

TECHNOLOGIES THAT CHANGE YOUR LIVES

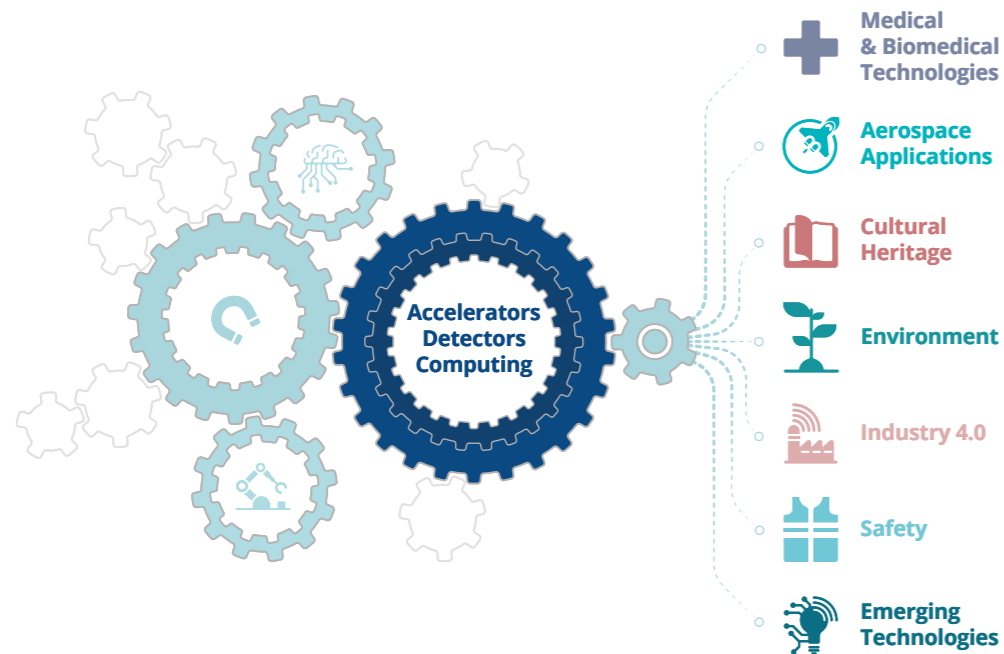


Knowledge Transfer
Accelerating Innovation

FROM CERN KNOWLEDGE TO SOCIETY

CERN is a centre of excellence, performing world-class research in fundamental physics. By uniting engineers, technicians and scientists from all over the world, the Laboratory develops pioneering technology and expertise with the potential of leading to applications in areas beyond particle physics.

An integral part of CERN's knowledge transfer activities is to liaise with different actors in its ecosystem, in order to create opportunities for the transfer of the Organization's technology and know-how. The ultimate goal is to accelerate innovation and maximise the global positive impact of CERN on society.

