Press Release

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Bilfinger Delivers Magnet System for Experimental Research into Anti-Matter

The Bilfinger subsidiary Bilfinger Noell has delivered a customized, super-conducting magnet system to the European Organization for Nuclear Research (CERN), which intends to use it for its so-called “ALPHA-g” experiment. The magnet will be deployed to perform fundamental physical research into the underlying structure of matter, particularly with the help of large-scale particle accelerators.

Within the record time of one year, the industrial services provider was able to design and plan the magnet, and, having procured all the required components, to construct and successfully test it at CERN at the hyper-frigid temperature of four degrees Kelvin (-269.15 degrees Celsius). “This project is proof positive that we are a reliable partner for research institutes. We are able to quickly understand what they are looking for and consistently align whatever we do with those needs; thanks to our innovative and effective technologies, we provide significant added value,” explained Bilfinger CEO Tom Blades.

What makes the 2.5-ton and 2.8 meter-high superconducting magnet so extraordinary is its functional system, which was developed by Bilfinger in line with the customer’s specific requirements. A conduction-cooling technology, rather than liquid helium, is used to keep the system at its operating temperature of four degrees Kelvin, allowing a magnetic field with a force of one Tesla to be generated. Superconductivity allows the system to be operated in an energy-efficient manner. Thanks to the conduction-cooling method used, the complicated and potentially hazardous use of liquid helium is dispensed with.

On the hunt for anti-matter

We know that if we allow two objects of differing mass to drop in the absence of all friction, they will fall to earth at exactly the same speed due to the force of gravity. What we do not know – since it has never been directly measured by experiment – is whether anti-matter falls with the same speed as normal matter or whether it somehow behaves differently. The Alpha-g experiment permits the scientists at CERN to investigate how gravity affects anti-matter: Using trapped anti-hydrogen atoms, they intend to test, for the first time ever, whether such atoms are attracted or repelled within the earth’s gravity field.

Anti-matter can be described as a sort of mirror image of normal matter: For each particle of matter, there is a corresponding particle of anti-matter. One such example is the positron, which represents the anti-particle of the electron. Anti-matter is created through radioactive decay, for example, or reaches us in the form of cosmic radiation from outer space. It can be put to a variety of uses, e.g. in medicine.

CERN's scientist managed to complete a number of experiments regarding the fundamental symmetry between matter and anti-matter in time before the facility's shut-down for major refurbishment at the end of 2018. CERN is the world's largest center for research into particle physics. Bilfinger's successful ongoing collaboration with CERN dates back to 1990. The industrial services provider also works with other research institutes, such as the Karlsruhe Institute of Technology or the GSI Helmholtzzentrum für Schwerionenforschung (Helmholtz Center for Heavy Ion Research) in Darmstadt.

Bilfinger Noell GmbH, based in Würzburg, is a group company of Bilfinger SE. It offers customized solutions to clients worldwide as well as high-tech specialized engineering services. Bilfinger Noell's palette of services includes the development, planning, delivery, and commissioning of plants and their facilities as well as their operational management. The 270 employees on staff work mainly in the engineering field.

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