NEWSLETTER

Issue 3, October 2016

Dear HEPTech members,

In this third edition, STFC, NCSR-Demokritos and INFN feature recent and promising technology developments and new activities around their laboratories.

In the in-focus, B. Dobrev highlights the strategic interplay between the Scientific Research Centre and the TTO of Sofia University.

Beside the upcoming Steering Committee and Board meeting, three important AIMEs will provide unique opportunities for TTOs to meet high-tech industry and get familiar with new developments that can be of use to our community. GSI is hosting the AIME on nanotechnology for high-energy physics, then we have the AIME within the IEEE NSS/MIC conference in Strasbourg, and CIEMAT is going to welcome the participants in an event dedicated to superconductivity in accelerators for medical applications.

Enjoy the reading,

Jean-Marie Le Goff
Chairman of HEPTech

Around the members

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Science & Technology Facilities Council

The HEXITEC detector: closing the circle from innovation to market

The STFC Innovations team has been working closely with the STFC detector group to realize the commercial potential of HEXITEC – a fully spectroscopic hard X-ray imaging detector developed at STFC. The internal STFC proof of concept fund helped the group turn the experimental version into a HEXITEC Gig-E module suitable for early sales to academic collaborators. Following that, the Innovations team negotiated a license deal to Quantum Detectors Ltd, (an STFC spin-out company, http://quantumdetectors.com/hexitec/) to address sales in the synchrotron market. In addition application development and routes to other markets are also being actively explored.

Dr. Paul Seller will be presenting on HEXITEC at the HEPTech AIME Forum at 2016 IEEE NSS/MIC.

The HEXITEC detector measures the energy and position of every incident photon in the 4-200keV range. Each one of the 80 x 80 pixels provides a full energy spectrum with an average energy resolution of 800eV FWHM at 60keV. It is a self-contained module that only requires a mains power supply and connection to a PC or Laptop. It can be supplied with a user friendly GUI to operate the detector and provide calibrated spectra per pixel or industry standard Gig-E- Vision APIs for users to integrate into their own systems.
(Photo: Quantum Detectors)

STFC CERN Business Incubation Centre celebrated its first graduate company

The first graduate of the UK CERN BIC Programme, Oxford nanoSystems (OnS), joined the CERN BIC programme based at Harwell in January 2015.

OnS's mission is to be a leading provider of heat-transfer coating solutions into large-scale transportation, HVAC/refrigeration, energy and industrial, as well as electronics businesses. To this end, they have developed coatings which improve the physical effect of boiling heat transfer. Surface modification by physical means is known to improve heat transfer and the company came up with a nanostructured coating which could give superior results and be formed in confined spaces. The coating improves heat-transfer rates by more than 4 times and reduces the energy needed to initiate boiling from 15 to 2°C, which allows a greater proportion of the energy to be utilised. This 3-4 times increase in heat transfer coefficient could allow a customer to use a heat exchanger half the usual size at approximately half the cost.

Dr. Alexander Reip, CEO of Oxford nanoSystems, said: "Having access to CERN staff and facilities through the CERN BIC grant allowed us to increase our ability to examine how our coatings work in a system. These kinds of measurements are hard for a small company to get hold of easily, so having this access was a great help." (http://www.stfc-cern-bic.org.uk/45686.aspx)

An STFC spin-out makes a breakthrough in spectroscopy

STFC spin-out, Keit Spectrometers (http://keit.co.uk/), recently completed a £1.4m equity funding round. Keit have designed a rugged Fourier Transform Infrared (FTIR) spectrometer for harsh manufacturing environments. It is compact, lighter and more rugged than the standard systems. The round was led by Longwall Ventures, with participation from the Angel CoFund, Rainbow Seed Fund, Wren Capital, and various angel investors.

The rugged FTIR instrument was originally designed by Dr. Hugh Mortimer, in STFC RAL Space, for space applications, where the ability to perform in extreme environments with minimal maintenance and high vibration tolerance is paramount. Keit are now demonstrating the practical benefits of the instrument for better control of industrial processes for real-time chemical reaction analysis of liquids and slurries.

