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Indiana University

IU part of 'big bang' test

First beam of fastest proton accelerator up and running; IU team built particle detector

By Nicole Brooks

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Worst case scenario: Two beams of protons colliding at nearly the speed of light create a black hole that slowly devours and then replaces the Earth.

Best case scenario: The process provides scientists with data that will one day answer the question, 14 billion years later: How was the universe created?

Indiana University physics professor Harold Ogren called the fears inspired by the largest and most powerful particle accelerator ever built "unrealistic." Indeed, faculty and students gathered Wednesday afternoon on the IU campus for Ogren's colloquium on the Large Hadron Collider laughed at the idea of the accelerator destroying the world. What LHC could produce, "if gravity is different than we think," are small black holes that would evaporate before they could do any harm, Ogren said.

The \$8 billion LHC is a ring 27 kilometers, or 17 miles, in circumference designed to accelerate protons to energies of 7 trillion electron volts and smash them together, creating new particles. The LHC seeks to recreate the universe as it was only moments after the Big Bang. The superconducting ring began operation Wednesday at CERN, the leading laboratory for particle physics, outside Geneva, Switzerland.

Ogren and a team of IU faculty and graduate students have for 12 years worked to design and construct one piece of the collider, a barrel transition radiation tracker that fits inside one of four experiments stationed at different points on the ring.

At full power, Ogren said, trillions of protons will travel around the accelerator 11,245 times per second. Two beams of protons, one traveling clockwise, the other counterclockwise, will cross, or collide, at those four locations. IU's contribution is inside Atlas.

The Atlas detector, which weighs about 7,000 tons, will gather the new particles created when the proton beams collide. This data may answer the big question of how mass is generated.

Ogren has a \$200 Swiss franc bet with a colleague that two years from the first collision of the beams, scheduled to happen in October, the Higgs boson particle will be discovered. The theoretical Higgs boson, also called the "God particle," is believed to give other particles their mass.

Some scientists have said the worst thing that the LHC could create is not a black hole, but nothing. Even this, Ogren said, would be an important breakthrough in science.

"Even if nothing new were discovered, that would already be groundbreaking," Ogren said. "Seeing nothing new would mean that something is wrong with our present model."

Visit CERN's Web site at <http://public.web.cern.ch> to learn more about the LHC.

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Physicist Harold Ogren, an IU professor, stands beside a transition radiation tracker, one of 96 modules used in the Atlas experiment. Chris Meyer | Courtesy of Indiana University

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