Press Release

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Data Collection Resumes at the Large Hadron Collider

Freiburg physicists receive 6.2 million euros for their work at the research centre for elementary particle physics CERN

Scientists from the Institute of Physics at the University of Freiburg will receive 6.2 million euros in funding from the German Federal Ministry of Education and Research (BMBF) over the coming three years. The funding will serve to finance new research in the ATLAS experiment within the research focus FSP-ATLAS at the European research centre for elementary particle physics CERN in Geneva, Switzerland. ATLAS is a particle detector at the Large Hadron Collider (LHC), the world's most powerful particle accelerator. The Freiburg physicists will receive approximately 16 percent of the BMBF funding for FSP-ATLAS, which pools the research of 15 German universities, the German Electron Synchrotron (DESY), and the Max Planck Institute for Physics in Munich.

Data collection at CERN resumed in early June 2015. Scientists collide protons with the record energy of 13 tera-electronvolts – nearly twice as high as previously – in the 27-kilometer-long LHC. Following the discovery of the Higgs boson in 2012, the researchers are concentrating on new questions: Does the higher energy level unravel previously unknown forms of matter that might point to an explanation for the dark matter in the universe? Does the Higgs boson possess the properties predicted in the standard theory or does it deviate from them? Do further Higgs bosons exist or are there even indications at the LHC for further spatial dimensions, as predicted by several theoretical models?

The main task in the coming three years will be the analysis of the newly collected data. The Freiburg physicists are concentrating on precise measurements of the properties of the Higgs boson and searching for so-called supersymmetric particles, whose existence is predicted in extensions of the standard theory. . In parallel to this work, the scientists focus on the development of improved detector technologies to prepare the ATLAS experiment for future experimental conditions. On the theoretical side, the experimental search will be complemented by precise predictions. The goal of these predictions will be to detect in the measurement data even subtle deviations from the theoretical expectations of the standard theory, potentially caused by new physics. Moreover, the researchers are constructing alternative theoretical models.

The Freiburg particle physicists in the research groups led by Prof. Dr. **Gregor Herten**, Prof. Dr. **Karl Jakobs**, and Prof. Dr. **Markus Schumacher** have been involved in the ATLAS experiment for many years and have played a key role in its conception, design, and operation. In addition, they have made important contributions to data analysis – such as that leading to the discovery of the Higgs boson. Jakobs is serving as spokesperson of FSP-ATLAS since three years. On the theoretical side, Freiburg research groups led by Prof. Dr. **Stefan Dittmaier**, Prof. Dr. **Harald Ita**, and Prof. Dr. **Jochum van der Bij** are making complex high-precision calculations which are essential for the analysis of the data. . Last but not least, more than 30 PhD students and postdocs are contributing significantly to the success of elementary particle physics in Freiburg. Some of the PhD students are receiving funding as members of the German Research Foundation research training group “Mass and Symmetries after the Discovery of the Higgs Particle at the LHC,” established on 1 April 2015.

Further articles on elementary particle physics in Freiburg on the research portal “Surprising Science”:
www.pr.uni-freiburg.de/go/bausteine-der-welt

Information on FSP-ATLAS:
www.fsp101-atlas.de

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