidelberg Ion-Beam Therapy Center

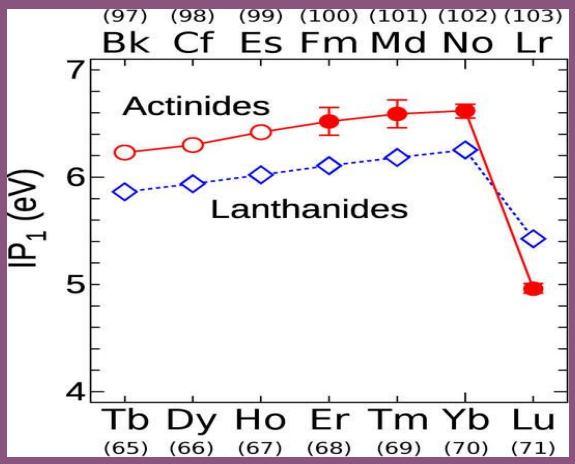
2010: Foundation of FAIR GmbH, GSI holds a share of 75 percent

Highlights of recent research developments

❖ Order in the periodic table: Measurement of ionization potentials of heavy elements confirms that actinide series ends with lawrencium

An international group of researchers including participants from GSI Helmholtzzentrum für Schwerionenforschung in Darmstadt and its two branches, the Helmholtz Institutes Mainz and Jena, have determined the first ionization potentials of the artificially created elements fermium, mendelevium, nobelium, and lawrencium. The data unambiguously show that the actinide series ends with lawrencium.

More information



Ionization potentials of lantanides and actinides. Clearly visible in the actinides is the increase of the energy up to nobelium, and afterwards the drop at lawrencium, in analogy to the lantanides.
(Photo: published by GSI with a permission from the American Chemical Society)

❖ Research on tumor therapy with oxygen ions: GSI doctoral candidate is honored

Clinical and radiobiological studies for tumor therapy with heavy ions began at GSI over 20 years ago. Today the objective of such research at GSI and FAIR is to continue improving this successful therapy and to use it in increasingly customized ways in medical applications. Dr. Olga Sokol is a scientist at the Biophysics Department at GSI. A focus of her research is the use of oxygen ions in tumor treatment, for which she was recently honored with the Giersch Award for outstanding doctoral dissertations in 2018. More information

Treatment place at GSI and FAIR (Photo: G. Otto,GSI)

❖ Open research platform as a goal: GSI and FAIR awarded EU funding

To create a European science cloud, allowing universal access to research data through a single online platform is the aim of the European Open Science Cloud (EOSC) initiative launched by the EU member states. The EU project ESCAPE has now received a grant. ESCAPE (European Science Cluster of Astronomy & Particle physics ESFRI research infrastructures) aims to address the common Open Science challenges in astronomy and particle physics research domains. FAIR and GSI are playing a decisive role in this comprehensive project.

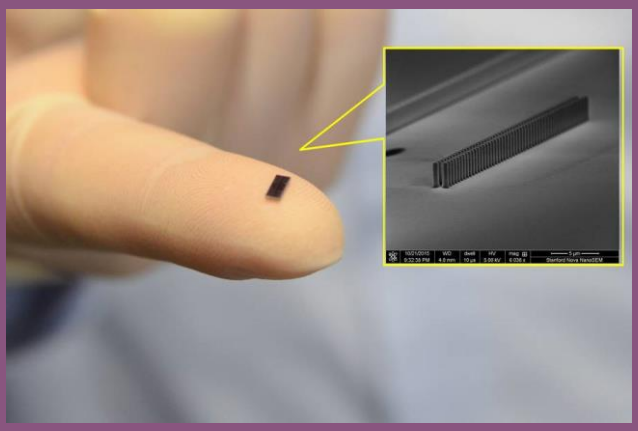
More information

View inside a corridor of the Green IT Cube filled with computer racks on GSI and FAIR campus. (Photo: G. Otto,GSI)

❖ Alternative concept for particle acceleration

Led by the GSI scientist Prof. Dr. Oliver Boine-Frankenheim, the accelerator physics group at the TU Darmstadt aims to use computer-aided models to optimize the operation of accelerators at the highest beam intensities, such as in the FAIR facility. In addition, future concepts for particle accelerators will be developed. The Boine-Frankenheim group has now developed a concept for a laser-driven electron accelerator, which is so small that it could be produced on a silicon chip. It would be inexpensive and with multiple applications.

More information



Accelerator chip on the tip of a finger, and an electron microscope image of the chip. Photo: Hagen Schmidt / Andrew Ceballos

❖ Cryogenic testing of magnet units: Contracts signed in Dubna

Further important steps towards the completion of the unique superconducting magnets for the future accelerator center FAIR have been taken during the visit of a delegation from GSI and FAIR to Dubna, Russia. In order to guide the particles in a precise beam at close to light speed, FAIR requires hundreds of magnets and complete magnet systems, some of them custom-made. These systems also include a series of superconducting quadrupole units for the large ring accelerator SIS100. Russia is constructing these units as an in-kind contribution to the FAIR project. The contract for a comprehensive test program for this magnet series was signed recently at the Joint Institute for Nuclear Research (JINR).

More information

The contract signing ceremony. In the photo in front the Technical Director of GSI and FAIR, Jörg Blaurock (left), and Victor Matveev, Director of JINR.
Photo: Igor Lapenko, JINR

THE INTERVIEW

Dr. Tobias Engert,
Head of Technology Transfer at GSI
and Chairman of HEPTech

Dr. Engert, what is your vision about HEPTech in a two-year perspective?

In two years I would like to see HEPTech as an established and structured international Technology Transfer Network for high-energy physics.
HEPTech should be a platform to enable the members to communicate and to exchange their experience in the HEP community. Also, the clustering of the members' interests and needs, and their technology topics should enhance the transfer possibilities for each of them.

What are the first steps to be taken in this direction?

The first steps in this direction will be to focus on the key tasks of our network. We want to create a common mission together with all the members and to establish tools to improve the mutual exchange in the community. Furthermore, we focus on the communication and collaboration between other research, technology transfer and industry networks. We also want to show how important and useful HEPTech is as an association

What challenges do you anticipate?

The main challenges will be to cluster the different interests and needs of the individual members.

Even we all belong to the HEP community, the universities and institutions inside HEPTech are often very different in their structure, focus, priorities and background.

How are you going to deal with them?

By integrating all members in the establishment of the new mission, structures and tools and enabling the HEPTech network to be flexibly adapted to the needs of the members in the future.

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HEPTech upcoming events

- HEPTech Preparatory Meeting , *21 March 2019, 9.30-17.00* , GSI, Darmstadt, Germany
- Board Meeting, 27-28 June 2019, GSI, Darmstadt, Germany
- European Cryogenics Days, 7-8 October 2019, Lund, Sweden
- Board Meeting, 26-27 November 2019, GSI, Darmstadt, Germany