New ESA lab for advanced manufacturing techniques and materials at STFC

In July 2016, a new laboratory of the European Space Agency for advanced manufacturing techniques and materials was inaugurated (http://www.stfc.ac.uk/news/stfc-hosts-new-esa-lab/).

The Advanced Manufacturing Laboratory is hosted by the STFC Rutherford Appleton Laboratory on the Harwell campus, directly adjacent to ESA's UK facility. Its key aim is to exploit the expertise and world-leading facilities that are on the Harwell campus, to assess new material processes, joining techniques and 3D printing technologies for application in space. It is an example of the collaborations that develop in the space cluster on the Harwell campus.

3D printing is a key focus of the laboratory, involving parts being built up layer by layer rather than being machined away from bulk material. The print material is typically a powder or wire feedstock that is melted using a laser or electron beam source.
Harwell will be looking at aspects such as the physical process parameters, the impact of powder feedstock and the design procedures used in order to assess the effect of 3D printing techniques upon the quality of manufactured parts. ***ESA-RAL Advanced Manufacturing Lab (Photo: ESA)***

DEMOKRITOS
NATIONAL CENTER FOR SCIENTIFIC RESEARCH

Technology transfer at the 4th Hellenic Forum for Science, Technology and Innovation

The 4th Hellenic Forum for Science, Technology and Innovation took place at the National Center for Scientific Research ”Demokritos”, in Athens, from 11th to 15th July 2016.

The Hellenic Forum is an important part of the Metropolitan Innovation Hub, a cluster initiative aiming at the establishment of a virtual technopolis among the local industry and the Greek research centres. Sixteen multidisciplinary workshops with a broad range of topics around nanotechnology, energy & environment, life sciences and ICT were organized within the framework of the forum. It was attended by more than 600 delegates and more than 100 distinguished speakers from around the world made presentations.

In the framework of the ICT, a dedicated workshop on technology transfer titled “It’s the bits that make the business”, was held on 11th July. It was organized and chaired by Michele Barone, the representative of the “Demokritos” node in HEPTech. He made the welcome and overview of the session and introduced the very distinguished speakers. Among them were Dr. Kostantinos Abatzis, Director of applications and grants at the Hellenic Industrial Property Organization. His talk focused on the protection of the research results with patents and emphasized on how to protect the inventions, and on the cost of patent application in Greece and abroad.

Ian Tracey, Secretary General of HEPTech, gave two talks exploring the journey of commercializing ideas from the beginning to the end. He reviewed the different types of intellectual property that can be used in protecting the ideas and the common mistakes that are made. Some examples were given, stressing upon the key issue of maintaining the balance between protection and sharing.

Dr. Jean-Marie Le Goff, Chairman of HEPTech, presented a case study based on collaboration spotting, which is an interactive visual graph navigation toolset for multidimensional data in visual analytics. Visual analytics is the science of analytics reasoning facilitated by interactive visual interface, offering an excellent environment to tackle complex problems related to big data.

The technology transfer workshop brought together 60 participants from academia and industry. The large number of questions and remarks demonstrated the high interest in the topics discussed. That, coupled to the high quality of the talks and enthusiasm of the participants, was a proof of a great success.

Special thanks should be given to the speakers and in particular to Ian and Jean-Marie, who took part in the forum for the third time.

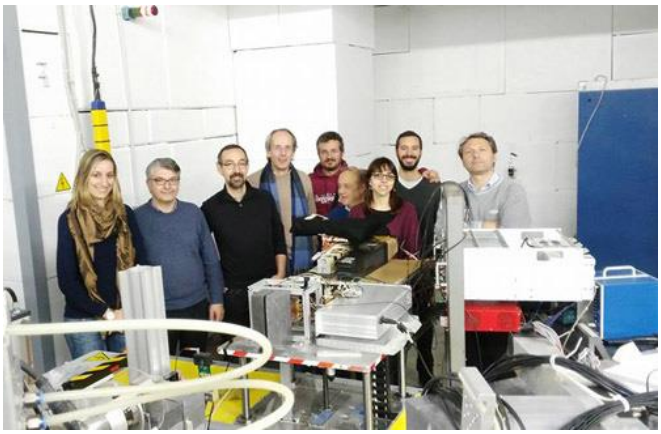
**The lectures delivered at the forum have been recorded by the Bodosakis Foundation and are available at: http://www.blod.gr*

