

## Special Report

# What Is Dead?

Philip E. Gibbs \*

### Abstract

There is a lot of interesting talk around the blogs about the fate of SUSY and even the whole field of phenomenology. It is a fascinating debate.

**Key Words:** SUSY, Standard Model, MSSM, Higgs Boson, CERN, LHC, ESP-HEPS, 2011.

The CERN DG had some words of caution to give us during yesterday's press conference. These are early days for the LHC and we should not imagine that it has already given a definitive report, but it has made some good points along with the Tevatron.

The Higgs sector [does not look like](#) what the standard model predicts. There are [hints of something](#) in the light mass window but it does not look like the SM Higgs. It does not have sufficient cross-section and may be spread out over too wide a mass range. It is too early to say what that is, or even if anything is really there. Much more data must be collected so that each experiment can separately say what it sees. That could take until the end of next year, but we will certainly have more clues at the end of *this* year. If the Standard Model is out, then we cannot be sure that some heavier Higgs is not another possibility. It just wont be the SM Higgs.

SUSY predicts a light Higgs but all the searches for missing energy events predicted by SUSY have been negative so far. Does this mean SUSY is dead? Of course it doesn't. Some of the simpler SUSY models such as MSSM are looking very shaky, but there are other variants. We need some SUSY based fits using all the available data including the Higgs searches. Hopefully the phenomenologists will provide some updates for those soon to let us know what the conclusions are. I have explained in the past that [SUSY is a well motivated theory](#). Many phenomenologists have put a lot of work into it, but if the LHC rules it out I am sure they will be the first to give us the right reasons to think so.

I don't agree that the work of phenomenologists has been a waste of time. Without their research the experiments would not have been able to set up the model based tests that have told us so much. A lot of different ideas apart from SUSY are being tested. They can't all be right. Following the EPS conference there will be a number of follow-up meetings to discuss the implications (see [the Calendar](#)). This will be the time for the theorists to come back and tell us what is left on the table. It will help the experimenters to prioritize the searches they want to put most effort into as more data becomes available.

The parameter space of SUSY is large and flexible but everywhere it describes a Higgs sector that is different from the standard model. That is why I think the Higgs sector is crucial to understanding whether SUSY at the electroweak scale will live or die. That part of the story

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\* Correspondence: Philip E. Gibbs, Ph.D., Independent Researcher, UK. E-Mail: [phil@royalgenes.com](mailto:phil@royalgenes.com) Note: This report is adopted from <http://blog.vixra.org/2011/07/26/what-is-dead/>

is still at an early stage. The next chapters in this gripping tale will unfold in the next few months. There could be several unexpected twists on the way.

**Update 27-Jul-2011:** Tommaso Dorigo has a [relevant article about SUSY fits](#) with a pointer to some [updates from the MasterCode project](#)

## References

1. <http://blog.vixra.org/2011/07/26/what-is-dead/>