NEWSLETTER

Issue 14, May 2019

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A unique Big Data Centre of Excellence at Sofia University

A unique Centre of Excellence (CoE) will be established in Bulgaria as a partnership between Sofia University, Chalmers University of Technology and Chalmers Industriteknik, Sweden. It will be institutionalized by Big Data for Smart Society (GATE) project funded by Horizon 2020 WIDESPREAD-01-2018-2019 Teaming Phase 2 and Bulgarian Government.

The GATE CoE will act as a globally competitive ecosystem for conducting basic and applied interdisciplinary research and innovation in the Big Data areas with high social impact, by translating the scientific knowledge into new governmental, scientific, industrial and societal applications.

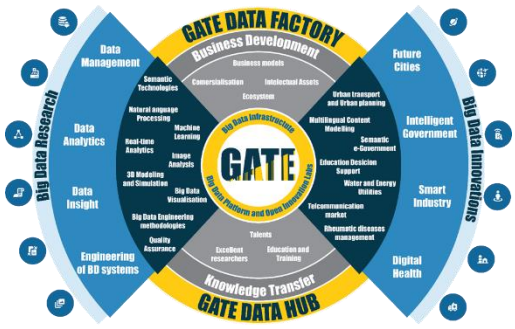
Through excellence in Big Data research, innovation and education GATE will address the recent surge in Big Data in Bulgaria and Western Balkans. GATE will play a strategic role in expanding the impact of the network of European Big Data CoEs and disseminating the best practices and innovative models to the widening countries, thus creating a great impact not only at national and regional but also at European level.

GATE research and innovation is organized in four Strategic Application Themes - Future Cities, Intelligent Government, Smart Industry and Digital Health, which are outlined by the Bulgarian Smart Specialization Strategy and selected by the project team as especially promising sectors with at most societal impact.

Apart from new scientific methods and algorithms and domain specific data models, GATE will provide a unique collaborative environment for experimentation, test-bedding, research and innovation. New value-added services will be offered through Data Hub and Data Factory, creating Data Culture within the society. The CoE will deliver economic and societal benefits through fostering closer collaboration between academia, government and industry, thus helping Bulgarian organisations in various sectors to become and remain competitive.

More information www.gate-coe.eu

GATE Concept



A model of TT – from a CERN technology to a UK start-up

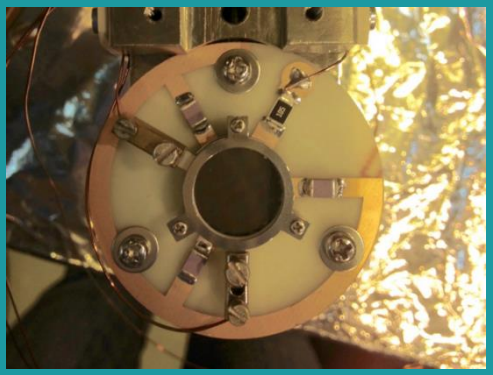
Carbon dating is the 'gold standard' technique applied by archaeologists worldwide to date objects made from organic materials from over the past 50,000 years. It is based on the measurement of a specific isotope of carbon – Carbon 14 (14C). Produced in the upper atmosphere, 14C is taken in by plants through photosynthesis, which are then consumed by organisms on the planet. So every living thing has 14C in them. Once it dies, the 14C decreases through a pattern of decay, and it is by measuring the time taken for the 14C to decay, using laser and accelerator technologies, that archaeologists are able to date materials with accuracy.

Now, the UK start-up Artemis Analytical, a spin out of the University of Manchester, is about to change all that, developing technology from the heart of CERN to reduce the waiting time and cost of carbon dating, with results in days rather than months. The company is gearing up to take its technology to the next stage at the STFC CERN Business Incubation Centre at Daresbury Laboratory, designed to support start-ups looking to apply technologies developed through high energy physics research to develop new products and services.

Artemis Analytical's pioneering new technology is based on ultra-sensitive laser spectroscopy techniques developed at CERN's ISOLDE facility, capable of detecting isotopes that are only produced in supernovae explosions. At the STFC CERN BIC, located at Sci-Tech Daresbury, in the Liverpool city Region, the company will now work towards finalising its prototype of an enhanced-sensitivity mass spectrometer designed specifically for the rapid detection of 14C from environmental samples and ancient artefacts. The mission is to provide a quick and cost effective carbon dating analysis service for archaeologists, and eventually to commercialise a compact, rapid results spectrometer.

