Press Release

New sensors for new particles

Globally unique sensor chips from Infineon Technologies Austria and high energy physicists from the Austrian Academy of Sciences are supporting the search for previously undiscovered materials at CERN

Villach, Vienna – April 26, 2016 – Ninety-five percent of the universe is still considered unexplored. Scientists at CERN, the world's largest particle physics research center, located in Geneva, are working on solving these mysteries. In May 2012, researchers there discovered the so-called Higgs Boson, whose prediction won Peter Higgs and François Englert the Nobel prize in physics. One of the things CERN scientists are researching at the moment is dark matter: Although the universe may well have five times the mass of visible matter, this extent can only be indirectly proved. With a bit of luck, CERN will succeed in generating dark matter.

A unique sensor chip can contribute to proving the existence of dark matter: It is eight inches or 15 x 10 cm and was developed jointly by Infineon Austria and the Austrian Academy of Sciences' Institute of High Energy Physics (HEPHY). Tens of thousands of these silicon components could be used at CERN in the near future. They are not only more economical to produce than previous sensors, which measured up to six inches or 10 x 10 cm. The components also stand up better to constant radiation and thus age slower than the previous generation. Planned experiments will scarcely be possible without resistant sensors.

"This cooperation with the Austrian Academy of Sciences' Institute of High Energy Physics is a successful example of how we can incorporate significant Austrian innovations into experimental fundamental research," says Sabine Herlitschka, Chairman of the Board at Infineon Technologies Austria AG. "The use of new particle sensors in top international research to push the boundaries of physics as we know it is even more gratifying".

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“The collaboration with Infineon Technologies Austria is an impressive demonstration of the open approach to application in fundamental research, as implemented at the Austrian Academy of Sciences,” says President of the Austrian Academy of Sciences, Anton Zeilinger. “The mutual exchanging of knowledge and innovation is a criteria for success which offers added value both for research as well as finance, industry and society,” Zeilinger continues.

“Finding answers to the unanswered questions in particle physics enables us to carry out new experiments and constantly develop new technologies to ensure the success of these experiments. That is why collaboration with a high tech company like Infineon is so important,” says Jochen Schieck, Director of the Austrian Academy of Sciences’ Institute of High Energy.

As tall as an apartment building and and 100 meters below ground

The experiments at CERN are analyzing the structure of matter and the interplay among elementary particles: Protons are accelerated almost to the speed of light and then made to collide, giving rise to new particles whose properties can be reconstructed with various detectors.

Two of the detectors for which the use of the Infineon sensors is currently being tested are named ATLAS (A Toroidal Lhc ApparatuS) and CMS (Compact Muon Solenoid). Particle physics experiments are huge cameras: When particles penetrate the silicon detectors, it registers them. With 20 meters (ATLAS) respectively 15 meters (CMS) height both experiments are located 100 meters below ground. They have been in almost round-the-clock operation for years, carrying out 40 million individual experiments each second.
The two sides are currently discussing possible production of chips with a total area of up to 1,000 m².

Future use in medical applications

The technology developed for CERN could help cancer patients in less than ten years: Several groups of researchers are currently testing proton computed tomography. The medical imaging procedure is based on the same fundamentals as the chip technology for CERN. Large silicon detectors like the ones Infineon and HEPHY are developing could supply tomographic images during therapeutic radiation. This would better determine the position of the tumor, allowing less damage to be done to healthy tissue than is possible with conventional X-rays. It would reduce the radiation load by a factor of 40.

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In the research community, Infineon's production of the sensors has already attracted attention: At the presentation of the 2014 Houska Award, Austria's largest private prize for commercially relevant research, the project by Infineon and HEPHY won second place.

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About Infineon Austria
Infineon Technologies Austria AG belongs to the Infineon Technologies AG group, a leading global supplier of semi-conductor solutions which make life easier, safer and more environmentally-friendly. Microelectronics from Infineon reduce the energy consumption of consumer electronics, household appliances and industrial facilities. They play a significant role in improving the comfort, safety and sustainability of vehicles and enable secure transactions in a networked world.

Infineon Austria is the only location alongside Germany to combine expertise in research & development, manufacturing and global business responsibility. Its headquarters is based in Villach with further branches in Graz, Klagenfurt, Linz and Vienna. With approx. 3,500 employees (incl. 1,300 in research & development) from around 60 nations, the company generated a turnover of €1.4 billion during the 2015 fiscal year (end of September). A research rate of 25% makes Infineon Austria one of Austria's most research-intensive companies. Further information at www.infineon.com/austria.

About the Austrian Academy of Sciences
The Austrian Academy of Sciences has the legal duty of "promoting every aspect of science". It was founded in 1847 as a society of scholars and with over 780 members, 28 research institutions and approx. 1,450 employees and today represents innovative fundamental research, interdisciplinary exchanging of expertise and communication of the latest discoveries – with the aim of contributing to scientific and social progress. www.oeaw.ac.at

About HEPHY
The Institute for High Energy Physics (HEPHY) at the Austrian Academy of Sciences (ÖAW) was founded in 1966 and carries out fundamental research into the field of elementary particle physics. By taking part in large-scale international experiments at the at the European Laboratory for Particle Physics (CERN) and the KEK, the National Japanese Research Center, the approx. 70 scientists are seeking to find basic answers to the structure of our world. Research groups also are also exploring the theory of elementary particles and engaging in a direct search for dark matter at the Italian underground laboratory of Gran Sasso. And the institute is involved in studies for future experiments such as the planned International Linear Collider (ILC). The training of students and lively and comprehensible presentation of this complex field of research to the public is another important aspect of the institute's work. www.hephy.at

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