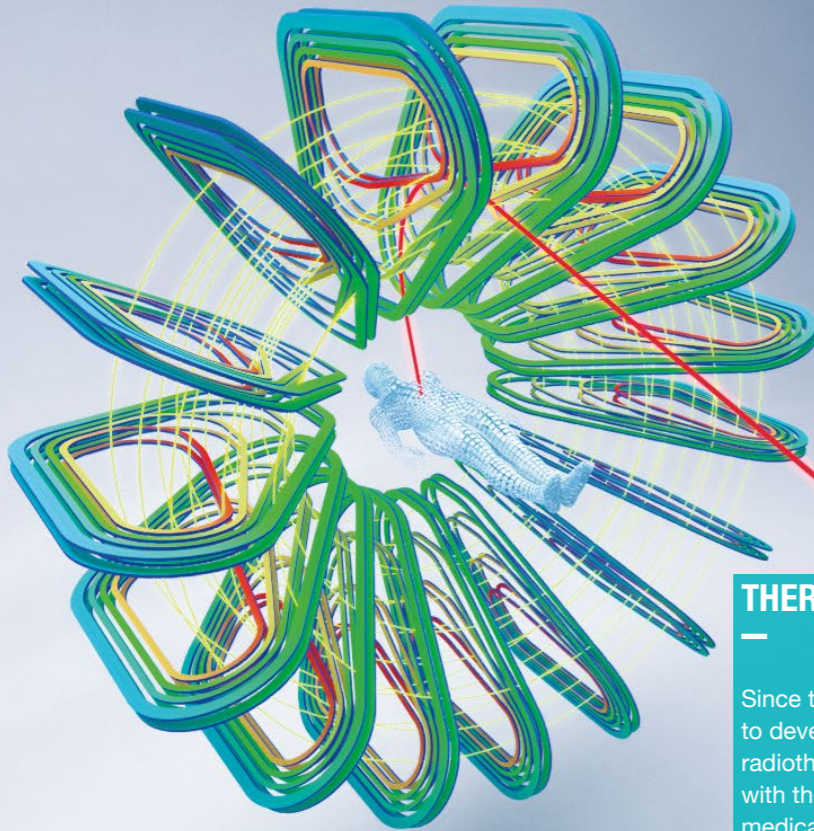


CERN's three pillars of technology are accelerators, detectors and computing. Behind these, lie a great number of areas of expertise: from magnets to sensors, microelectronics, radiation monitoring and many more. These technologies and the human expertise associated with them translate into positive impact across industries beyond CERN.

IMPACT STORIES

NEW TOOLS FOR PRECISION MEDICINE

CERN-MEDICIS (Medical Isotopes Collected from ISOLDE) is a one-of-a-kind infrastructure designed to produce a new generation of non-conventional radioisotopes with potential applications in precision medicine and theranostics. The development of innovative radiopharmaceuticals is in fact strongly connected to the availability of novel types of radioisotopes that are not readily produced by traditional methods. MEDICIS aims to increase the range of radioisotopes available for biomedical research, thanks to its unique set-up that includes an irradiation station on a high-energy proton beam and a radioisotope mass-separation beam-line. Since December 2017, MEDICIS has been providing innovative radioisotopes to biomedical research centres.

