

HIGH ENERGY PHYSICS DISCOVERIES  
FROM THE TEVATRON TO THE LHC

Sunday 15 February 2009

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- 13:30 Introduction (05') Joe/Maria
- 13:37 Welcome from FNAL Director (08') Pierre Oddone
- 13:45 Discoveries with the Tevatron Collider at Fermilab (25') [Minutes](#) [Slides](#) ) Jacobo Konigsberg (University of Florida)  
The Tevatron collider at Fermilab has been operating at the energy frontier in particle physics, through proton-antiproton collisions, for nearly 25 years. Scientists are pouring over the very large datasets now available. This talk will present the latest results from measurements and observations made by the CDF and DZero experiments, and will highlight the perspectives for further discovery, including exotic phenomena and the possibility of finding evidence for the elusive Higgs boson.
- 14:17 Closing in on the Higgs particle with Tevatron Data (25') [Slides](#) ) Dmitri Denisov (Fermi National Accelerator Laboratory)  
The Higgs boson is a cornerstone ingredient in the standard model of particles and their forces. It is expected to explain a curious mechanism that kicked in at an early moment in the life of the universe: the W and Z bosons (the carriers of the weak force) became endowed with mass while the photon (the carrier of the electromagnetic force) did not. This talk will present the latest results and future expectations by the CDF and DZero experiments for subatomic processes involving these bosons, including the search for the Higgs boson.
- 14:45 break (10')
- 14:55 The Large Hadron Collider (LHC) (25') [Slides](#) ) Lyn Evans (CERN)  
The Large Hadron Collider (LHC) is the world's largest and highest-energy accelerator and the most ambitious and complex scientific undertaking ever attempted. It was built by the European Organization for Nuclear Research (CERN) in a tunnel 27 kilometres (17 mi) in circumference, as much as 175 metres (570 ft) beneath the Franco-Swiss border near Geneva, Switzerland. The study of the very high energy proton-proton collisions is expected to extend unprecedentedly our understanding of the Universe and point to the solutions of puzzles such as the dark matter of the universe and the origin of matter. The science and technology work towards the first successful circulation of proton beams on September 10 2008 and towards the first high energy collisions in 2009 are detailed in this talk.
- 15:27 The ATLAS experiment at the CERN LHC (25') [Slides](#) ) Marzio Nesi (CERN)  
ATLAS (A Toroidal LHC Apparatus) is one of the particle detector experiments constructed to study the proton-proton collisions that the LHC will produce. ATLAS is 44 metres long and 25 metres in diameter and weighs about 7,000 tonnes. The full ATLAS Experiment has been operational and taking cosmic ray data since September 2008, and is preparing for the high-energy collisions scheduled for late summer 2009. It also acquired and analyzed the so-called "splash events" that occurred as the LHC beams were successfully circulated at the LHC on 10 September 2008. The ATLAS detector will search for new discoveries in the head-on collisions of protons of extraordinarily high energy. ATLAS is expected to provide understanding about the basic forces that have shaped our universe since the beginning of time and that will determine its fate. Among the possible unknowns are the origin of mass, extra dimensions of space, microscopic black holes, and evidence for dark matter candidates in the universe.
- 15:59 The CMS experiment at the CERN LHC (25') [Slides](#) ) Tejinder Virdee (CERN & Imperial College)  
The 12,500-tonne Compact Muon Solenoid experiment (CMS) in Cessy, France, uses key information about particles emerging from high-energy proton collisions in the Large Hadron Collider (LHC) to unearth nature's secrets. CMS's method of construction is original and unique in that "slices" of detector weighing as much as 2000 tonnes were fully constructed and tested with the acquisition and analysis of cosmic ray data on the earth's surface and then lowered 100 metres into the cavern, ready-made. CMS has been fully operational, recording and analyzing large volumes of cosmic ray data as well as the data from the circulation of the the first LHC beams on Sept 10 2008. It intends to make discoveries that will assist in the description and characterization of the composition of the Universe, its beginning, evolution and its intricate works.

Lyn Evans | Project Leader, LHC



Lyn Evans is recognized worldwide as an outstanding expert in particle accelerators. He was elected a Fellow of the American Physical Society "for contributions to the physics of particle accelerators and storage rings, in particular to the development of the understanding of the fundamental limitations of high-energy hadron colliding beam devices." Evans has worked at the forefront of the development of the world's most powerful accelerators for more than 30 years. Since 1994, he has led the design and construction of the Large Hadron Collider at CERN, the European Laboratory for Particle Physics near Geneva, Switzerland. The LHC will advance the energy frontier and allow scientists to search for new physics phenomena such as the Higgs particle, supersymmetric particles and extra dimensions.

