

Magnetic monopole experiment at CERN could rewrite laws of physics

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(PhysOrg.com) -- An experiment led by a University of Alberta researcher, at the Large Hadron Collider (LHC) at CERN, could dramatically change our concepts of basic physics, revolutionize our understanding of the Universe and could eventually lead to technologies in future generations that right now only exist in science fiction.

U of A physics professor James Pinfold is leading an international team of physicists who will use ultra high energy proton collisions. The protons will move at very near the speed of light, in search for a hypothetical particle, called the [magnetic monopole](#).

The magnetic monopole is a theoretical particle of matter. "Several important theories of physics are built on the belief that monopoles exist and it would be a great scientific coup to prove that," said Pinfold.

If successful, Pinfold says, physics textbooks from university level right down to high school will have to be revised.

"Our conventional understanding of magnets tells us they have a north pole and a south pole," said Pinfold. "A magnetic monopole has only one pole and that will change our understanding and the potential of electromagnetism," the force that binds particles of matter together. "Electromagnet force is the reason that, when I sit down on a chair, I don't fall through it."

Pinfold says the discovery of electronic monopoles will open up a whole

new future for materials and technology if scientists can produce large numbers of them. "Monopoles could make materials strong enough to withstand a nuclear explosion and could also enable magnetic levitation."

Conventional understanding of magnets is that they must have north and south poles. In 1930 it was shown that a sub atomic particle with just a single magnetic pole could exist. Several modern theories of physics are built on the theoretical existence of magnetic monopoles.

Last year, researchers in France and Germany [reported the observation of certain states of spin ice](#), a kind of crystalline material with essentially the same atomic arrangements as water ice that would create monopole-like particles. But Pinfeld warns, "these 'quasi-monopoles' should not be confused with the real thing being sought by the U of A led collaboration at CERN."

The U of A-led experiment is already underway at the LHC and Pinfeld says he hopes to find evidence of magnetic monopoles early in 2011. "It's quite an honour to be conducting this experiment," said Pinfeld. "We can't wait till we get our hands on the data from the LHC."

At CERN, on the Swiss, French border, Pinfeld's team will use the LHC, a [particle accelerator](#) 27 kilometres in circumference, to search for magnetic monopoles in the shrapnel like debris produced by colliding protons. The [proton collisions](#) will create unprecedented energy, 14 TeV. The tiny fireballs created in the impact will duplicate the energy produced just after the Big Bang, the event that created the universe.

Provided by University of Alberta

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