More information (Article originally published at the Science and Technology Facilities Council)

Artemis Analytical's technology is based on ultra-sensitive laser spectroscopy techniques developed at CERN's ISOLDE facility (Credit: CERN)



ELI-ALPS – one more step ahead

The installation of the new 1 kHz single cycle laser system SYLOS 2A of the laser research facility of Szeged has been completed.

Earlier in May, ELI-HU Non-Profit Ltd. held a ceremonial inauguration event in Szeged to celebrate the handover of the SYLOS 2A laser system. Designed by the Lithuanian companies EKSPLA and Light Conversion and developed in collaboration with ELI-ALPS personnel in two phases, the laser system amounts in total of 4.9 million euros.

The SYLOS laser system, emitting pulses with durations of a few femtosecond at 1 kHz repetition frequency, has been developed in two project phases to become one of the main laser sources of ELI-ALPS with the participation of a Lithuanian consortium and Hungarian scientists. The laser will drive four of the 12 beamlines of ELI-ALPS; namely two gas-based and one solid surface based plasma generation stations for coherent soft x-ray sources and associated detection stages, while an additional source for high peak intensity electron pulses. By driving these exceptional secondary sources, the state-of-the-art laser system opens the way for the investigations of nonlinear extreme ultraviolet and x-ray processes, four-dimensional imaging, as well as various industrial, biological and medical applications. Beyond fundamental research, this laser system will be utilized in the project aiming the reduction of the radioactive radiation of used nuclear fuel by a laser-related transmutation method, based on the idea and with the cooperation of the Nobel laureate Gerard Mourou and his coworkers.

The main objective of ELI-ALPS (Extreme Light Infrastructure Attosecond Light Pulse Source) project is to create a unique European research center, providing the international research community with laser pulses and further sources based on them. This facility is expected to lead to outstanding results not only in the field of ultrafast physical processes but also in biological, medical and materials sciences.

More information

(Photo: Ell-ALPS)

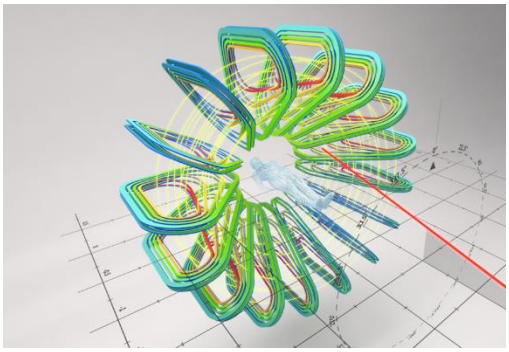
Innovative cancer treatment using CERN magnet technology

Hadron therapy is an advanced radiotherapy technique using proton or ion beams to deliver precision treatment of tumours, sparing the surrounding healthy tissues from unwanted radiation. The intrinsic precision of this technique makes it particularly suitable for treating tumours in children or close to organs at risk. Furthermore, using rotating gantries to move the beam around the patient, medical doctors can irradiate the tumours from different angles, sparing even more of the surrounding tissue.

Gantries are complex pieces of engineering, representing a considerable part of the installation costs and size, or footprint, in hadron therapy. Particularly for carbon ions, there are only two gantries in the world. The first one is at the Heidelberg Ion-Beam Therapy Center in Germany, measuring 25 metres in length and weighing more than 600 tonnes. The second one, in Chiba, Japan, is a superconducting gantry with a reduced size and weight, but with the added challenge of a rotating cryogenic system. While the therapeutic interest for carbon or other ions heavier than protons is increasing, the enormous size of today's gantries, combined with the lack of viable standard technological solutions, poses relevant constraints on future hadron therapy facilities.

Well aware of these challenges, CERN scientist and magnet expert Luca Bottura came up with a new, innovative gantry design based on a toroidal magnet concept, GaToroid, which bends the treatment beam without the need to rotate the structure. The gantry comprises a set of fixed, discrete superconducting coils constituting the toroidal magnet, and a bending device at the entrance of the structure to direct the beam at the right angle. Due to the use of superconductors, GaToroid will substantially reduce weight and footprint compared to conventional gantries, especially for ion beams.