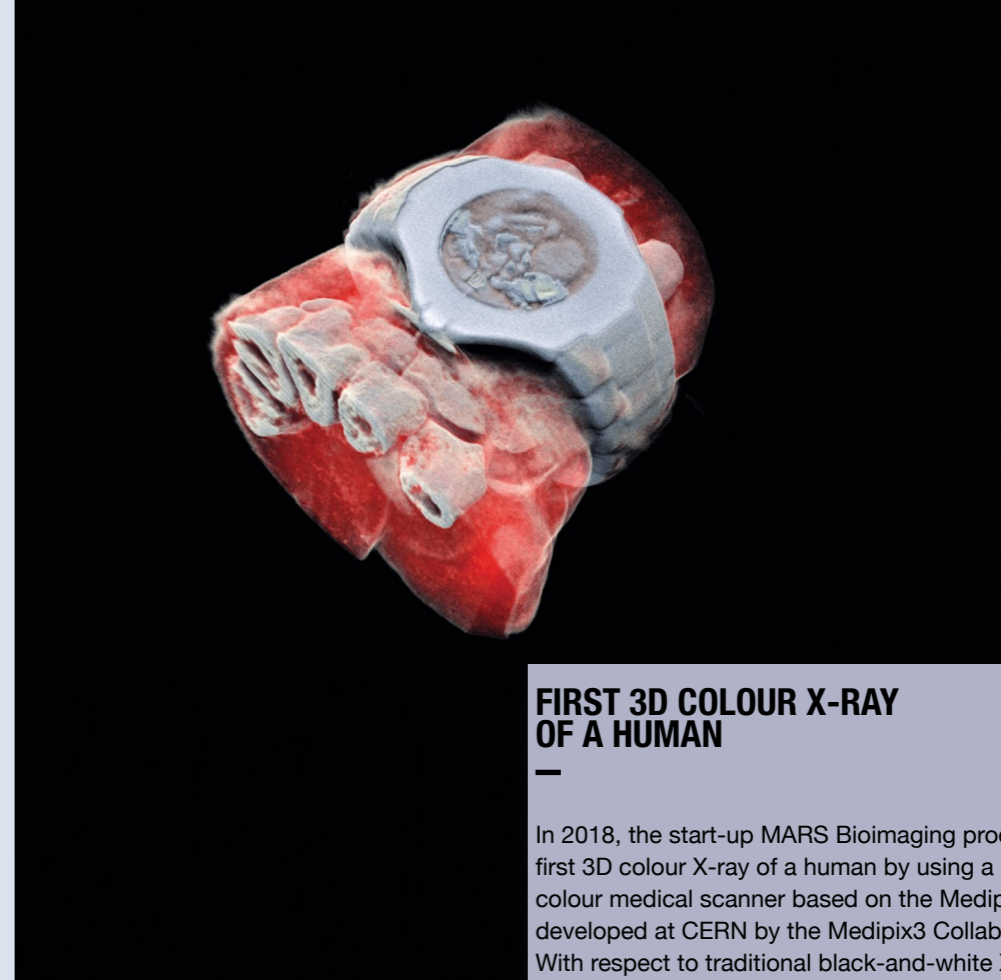


THERAPEUTIC PARTICLES

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Since the 1990s, CERN has applied its core expertise to develop cutting-edge solutions for advanced cancer radiotherapy. The Laboratory has contributed, together with the TERA Foundation and INFN, to the design of the medical accelerator for the ion therapy centre CNAO in Italy, and to the construction of the one for MedAustron in Austria (based on the CNAO design). More recently, CERN has licensed its innovative Radio-Frequency Quadrupole technology to ADAM S.A., which is developing a new generation of linac-based proton therapy systems. CERN is now focusing its efforts on novel technologies and pioneering concepts for next-generation ion therapy machines – from linacs to superconducting magnets, gantry systems, as well as flash radiotherapy.

© MARS Bioimaging



FIRST 3D COLOUR X-RAY OF A HUMAN

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In 2018, the start-up MARS Bioimaging produced the first 3D colour X-ray of a human by using a breakthrough colour medical scanner based on the Medipix3 technology developed at CERN by the Medipix3 Collaboration. With respect to traditional black-and-white X-ray scans, colour X-rays can distinguish parts of the body which have similar density but are made of different materials. With this technology, doctors can access new diagnostic information and will have the opportunity to use next-generation contrast agents to detect cancer.

RADIATION MONITORING IN SPACE

CERN has a lot in common with space missions; both deal with extremely harsh environments that have overlapping technological requirements. Derived from the CERN hosted Medipix2 Collaboration, Timepix is being utilised for radiation monitoring in NASA's Orion vehicle and at the International Space Station.



UNIQUE TESTING FACILITIES

CERN has established partnerships with key institutions in the aerospace community, and provides access to its unique infrastructure and expertise. Irradiation facilities are of particular interest to the community for joint R&D activities, in addition to testing of spacecraft components in space-like environments. CERN's facilities are hosting test campaigns for their partners, most recently through the mixed field irradiation facility CHARM and high-energy electron irradiation facility VESPER. In addition to this, CERN also operates testing facilities for ultra high-energy heavy ions, ultra high-energy protons and high-energy protons/neutrons/gammas.





