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Smart Guide to 2012: Higgs hunt is all about catching Zs

- » 29 December 2011 by [David Shiga](#)
- » Magazine issue [2844](#). [Subscribe and save](#)
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Imagine trying to spot the tracks of a zebra after a herd of horses has passed by. That gives you an idea of the challenges the [Higgs boson](#) hunters face in 2012.

It may seem as if the search is almost over. On 13 December, two teams at the [Large Hadron Collider](#) at CERN, near Geneva in Switzerland, [reported hints of the Higgs boson](#), the elusive particle thought to give all others mass. A deluge of data due from the LHC next year should be able to confirm these signals - or rule out the particle altogether.

But accumulating data is just the start of the painstaking process of particle discovery. The Higgs is not detected directly, but via the things it decays into, such as pairs of photons or particles called Z bosons. Other, less exotic, particles such as quarks can also generate these decay products. This background can swamp the Higgs signal. "The background becomes the Achilles heel of the search," says LHC team member [Bruce Mellado](#) of the University of Wisconsin in Madison.

The nature of the most recent signal, which suggests a lightweight Higgs, only makes the search harder. Unlike a heavy Higgs, a light Higgs rarely decays into Z bosons, and its more common decay products are even more easily lost in the background.

To claim a Higgs discovery, physicists need to extract from this mess the gold standard signal - one with a statistical significance of 5 sigma, meaning the chance of producing it from background events alone is less than one in a million.

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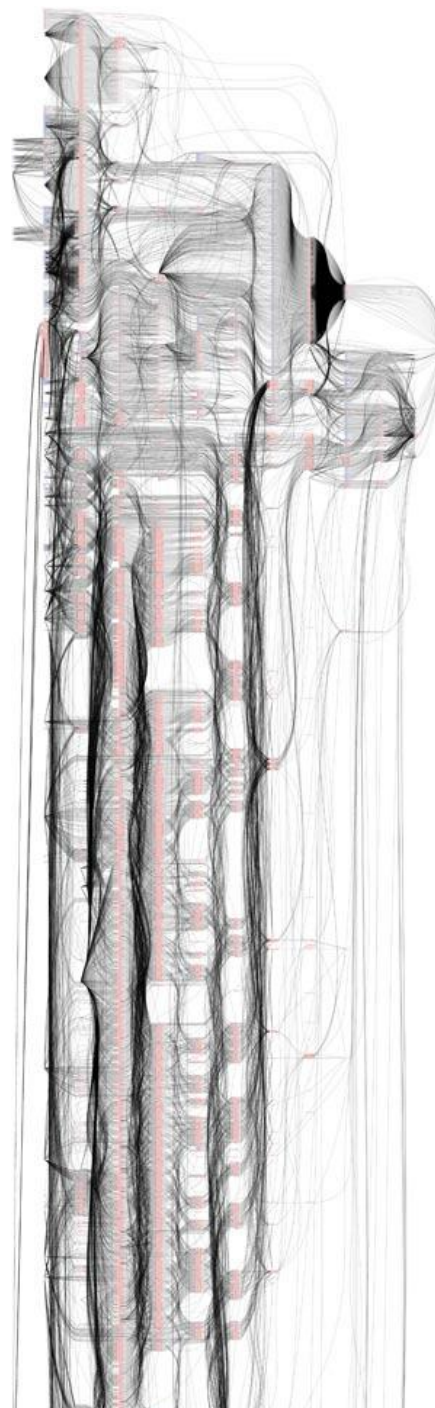
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Bravo!

Thu Dec 22 11:00:47 GMT 2011 by **Eric Kvaalen**

"To claim a Higgs discovery, physicists need to extract from this mess the gold standard signal - one with a statistical significance of 5 sigma, meaning the chance of producing it from background events alone is less than one in a million."

New Scientist finally managed to say what a number of sigmas means without getting it wrong! See <http://en.wikipedia.org/wiki/P-value#Misunderstandings>

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More Likely That This Is Not The Higgs

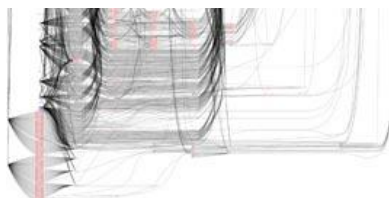
Thu Dec 29 17:05:21 GMT 2011 by **Julian Mann**

Unless a heavier super-partner emerges and it has not so far, it is more likely that this is just a quark. Also both CMS and Atlas used the same background shape parameterizations. I would have been more impressed had they been different, and similar results obtained from both experiments

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Ordinary particles can leave behind the same signatures as the Higgs, so physicists must account for this possibility when searching for the elusive particle. The image above is a graphical representation of the probability model used to tease apart a Higgs signal from "the background" (Image: Kyle Cranmer)



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