PADME: In search of the dark photon

INFN recently gave the green light to PADME (Positron Annihilation into Dark Matter Experiment), that represents one of the most important results of What Next, the scientific review programme promoted in the INFN community to identify the most promising experiments and research fields on which to focus in the near future. PADME is dedicated to the search for the dark photon, a hypothetical particle similar to the electromagnetic wave photon but with a small mass, predicted by a number of recent theoretical models that describe dark matter. The experiment will be a result of an international collaboration already involving researchers from the MTA Atomki institute in Debrecen, Hungary, and from Sofia University, Bulgaria.

The study of dark matter is one of the most fascinating frontiers of fundamental physics research. It is estimated that this unknown matter represents approx. 80% of all matter in the universe and 27% of the universe as a whole. Physicists understand neither what it is made of nor why. Despite being so abundant at the cosmic level, its direct interactions with our ordinary matter have not been detected yet. The only certainty about its nature is that dark matter is made of something different from the particles that make up ordinary matter, such as protons, neutrons or electrons. One hypothesis, on which the PADME experiment is based, is that dark matter is sensitive to a new type of force different from the four fundamental forces already known i.e. gravitational, electromagnetic, strong nuclear and weak nuclear forces. This new force, as for the other four, is associated with a "messenger", in this case a photon, with properties similar to the ordinary photon but having a small mass. Physicists have called this hypothetical "messenger" the "dark photon". Due to its mass and its abundance in the universe, the dark photon could represent all or most of the dark matter. PADME could reveal for the first time the existence of this new force, using a small but extremely accurate measurement device, able to observe the production of dark photons in collisions of electrons and anti-electrons (positrons).

The PADME research team (Photo: INFN)



The experiment will enter into operation in the INFN Frascati National Laboratories (LNF) in a new experimental room of the linear accelerator test structure, the Beam Test Facility (BTF), and will be built around a calorimeter consisting of approx. 600 inorganic scintillating crystals. The positrons, coming from the accelerator, will reach a diamond target and, interacting with the atomic electrons, could produce dark photons together with a visible photon. In order to function, the experiment needs a

magnetic field developed by a reserve magnet created at CERN and sent to the LNF to be used in the PADME experiment. The PADME calorimeter will provide an accurate measurement of the characteristics of the visible photon from which it is possible to extract valuable information on the existence and mass of the dark photon. (http://home.infn.it/newsletter-eu/newsletter-infn-eu-26.html)

Midnight Blue: Cloud software for research

INDIGO–DataCloud, (https://owncloud.indigo-datacloud.eu/index.php/s/AawfpkB8ukBXnas), the project funded within the scope of the European Horizon 2020 programme of the European Commission and coordinated at European level by the National Institute for Nuclear Physics (INFN), in mid-August reached an important milestone: the release of the first version of cloud software platform for scientific research. Called Midnight Blue, the platform is open source, flexible, free-of-charge, and capable of operating on both public and private cloud infrastructures.

(Photo: INFN)

The ultimate goal of the project is to provide the European scientific community with tools for more effective and efficient research. The platform is able to respond simultaneously to calculation, processing and data storage needs of researchers from different scientific domains, without the need of rewriting the software from scratch every time. This is made possible through the common use of advanced functionalities provided by the INDIGO platform. Twenty-six public and private partners from eleven European countries participate in the 11 million Euros project. The release of the second version of the software is expected in the spring of 2017.

In focus

Scientific Research Centre with a TTO at Sofia University, Bulgaria

At HEPTech, Sofia University “St. Kliment Ohridski” is represented by the Scientific Research Centre (SRC) with a Technology Transfer Office (TTO).