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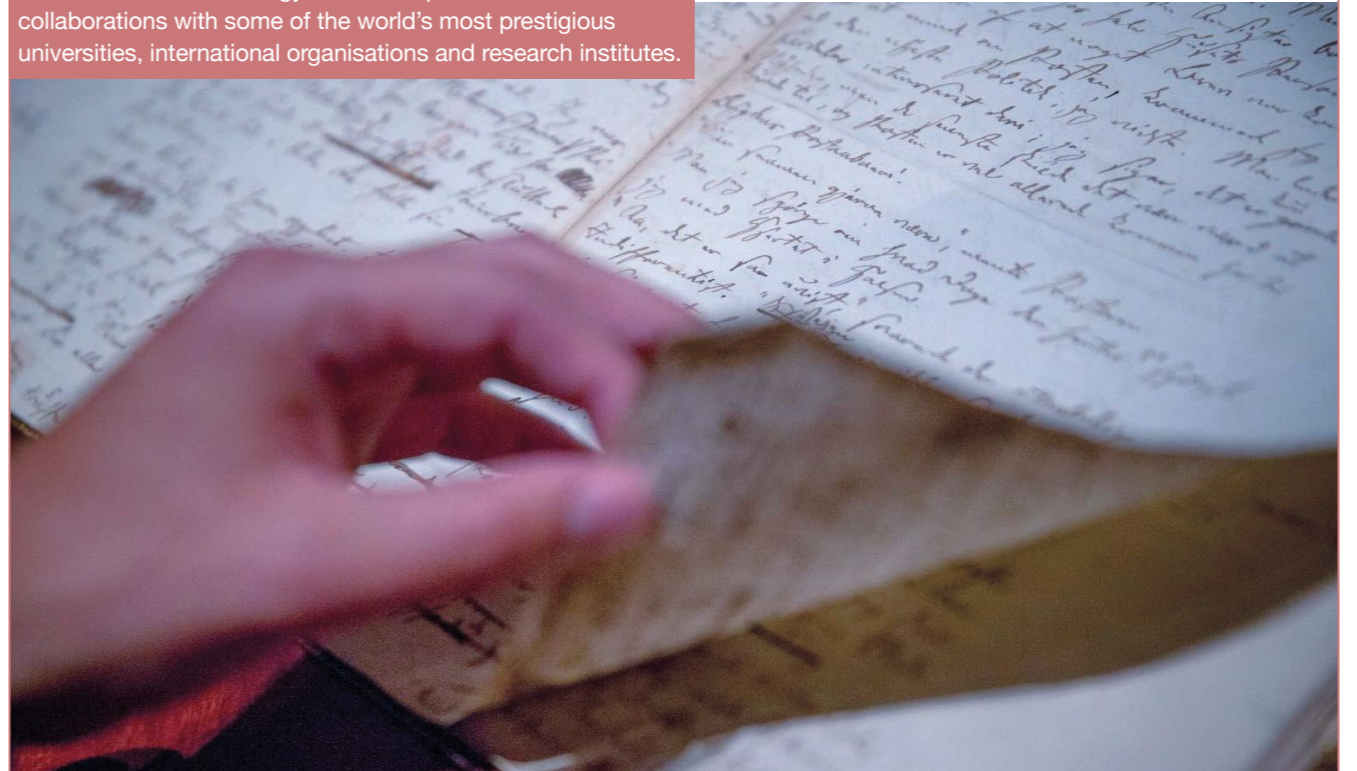
SENSOR TECHNOLOGY IN DRONES

