Charles Univesity physicists take part in ATLAS experiment

This year's Nobel Prize for Physics has been awarded to Francois Englert and Peter W. Higgs for their theoretical discovery of a mechanism contributing to our understanding of the origin of the mass of subatomic particles, recently confirmed by the discovery of the predicted fundamental particle during the ATLAS and CMS experiments on the LHC accelerator at CERN.

The experimental confirmation of the existence of the Higgs boson was the discovery of the final part of the so-called Standard Model of the microcosm, requiring the efforts of thousands of scientists. The existence of the boson was proved in two separate experiments, ATLAS and CMS, over the course of last year. The international team of 300 physicists working at the ATLAS detector included more than 60 physicists and students from the Czech Republic. Specialists from the CU Faculty of mathematics and Physics, Czech Academy of Sciences and the Czech Technical University (CTU) were amongst the founding members of the ATLAS experiment, contributing from the start to the design and construction of the detector. The CU team is currently focusing on the operation and modification of part of the ATLAS detector, and chiefly on the analysis of gathered data on proton collisions within the LHC accelerator. Several specialists are directly involved in measuring the properties of the Higgs boson.

"In its simplest form, the BEH theory can, with the introduction of a single new particle, (the so-called Higgs boson) explain the large-scale values of the so-called intermediate bosons W and Z, which were discovered 30 years ago, also at CERN," said the chairman of the Committee for the Cooperation of the Czech Republic with CERN, *docent* RNDr. Rupert Leitner, DrSc. The first reports of the discovery of the unknown boson, which is about 130 times heavier than a proton, were announced by the ATLAS and CMS experiments last July. Particle decay found during the study of proton collisions within the accelerator indicated that the long sought-after Higgs boson may have been found. Further experimental data gathered up till the end of last year proved that other decay processes and properties of the new particle were in line with the anticipated properties of the Higgs boson. "The existence of the Higgs boson has now been proven in two different experiments, ATLAS and CMS, and within each of these through around a thousand decay processes for three different pairs of particles," added *docent* Leitner.

Professor RNDr. Jiří Hořejší called the discovery of the Higgs boson the last milestone on the road to confirming the theories of the so-called Standard Model of weak electrical interactions. "If the boson observed really is the Higgs boson, then it will be the first time that an elementary particle with a spin of 0 has been observed, which is, in itself, remarkable. Secondly, the exchange of the Higgs boson also represents a certain, specific interaction, not identical to any of the four fundamental forces hitherto observed. We could therefore, in this sense, also talk of the discovery of a new 'fifth interaction'", said Professor Hořejší.

"The discovery of the Higgs boson required an enormous effort on the part of many people, and, through the ATLAS experiment, Czech scientists made a worthy contribution to this global effort," said Mgr. Alexander Kupčo from the Institute of Physics of the Czech Academy of Sciences on the project, which has been supported by the Czech Ministry for Education, Youth and Sports since 2004.