



# TRIUMF

Canada's National Laboratory for Particle and Nuclear Physics  
Laboratoire national canadien pour la recherche en physique  
nucléaire et en physique des particules



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## Stronger, Higher, Faster: Canadians Savour Thrill of Victory at Physics Frontier

*World-Record Energy Collisions Achieved at LHC Particle Accelerator in Geneva*

(Vancouver, BC) – On Tuesday evening, December 8th, thousands of physicists around the world cheered as CERN's Large Hadron Collider (LHC) smashed together subatomic particles at the highest energies ever reached by a man-made accelerator and the giant ATLAS detector observed the products of the record-breaking reactions whizzing through its sophisticated tracking devices. Some of the loudest cheers were from Canadians who helped design, build, and commission LHC and ATLAS which are launching a new era of discovery about how the universe works.

"This is the breakthrough moment we have all been waiting for," said Rob McPherson, spokesperson and Principal Investigator for the 150 person Canadian team, professor at the University of Victoria, and Institute of Particle Physics Research Scientist. "The LHC was conceived of more than two decades ago, and today's success represents the start of a new era in our understanding of matter and the universe." The new world record is set by the collisions of more than 10 billion protons per bunch at a total energy of 2.36 trillion electron volts, or TeV, per collision.

The Large Hadron Collider accelerates two counter-rotating beams of protons to nearly the speed of light and then brings them into collision inside giant, cathedral-sized detectors that study the subatomic debris that comes flying outward. The Canadian team plays a leading role in the ATLAS detector, akin to a gigantic digital camera that examines the millions of collisions per second and identifies which ones should be stored and analyzed in more detail. The project goals are just as awe-inspiring: probe the structure of space to search for extra dimensions, identify and study why matter has mass in the universe, and even explore theories that connect subatomic particles to the cosmos through dark matter and dark energy.

"This is it," said Nigel S. Lockyer, director of TRIUMF, Canada's national laboratory for particle and nuclear physics that led Canadian involvement in the project. "We are the edge of what we know and are boldly stepping forward: we are now doing physics that has never been done before! It's amazing...and I'm glad Canada has a piece of the action."

TRIUMF worked with universities and companies across Canada to contribute key elements of the Large Hadron Collider accelerator itself as well as the ATLAS detector. TRIUMF is also home to one of the ten supercomputer (so called Tier-1) data centres around the world that processes the enormous volumes of data from the ATLAS experiment and distributes it to the thousands of scientists involved. In fact, today's collisions "showed up" in the Canadian computer centre within hours, ready for Canadian scientists to start analyzing them.

These developments come just three weeks after the LHC restart, demonstrating the excellent performance of the machine. First low-energy beams were injected into the LHC on Friday 20 November. On Monday 23 November, two low-energy beams circulated together for the first time, and the four giant LHC detectors recorded their first collision data. Next steps are to increase the energy and number of collisions over the next months as physicists scour the data for signs of the Higgs Boson, supersymmetry, new dimensions in space, and whatever other secrets nature has in store.

Follow LHC progress on twitter at <http://www.twitter.com/cern>. For photos, video, and latest information see <http://press.web.cern.ch/press/lhc-first-physics/>.

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### **About TRIUMF**

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, Queen's University, University of Regina, Simon Fraser University, Saint Mary's University, University of Toronto, University of Victoria, York University.

### **About ATLAS Canada**

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. ATLAS Canada and the Canadian Tier-1 Data Centre are supported in part by NSERC, CFI, CANARIE, and the BC Knowledge Development Fund. See <http://www.atlas-canada.ca/>.

### **About CERN**

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. See <http://cern.ch> and <http://lhc-first-beam.web.cern.ch/>.

### **About the Large Hadron Collider**

The Large Hadron Collider or LHC is a particle accelerator which, at 27 kilometres in circumference, will be the world's largest and most complex scientific instrument when it switches on in fall 2008. 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 2010. It relies on technologies that would not have been possible 30 years ago. The LHC is, in a sense, its own prototype.

### **About ATLAS**

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.

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