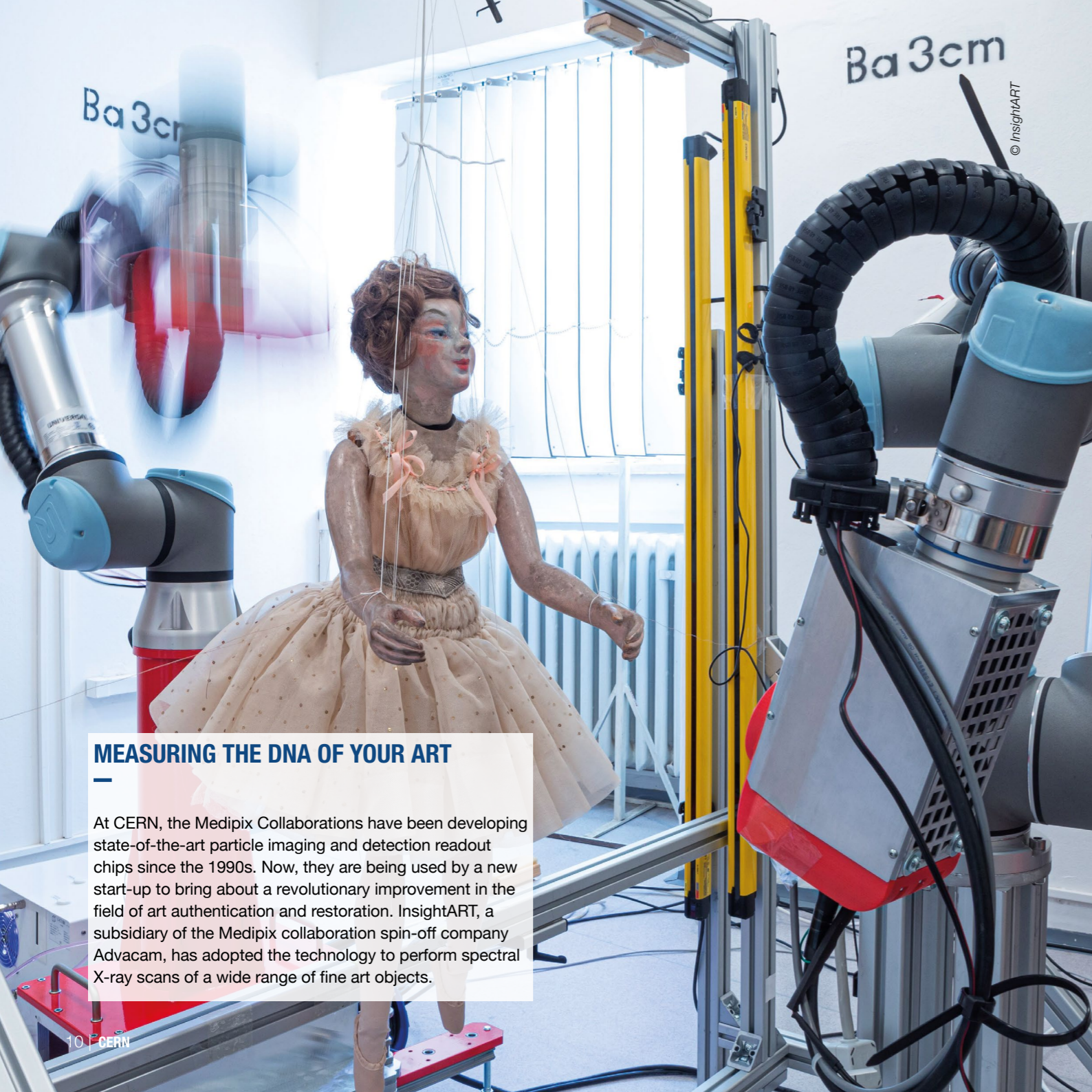
The start-up Terabeec began by providing aerial inspections and imaging services by deploying drones. After a fruitful collaboration with CERN, where sensors were made to ensure the safety of operations in the complex environments of the Large Hadron Collider, their business was expanded to innovative 2D and 3D infrared LED Time-of-Flight sensor development and thermal cameras for many movement monitoring applications such as mobile robotics, industry 4.0 and IoT.

DIGITAL PRESERVATION FOR LIBRARIES

CERN spin-off TIND is providing solutions for library management and data preservation based on the CERN open source software Invenio. Originating from a student programme between CERN and the Norwegian University of Science and Technology, the start-up has established collaborations with some of the world's most prestigious universities, international organisations and research institutes.

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MEASURING THE DNA OF YOUR ART

At CERN, the Medipix Collaborations have been developing state-of-the-art particle imaging and detection readout chips since the 1990s. Now, they are being used by a new start-up to bring about a revolutionary improvement in the field of art authentication and restoration. InsightART, a subsidiary of the Medipix collaboration spin-off company Advacam, has adopted the technology to perform spectral X-ray scans of a wide range of fine art objects.

ACCELERATING INNOVATION

In order to foster innovation, CERN actively invests in a wide variety of activities which can potentially lead to positive societal impact. CERN's Knowledge Transfer group plays an important role in this process, providing advice, support, training, networks and infrastructure to ease the transfer of the Organization's technology

and know-how. These activities are conducted through the group's engagement with different actors of its ecosystem, including industry (large corporations, SMEs and start-ups), the CERN community, and academic partners in high-energy physics and other fields.

HOW TO COLLABORATE WITH CERN



Start a company based on CERN technology or know-how

CERN encourages the creation of spin-off companies, and gives support to CERN personnel and external entrepreneurs wanting to establish a company in one of CERN's Member States.



Service & Consultancy

CERN's expertise and cutting-edge infrastructures represent a unique opportunity for industry and academia in need of a specific high-tech service. CERN experts are available to provide professional advice or specific studies to your business.



Licensing

CERN grants licences to commercial and academic partners for the exploitation of its technologies. All CERN technologies available for licensing can be found at kt.cern/technologies



R&D Collaborations

CERN has a well-established tradition of collaboration with research institutes. R&D projects can be developed in CERN's many areas of expertise. You are invited to contact CERN's Knowledge Transfer group to discuss how to establish an R&D collaboration.

Find out more at kt.cern/collaborate



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