More information



The new compact non-rotating gantry design enables the treatment of tumours from different angles using superconducting toroidal magnets (Image: Daniel Dominguez/CERN)

IN FOCUS

CERN - A New Spin-off Policy to promote CERN Technologies

As part of its knowledge-transfer mission, CERN encourages and supports the creation of companies that seek to build on its technologies and thus make CERN's technological research available to society. In order to clarify how the Organization supports companies established to use CERN technologies (spin-off companies), CERN adopted the CERN Spin-off Policy. It complements the Policy on the Management of Intellectual Property (the CERN IP Policy), adopted in 2010.

The CERN Spin-off Policy summarises the framework of CERN's support to spin-off companies, in terms of technology licensing, financial benefits and the use of CERN's facilities and labels. It also details the Knowledge Transfer (KT) group's role and the possible ways in which CERN personnel can be involved in spin-off companies and, by extension, in other types of commercial activity.

In addition to having access to CERN technology, spin-off companies qualify for technical support as well as access to equipment and infrastructure, subject to the availability of resources and the constraints of CERN's international legal status. Access to the technology is granted through licence agreements that can cover different types of IP, as established by the CERN IP Policy.

These licence agreements detail, for example, the financial terms and conditions, the field-of-use limitations and the commitment to ensure all reasonable efforts are made to bring the technology to market. These are clauses that will typically be discussed in greater detail by the spin-offs' teams and the CERN KT group.

CERN's KT group offers support on this matter, by advising all parties interested in setting up a spin-off company on the terms of CERN's knowledge-transfer policies.

Since CERN provides access to its network of incubators and entrepreneur-minded individuals, the KT group might also be the point of contact for the spin-off companies to the network of Business Incubation Centres (BICs). The network aims at supporting the creation and development of companies in technical fields related to CERN's areas of expertise.

More information

The CERN Spin-off Policy can be consulted here. Please contact kt@cern.ch if you do not work at CERN and are interested in consulting these documents.

The Globe (Photo: CERN)

CERN releases a new Policy on Software Dissemination

Giovanni Anelli,

Head of Knowledge Transfer Group at CERN

CERN is a collaborative environment, where developers from different organisations, institutes, and countries often contribute to various degrees of a given software project. Despite its uniqueness as a fundamental research laboratory, CERN does not differ from industry or academia with respect to software creation. The majority of the laboratory's output is Components Based Software (CBS), and software that does not contain external components is the exception rather than the norm.

Development teams often focus on the desired outcome, employing the component that seems most suitable to satisfy the project's requirements. As a result, code may not always be properly identified and documented. This approach is perfectly valid if the CBS is not to be distributed outside CERN but from a dissemination perspective, it may contribute to complicate the path as the licensing scheme of the different components is not taken into account.

The new software dissemination policy therefore recommends ways of anticipating software dissemination in order to facilitate it.

The possible dissemination paths are greatly influenced by the freedom to choose a licensing model, and fall into four different cases depending on the involvement of external contributors in the development and the usage of external code components.

In order to assess the dissemination potential, every software technology is evaluated on a case-by-case basis, considering the needs and aspirations of the developer's team. The Knowledge Transfer (KT) group is responsible for facilitating the transfer of CERN technology, undertaking a number of concrete actions to promote CERN software technologies, also providing support and expertise to assist in all steps of the dissemination process. Numerous technologies are brought to the attention of CERN's KT group every year, leading to various collaboration agreements and knowledge transfer activities with industry.

In 2017, a licence agreement was signed between CERN and the leading global display manufacturer LG Display, giving them access to controls middleware software from CERN to be used in factory automation across their plants. The software was originally developed by the BE-CO group for the LHC to provide a common software communication infrastructure for the accelerator controls but will now be adapted to its new application by LG-Display with the support of the development team.

The possible disseminations paths for software technologies are many, and if you want to learn more about how KT can support the process you can access all CERN KT policy documents here.

More information

HEPTech upcoming events

- 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