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Marzio Nessi | Project Manager, ATLAS



Marzio Nessi is the technical coordinator (project manager) of the ATLAS experiment at the CERN Large Hadron Collider. He earned his Ph.D. in physics from ETH Zurich, Switzerland. As a research staff member at Rice University, he worked on experiments at Brookhaven National Laboratory, at Fermilab and at CERN. Since 1989, he has worked at CERN, where he took part in the running and physics analysis of the UA2 experiment. He joined the ATLAS project at its very beginning and worked on the core effort that led to the design and the scientific and technical proposals for the ATLAS experiment at LHC. He was the spokesman of the RD34 project for ATLAS, and then became project leader of the ATLAS hadron tile calorimeter, which he had conceived. In 1999, he was elected by the ATLAS scientific collaboration as the overall technical coordinator. In this position he has led the successful construction of the gigantic ATLAS detector, which saw its first beam in September 2008.

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Tejinder (Jim) Virdee | Spokesperson, CMS



Tejinder (Jim) Virdee is professor of physics at Imperial College, London and scientific associate at CERN. He is the spokesperson of the Compact Muon Solenoid collaboration at the CERN Large Hadron Collider and was the deputy spokesperson of CMS from 1993 to 2006. Virdee's graduate studies at Imperial College were on an experiment conducted at the Stanford Linear Accelerator Center. He worked on a deep inelastic Compton scattering experiment and then on the UA1 proton-antiproton collider experiment, both at CERN. Since 1990, Virdee has concentrated on the physics of, and experimentation at, the next generation of hadron colliders. He is a founding member of the CMS collaboration, which now comprises over 2500 scientists and engineers from over 180 institutes in about 40 countries, including the UK. Virdee has been actively involved in all phases of the CMS experiment, including the definition of the physics goals; detector R&D and prototyping; construction, installation, and commissioning of the detector; and the preparations for the extraction of science results. CMS performed well when the first beams traversed the detector in September 2008.



Pier Oddone was appointed the director of Fermi National Accelerator Laboratory in July 2005. Fermilab, a U.S. Department of Energy national laboratory, advances the understanding of matter, energy, space and time through the study of elementary particle physics and particle astrophysics. The laboratory is managed by the Fermi Research Alliance, a partnership of the University of Chicago and the Universities Research Association. Oddone previously served as deputy director of DOE's Lawrence Berkeley National Laboratory, with primary responsibility for the scientific development of the laboratory and its representation to the agencies. He received the 2005 Panofsky Award of the American Physical Society for the invention of the Asymmetric B-Factory. He is a Fellow of the American Physical Society, and was elected as Fellow of the American Academy of Arts & Sciences in 2008. Oddone was born in Arequipa, Peru, and is a U.S. citizen. He received his Ph.D. in Physics from Princeton University.

*Fermilab*

Jacobo Konigsberg | Cospokesperson, CDF



Jacobo Konigsberg is a professor of physics at the University of Florida, Gainesville, and cospokesperson of the CDF experiment at Fermi National Accelerator Laboratory. CDF is a collaboration of more than 600 physicists from 65 institutions from 15 countries. The experiment studies proton-antiproton collisions produced by the Tevatron accelerator at Fermilab. Research at CDF includes the search for the Higgs particle and other physics phenomena beyond the standard model of particles and fields. Konigsberg was part of the team that discovered the top quark at CDF and his research is centered on elucidating the properties of this particle and its possible connections to new physics. He participated in the construction and operation of various CDF detector systems and has held leadership positions of various physics analysis groups. He received his Ph.D. from UCLA, working on an experiment at Brookhaven National Laboratory. He received the 2004 medal of the Division of Particles and Fields of the Mexican Physical Society and is a member of the Mexican Academy of Sciences and elected Fellow of the American Physical Society.

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Dmitri Denisov | Cospokesperson, DZero



Dmitri Denisov is staff scientist and the cospokesperson of the DZero experiment at Fermi National Accelerator Laboratory. His research includes studies of interactions of particles and nuclei, the search for new particles and forces at the energy frontier, and the development of new detectors and experimental methods for nuclear and elementary particle experiments. Denisov received his doctoral degree from the Institute for High Energy Physics at Serpukhov. In the 1990s, he was leader of design and construction of major elements of the DZero experiment. He was a member of the DZero team that discovered the top quark in 1995. As DZero cospokesperson, Denisov leads a collaboration of 600 physicists from 18 countries. Under his leadership, the DZero collaboration made multiple fundamental discoveries such as finding evidence for single top quark production, the observation of the Cascade and Omega baryons and the first observation of pair production of Z bosons, a critical milestone on the road to observing the elusive Higgs boson.

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