

Z-prime search may hurdle Higgs hunt

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This plush Z-prime represents a predicted particle physicists are hoping to find early next year. Credit: The Particle Zoo.

If you're bummed about humanity's biggest accelerator not producing a [Higgs particle](#) yet, maybe the latest effort to find a [Z-prime](#) will make you feel better.

The [new results](#) can't claim a discovery of this sub-atomic particle, a gauge boson. But Duke physicist Ashutosh Kotwal says his team is narrowing in on this less press-frenzied particle, which, if discovered, means our understanding of [particle physics](#) would need a few revisions.

Physicists have been looking for Z-prime just as they have the Higgs, by

slamming fast-moving particles into each other at the [Large Hadron Collider](#), or LHC, in Europe.

Scientists are interested in predicted particles like Z-prime because they could fix holes in the current model, the [Standard Model](#), that explains particle physics.

One of the biggest holes of the model is its inability to explain the origin of mass. The [Higgs boson](#) is supposed to correct this, but there are other problems, such as why neutrinos oscillate, why there is more matter than [antimatter](#) in the universe or where dark matter and dark energy originate.

Discovering new particles, like the Z-prime, could answer these questions, Kotwal says.

In April, scientists using Fermi Lab's Tevatron accelerator in Illinois [reported](#) possible signs of a Z-prime particle and with it, new forces of nature, but the physics community was cautious to claim discovery.

A few months later, Kotwal's team published data from LHC that did not find a Z-prime, despite working in similar energy levels as the U.S.-based accelerator.

Now, LHC is "far and away" more sensitive than the Tevatron, and by Christmas, the European collider will have produced four times more data in a range of energies and masses where Z-prime could be, Kotwal says. His team's [latest LHC data](#) has been submitted to the journal [Physical Review Letters](#).

Kotwal adds that Z-prime particles also appear to behave similarly to [gravitons](#), the hypothetical particles that could provide a quantum explanation for gravity. Any progress made in narrowing the mass and

energy range where Z-primes sit will bring physicists closer to finding gravitons and possibly unifying the four fundamental forces of nature.

Of course, [LHC](#) has much more data to collect, and while hopes for a Higgs have been pushed back to the end of 2012, a Z-prime particle could pop into the data early next year, Kotwal says.

Source: Duke University

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