

## ASTRONOMY

# Particle accelerator promises great discoveries

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In mid-September, the world's most powerful particle accelerator is scheduled to start up. Dubbed the Large Hadron Collider, it will create the highest-energy collisions ever produced by man.



I have been asked by friends if the LHC poses a threat to mankind. Some scientists have predicted that miniature black holes could be produced when so much mass is created in such a small volume by the collision of two high-speed protons.

Mother Nature can answer this speculation. So-called "cosmic rays" constantly pelt Earth. These rays actually are high-energy protons accelerated to high speeds by galactic forces, such as supernova explosions.

While the exact physical mechanism that ramps up cosmic rays to nearly the speed of light is unclear, the fact remains that some cosmic rays can exceed the speeds of even our most powerful accelerators.

Such rays are rare, but they do hit Earth.

Nature has been colliding protons all along at energies that exceed those created by particle accelerators. Miniature black holes might gobble up Earth in a science-fiction movie, but not in real life.

The advantage of the LHC is that protons can be collided in a controlled way, surrounded by huge particle detectors. The goal is to probe a new range of matter and perhaps discover new forms of matter.

Many particle physicists are expecting to see a new type of matter at

the LHC, called super-symmetric particles. It is possible that the lightest of these particles might be connected to the dark matter of the universe.

If these new particles are discovered, they might explain the subatomic structure of dark matter.

The cost to build the LHC is high, similar to that of the Hubble Space Telescope, and a multinational effort was required to make it happen. One could say that this is the Olympics of particle physics. We expect great things to happen.

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