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ATLAS Scientists Pushing Particle Physics into Terra Incognita

(Vancouver, BC) — After a year of operation colliding protons at the highest energies ever achieved, scientists working on the ATLAS experiment at the CERN LHC laboratory in Geneva, Switzerland, are releasing breathtaking results that extend and expand our understanding of matter and its interactions. The LHC creates the hottest conditions ever achieved in a lab, reaching energy densities that existed a trillionth of a second after the universe was born in the big bang. This is the epoch when pure energy gained mass and became matter in the early universe, and understanding this transition is a fundamental goal of particle physics. With the enormous number of seminal new results being presented at the Europhysics Conference on High Energy Physics in Grenoble, France, this week, we are on the cusp of breakthroughs in our understanding of the origin and fate of the universe. More than 150 Canadian scientists, about half students, lead international teams investigating the ATLAS data and pushing our knowledge into new territory.

The LHC has performed better in 2011 than even the optimistic expectations. “So far we’ve collected as much data as was planned for the whole of 2011 and that’s already a great achievement for the LHC,” said CERN’s Director General Rolf Heuer. “While it’s still too early for the biggest discoveries, the experiments are already accumulating interesting results.”

“Discovery or exclusion of the Higgs particle, as predicted by the Standard Model of Particle Physics, is getting ever closer,” said CERN’s Director for Research and Scientific Computing, Sergio Bertolucci. “Both occurrences will be great news for physics, the former allowing us to start detailed study of the Higgs particle, the latter being the first proof of the incompleteness of the Standard Model, requiring new phenomena to be happening within the reach of the LHC.”

“Canadians can be particularly proud of the achievements of our students, research fellows and faculty, leading to the fantastic scope and breadth of the ATLAS results being released this week” said Robert McPherson from the University of Victoria and Institute of Particle Physics, Spokesperson of the Canadians working on ATLAS at the LHC. “Canadians lead efforts both pinning down the interactions of known particles like the top quark, and also searching for the new physics our theories demand such as the Higgs Boson and Supersymmetry that should be accessible at the LHC.”

Canadian groups made important contributions to the ATLAS experiment and to the LHC itself. The TRIUMF lab in Vancouver hosts one of the ten “Tier-1” data analysis centres that streams ATLAS data in real-time for physics analysis. TRIUMF also built key parts of the LHC. Canadian groups from the University of Alberta, University of British Columbia, Carleton University, McGill University, University of Montreal, University of Regina, Simon Fraser University, University of Toronto, University of Victoria and York University, as well as the TRIUMF laboratory, built and operate critical components of ATLAS. Canadian scientists, including about 80 graduate students, 30 postdoctoral research fellows and 40 faculty members, continue to lead ATLAS physics analysis efforts.

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FOR EDITORS:

CERN, the European Organization for Nuclear Research, is the world's leading laboratory for particle physics. It has its headquarters in Geneva. At present, its Member States are Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom. India, Israel, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and UNESCO have Observer status. Canada has made important contributions to CERN's flagship accelerator, the Large Hadron Collider and one of its associated particle physics detectors, the ATLAS experiment.
<http://cern.ch>.

The Large Hadron Collider **or LHC** is a particle accelerator which, at 27 kilometres in circumference, is the world's largest and most complex scientific instrument. The LHC is the world's most powerful particle accelerator, producing beams seven times more energetic than any previous machine, and around 30 times more intense when it reaches design performance, probably by 2013. It relies on technologies that would not have been possible 30 years ago. The LHC is, in a sense, its own prototype.

ATLAS is a worldwide collaboration comprising over 2500 scientists and engineers from 178 institutions in 35 countries and regions. These are Armenia, Australia, Austria, Azerbaijan, Belarus, Brazil, Canada, China, Czech Republic, Denmark, France, Georgia, Germany, Greece, Hungary, Israel, Italy, Japan, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan, Turkey, United Kingdom and the United States of America.

ATLAS-Canada comprises about 150 faculty members, post-doctoral fellows and students from eleven Canadian institutes: the University of Alberta, University of British Columbia, Carleton University, McGill University, Université de Montréal, University of Regina, Simon Fraser University, University of Toronto, TRIUMF, University of Victoria and York University. See <http://www.atlas-canada.ca>

TRIUMF is Canada's national laboratory for particle and nuclear physics. Located on the south campus of the University of British Columbia, TRIUMF is owned and operated as a joint venture by a consortium of the following Canadian universities, via a contribution through the National Research Council Canada: University of Alberta, University of British Columbia, University of Calgary, Carleton University, University of Guelph, University of Manitoba, McMaster University, Université de Montréal, University of Northern British Columbia, Queen's University, University of Regina, Saint Mary's University, Simon Fraser University, University of Toronto, University of Victoria, University of Winnipeg, and York University. See <http://www.triumf.ca>.