Annually, the Scientific Research Centre (http://nis-su.eu/) administrates over 300 project contracts with a total value of about 10 Mio BGN. Projects are funded on a contract basis by the National Research Fund (30%), EC programmes (25%) and by industry. Over 500 researchers from the academic staff of Sofia University take part in these activities.

The Faculty of Biology (in the picture) hosts the SRC. ***(Photo: Faculty of Biology)***

The main functions of the SRC are to provide administrative and financial services to projects, including financial management and reporting; to support project proposal development; to distribute information about funding opportunities and events; to support technology transfer and consult the researchers on intellectual property protection; to organize training in commercialization of research results; to maintain web sites and data bases about projects and results; to produce information and promotional materials; and to serve as a National Industry Liaison Office of CERN.

Established in 2007 under a PHARE Project, since 2009 the Technology Transfer Office (http://tto.bg/) is a structure of the Scientific Research Centre of Sofia University. It acts as an interface between research and industry supporting the transfer of scientific knowledge and technology, stimulating establishment of spin-offs and development of innovation and entrepreneurial spirit among the researchers. The Faculty of Chemistry and Pharmacy (in the picture) hosts the TTO. ***(Photo: Faculty of Chemistry and Pharmacy)***

In the last four years of its operation, the Technology Transfer Office has filed three patent applications and realized technology transfer in the field of green technologies, e-learning and waste treatment. This year, three more contracts have been signed for transfer of the outcomes of a successfully completed European project.

In the last 10 years, the Scientific Research Centre and the TTO of Sofia University have been inextricably linked with the European Day of the Entrepreneur (EDE) – an initiative with strong traditions in the European Union. This event was organised for the first time in the framework of the PAXIS Network (Pilot Action of Excellence on Innovative Start-ups) and aimed at dissemination of best models for establishing new technology-based companies. This November, the forum takes place in Bulgaria for the 14th consecutive year and is organised by the Scientific Research Centre and the TTO of Sofia University. It will bring together young entrepreneurs, who are going to present their success stories and lessons learnt, and representatives of financial institutions and potential investors. The event is supported by the Representation of the European Commission in Bulgaria and by the Ministry of Economy.

The interview

Bojil Dobrev

Director of the Scientific Research Centre and Acting Head of the TTO at Sofia University

Why is the TTO at Sofia University part of the Scientific Research Centre?

This unique approach is an opportunity to better link the research and commercialization at Sofia University and to make the administration more efficient by providing support and/or services to both types of activities.
Furthermore, it is easier to provide training in commercialization and IP consulting for the researchers.
Last but not least, the Scientific Research Centre participates in many international projects which is a chance for the TTO staff to get involved in them as well.

How do you see the role of the TTO at Sofia University in the future?

In line with the newly elaborated commercialization strategy of Sofia University, the role of the TTO will be more significant as it is the structure that will continuously study the innovation demand of industry and will have to focus more on the marketing of research results both in natural sciences and humanities.

Since 2008, the TTO at Sofia University has been a member of the HEPTech network. What are the benefits of this networking so far?

The benefits of our HEPTech membership cover several aspects.
In the production of the IP regulations of Sofia University we have implemented a lot from the IP guidelines elaborated by the network. We also benefit from the good practice shared at the various workshops organized by HEPTech - in the field of marketing, licensing, and spin-offs. Through the TTO, the HEP research group at the Faculty of Physics regularly receives information about the HEPTech events and their follow-up.

HEPTech upcoming events

- Steering Committee - October 27th at CERN with VideoConference
- AIME on Nanotech for HEP - October 20th-21st, at GSI, Darmstadt, Germany.
- AIME within the IEEE NSS/MIC - November 1st, Strasbourg, France.
- AIME on Superconductivity in Accelerators for Medical Applications - November 24th-25th, at CIEMAT, Madrid, Spain
- HEPTech Board Meeting, December 9th at CERN

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