

The 5th Dvořák Lecture

By Professor Peter Jenni, University of Freiburg, Germany and CERN, Geneva, Switzerland

The long journey to the Higgs boson and beyond at the LHC

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Institute of Physics of the AS CR, v. v. i., Na Slovance 2, CZ-182 21 Praha 8, Czech Republic

Annotation

Since three years the experiments at the Large Hadron Collider (LHC), in particular ATLAS, investigate particle physics at the highest collision energies ever achieved in a laboratory. Following a rich harvest of results for Standard Model (SM) Physics came in 2012 the first spectacular discovery of a new, heavy particle, most likely the long-awaited Higgs boson. The latest results with the full data set accumulated over the first three-years running period of the LHC will be presented. Other, far-reaching results can already be reported for exploratory new physics searches like Supersymmetry (SUSY) and its implication for Dark Matter in the

Universe, Extra Dimensions, and the production of new heavy particles.

However, with the recent discovery of a new boson the exciting journey into unexplored physics territory, within and beyond the SM, has only just begun at the LHC, in particular also in view of the increased collision energy expected for the next running period starting in 2015. Besides the first results and the future prospects, the talk will also cover briefly the history and the challenges of the whole LHC project, as well as the fruitful collaboration with the Czech groups since the very beginning of this large scientific adventure..



Peter Jenni

Born in 1948, obtained his Diploma for Physics at the University of Bern in 1973 and his Doctorate at the ETHZ in Zürich in 1976. Participated in CERN experiments at the Synchro-Cyclotron (1972/3), at the Proton Synchrotron (1974/6), and, as ETHZ Research Associate, at the Intersecting Storage Rings (1976/7), the first high-energy hadron collider. During 1978/9, he was a Research Associate at SLAC in Stanford, USA. He became a CERN staff in 1980 with the UA2

experiment at the SPS $p\bar{p}$ collider (major involvement in the discoveries of jets and the W/Z bosons). His strong interest was with the Large Hadron Collider (LHC) since the beginning in 1984. Since 1995 up to 2009 he held the post of Spokesperson of the ATLAS experiment, which today comprises some 3000 scientists representing 177 Institutions from 38 countries. He has served on, and still is member of, numerous international science advisory committees. In particular, over the last 18 months he was strongly involved in shaping the scientific input with the Preparatory Group for the Update of the European Strategy for Particle Physics, personally motivated to promote CERN's future at the high energy frontier.

He received, among others, the Swiss Greinacher Prize, the Gold medal of the Comenius University, the Charles University memorial silver medal, the Ernst Mach Honorary Medal, the German Julius Wess Award and in March 2013 a share of a Special Fundamental Physics Prize of the Milner Foundation. After his retirement as a CERN Senior Research Staff in 2013, Peter Jenni has become a Guest Scientist with the Albert-Ludwig-University Freiburg, Germany.



Vladimír Dvořák (1934–2007)

Solid state physicist, the most prominent Czech scientist in the theory of ferroelectricity and structural phase transitions, for the whole productive life affiliated with the Institute of Physics, Acad. Sci. Czech Rep. in Prague, its director in 1993–2001, member of the Learned Society since 1995. The main protagonist of the revolutionary reforms in the Institute of Physics after 1989.

His personality has strongly influenced the scientific program and development in the Department of Dielectrics of the Institute since the late sixties up to present. Brilliant lecturer and most respected director of the Institute.

To commemorate his work and personality, the Institute of Physics of the Academy of Sciences of the Czech Republic decided to organize an annual festive Dvořák lecture, given by prominent internationally renowned scientists in the field related to the research pursued at the Institute of Physics.



Fyzikální ústav
Akademie věd ČR, v. v. i.