

On God Particle

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Abstract

Kaku says that the Higgs boson could be the trigger that sets the big bang off. This is the part that has led to so much criticism. Science reporting needs to cover the full range of news from the latest experimental results to the wildest new theories being discussed by physicists. If it does not do so then it will not inspire new young scientists to take up research. People like Kaku may not please everyone but they are getting the message across.

Key Words: God particle, Higgs boson, science reporting, Kaku.

It would be amiss of me not to jump into the debate about what Michio Kaku said on CBS about the Higgs boson. If you don't know what I am talking about see the blogs of [Sean Carroll](#), [Matt Strassler](#), [Peter Woit](#), [Lubos Motl](#) etc.

The initial case for the prosecution was that Kaku had said incorrectly that the Higgs Boson caused the big bang. If you listen more carefully to the details, he is saying that the Higgs boson could be part of a family of scalars that includes the inflaton responsible for inflation. This justifies that the Higgs boson put the bang into the big bang. It is perfectly true that this could be how it works and despite accusations to the contrary Kaku used the words "think" and "could" to indicate that this was a speculative hypothesis, not settled fact. If you missed those caveats it's your fault not his.

He rightly stresses that physicists don't like the term God particle used by the reporters but he is not making a great deal out of it. The term sticks because people remember it and it tells them that the Higgs boson is considered important. I think it has been explained enough times that it was a joke and was not intended to be taken literally. If the public still don't get that then there is no hope for their understanding. In any case Kaku is not the one guilty of promoting the usage in this interview.

Motl has covered this in the blog post and I agree with what he says. There is just one thing that I think is worth adding. Kaku says that the Higgs boson could be the trigger that sets the big bang off. This is the part that has led to so much criticism. In the original inflation theory the era of rapid expansion does not start right away when the universe is created. If that is the case then it might be true to say that the Higgs boson puts the bang into the big bang but it would not be right to say that it triggered the big bang. So what is he referring to? The answer I think is a genre of

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big bang theory in which there is a time before the big bang when it was in a steady meta-stable state. According to these theories our universe was triggered by a transition to another vacuum in which the inflaton is responsible for its rapid growth right from the first instant of the new phase. The theory of eternal inflation is one sub-variety of this type of cosmological hypothesis. Personally I do not favour such theories because they seem to be inspired by a philosophical desire to explain the universe in terms of temporal causality and as I discussed at length in my most recent [FQXi essay](#), that is not my philosophy. Nevertheless it has become a popular class of theory with cosmologists. Ironically Sean Carroll who sparked off this attack on Kaku seems to be one of its biggest supporters.

Matt Strassler criticises Kaku above all for not making it clear which parts of what he was saying were speculative. I invite you to listen to what he said again (see the links to the video on the other blogs). He actually stresses very clearly that “we do not know how or why” the big bang started, but “we think” the Higgs boson may be a key piece of the answer. I don’t think he could have made it any clearer that these are just possibilities.

If you are concerned that Kaku seems to think that the Higgs boson is responsible for inflation then be aware that this might actually be the case. Sean Carroll denies that this can be the case and Matt Strassler says that it is unlikely. Motl explains exactly why it could be the case and I remember hearing about this in a webcast talk at Moriond on the same day as some of the new results were being aired. The theory requires an extra coupling between the Higgs boson and the curvature tensor and it has its problems, but then so does every other theory of inflation. The model does at least have the virtue of not requiring other unknown fields. When Strassler says that this version of inflation is “unlikely” he is expressing his own opinion. He claims in a comment that he does not express his own personal opinion without indicating as much, yet here he does exactly that.

Kaku is an eloquent speaker and he knows his subject. He is very careful with his words and knows the kind of angle on a physics story that will get the general public interested. Most people do not have the time to digest the kind of details that are explained at length on some of the blogs, yet Kaku can convey a feeling of our excitement that ordinary people can appreciate immediately. Yes, the basic known facts about the Higgs boson are interesting and exciting too but the more speculative ideas that people are working on are what really gets people to sit up and listen. If some physicists fear that people cannot distinguish between known and unknown facts when words like “could” and “think” are used then they are simply not giving people enough credit.

Science reporting needs to cover the full range of news from the latest experimental results to the wildest new theories being discussed by physicists. If it does not do so then it will not inspire new young scientists to take up research. People like Kaku may not please everyone but they are getting the message across. I am sure he will not be discouraged by boring physicists who simply don’t get it.

References

1. <http://blog.vixra.org/2013/03/19/oh-my-god-particle/>