# Re: Is the search for the Higgs boson a farce?

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- *Date*: Mon, 10 Mar 2008 19:29:28 +0000 (UTC)


franklinhu@xxxxxxxxx wrote:

> I have been doing some research on what it would mean to discover the Higgs boson. Now correct me if I'm wrong, but it seems that any positive discovery of any particle over about 100 GeV would be immediately accorded the discovery of the Higgs particle.

You're wrong. There are searches for a great many heavy particles −− supersymmetric partners of Standard Model particles, heavy Ws and Zs, Kaluza−Klein particles in brane world models, WIMPs, and many others −− and a discovery would certainly not automatically be characterized as a Higgs.

> Now this seems wrong to me. First, the standard model doesn't even predict a precise value for the Higgs Boson, so even if somebody found something in the theoretical range of for the mass of a Higgs Boson, how could they possibly prove that it was a Higgs particle and not something else?

The Standard Model does not predict the mass of the Higgs, but it *does* predict the couplings, and therefore the production and decay modes.

> Second, even if you could justify the discovery by the mass value, how could you then prove that this is the particle responsible for creating the Higgs field? Could it not just be another new particle with none of the properties of the Higgs? Mass is not the only property of the Higgs. This is the thing that gives everything mass.

Right. That's why people would look at many other properties, and why many physicists have worked extensively on figuring out how to recognize and measure those properties (and how to distinguish a Standard Model Higgs from other possibilities).

> Third, why would we think the Higgs particle would decay so that it could be detected in particle accelerators? If the Higgs boson forms an all pervasive field, then in order to persist, it should not decay at all.

The vacuum expectation value −− the "average" value of the Higgs field −− is constant. The Higgs boson is the quantum of *fluctuations* around that average. If the Higgs mechanism is correct, such fluctuations must exist, and in the Standard Model their properties can be pinned down very precisely.

I think you've been looking at some terribly oversimplified references. I don't know the popular literature well enough to suggest alternatives, but you might look at, for instance, http://arxiv.org/abs/0710.0248 to see a bit of the technical side for a real search.

Steve Carlip

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