Exploring the possiblities of discovering properties of the Higgs boson via its interactions in the solar environment

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Abstract

Experiments at the LHC (Large Hadron Collider) at CERN (CERN) have recently announced the discovery of the Higgs boson. They are shying away from calling it the Higgs boson until its properties have been measured. Due to the difficulties of measuring the Higgs boson's properties at CERN, which are exacerbated by the LHC shutdown, we consider the possibilities of measuring Higgs properties elsewhere. Our analyses focus on the prospects of Higgs measurements from the Sun, but our conclusions are probably applicable to other Sun-like objects, such as stars.

1 Introduction

As everybody knows, the Higgs boson is a boson named after Peter Higgs [1]. In 2012, CERN announced the discovery of probably the Higgs boson and it was very exciting. However measurements of the Higgs boson have not been made and the LHC will be shut down throughout 2013 due to bad design [2]. This is very bad news and made a lot of important people very unhappy [3]. Because the properties of the Higgs boson are a matter of vital importance, other sources of Higgs bosons we can study should be sought urgently. Despite not being as well qualified as the people working at CERN, we have taken it upon ourselves to look for some.

2 The Higgs boson at CERN

The Higgs boson was discovered was discovered by the LHC which is a big, round underground tunnel. It is shaped like a donut, as depicted in Figure 1.

The people who work at CERN are all highly-qualified scientists, most of whom have real doctorates from actual universities and everything! They are

Figure 1: A donut. This is a good representation of what the LHC tunnel would look like if it was made of dough and topped with pink icing.

Certified University-Nurtured Trained Scientists (CUNTS) and are widely respected. The biggest experiments involved in the Higgs discovery are ATLAS, who are all CUNTS and CMS who are also CUNTS.

However, it should be pointed out that despite being CUNTS, it is possible that the LHC people have wasted a lot of money building their machine to discover the Higgs. The Higgs boson gives mass to matter and – despite being heavy – the LHC is still *not* the heaviest thing in the solar system. Therefore, it is not very well suited to producing Higgs bosons. It's ok, just not the best. The Sun, for example, is believed by most scientists to be the heaviest thing in the solar system and even heavier than the LHC. It follows that the Sun is a copious producer of Higgs bosons and should be studied in case it can reveal interesting facts about the Higgs.

3 History of the sun

Despite most people having heard of (and seen) the Sun, it is a controversial and mysterious object. It was first recorded thousands of years ago [4], but may be even older than that. Some people argue that the Sun is even older than the Earth, but there is no photographic evidence of this and it cannot be proven. We are deeply sceptical of these claims, but that is not important right now.

Controversy over whether the Sun orbits the Earth or the other way round arose in the 15th century when Galileo proved the Earth must orbit the Sun. However this issue is still not resolved because Galileo is dead [5] and therefore

his arguments are now invalid.

The Greek Archimedes and Plato thought the Sun was made of fire, which is true despite them not being CUNTS are therefore difficult to trust. However, we know now that the Sun is not made of only fire. It also contains Higgs bosons.

It is tempting to study Higgs bosons by going to collect some of them, but this would be both unethical and impractical. Plundering the natural resources of the Sun is the sort of thing Western nations have gotten over. After centuries of imperialism, hardly anyone does anymore and most of them have given the stuff back [6].

It would also be impractical because the Sun is a long way away from the Earth and it'd take ages to get there. It'd taken almost as long to get back too; maybe even longer because you'd have to escape the Sun's gravitational field.

It would also be impossible because there is no known way to transport Higgs bosons the distance required. One could imagine putting them in a bucket and carrying them about, but this would fail because some of them could fall out and the others would interact with the bucket and render the whole exercise futile. Of course, one could then imagine putting them in a more sophisticated bucket (e.g. one with a lid), but they would then just interact with the more sophisticated bucket and nothing qualitative would change.

The solution, of course, is to try to determine properties of the Higgs by observing from a distance.

4 The Higgs boson in the sun

In this section, we consider the prospects for making complementary measurements of the Higgs boson by observing solar Higgs bosons. In turn, we introduce a number of possible Higgs quantum numbers and assess the chances of working them out.

4.1 Mass

The mass of the Higgs boson is a measure of how much the particle weighs. In principle, it can be determined from solar measurements, but that would pointless because the LHC already measured the mass. It's about 125 GeV. Next question.

4.2 Colour

By looking at pictures of the Sun, we can hope to tell what colour the Higgs boson is. As we know there are lots and lots of Higgs bosons in the Sun, the colour of the Sun should contain the colour of the Higgs boson. The Sun is pictured in Figure 2, where it is clearly yellow.

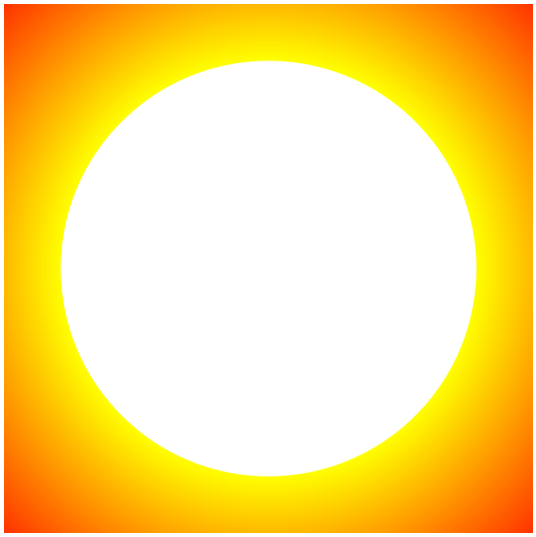

Figure 2: The Sun, being yellow.

4.3 Electric charge

The Higgs boson is neutral. The proof is by contradiction:

Case 1. Imagine a positively charged Higgs boson. Then the Sun would also be positively charged because it is full of Higgs bosons. Therefore, the planet Mercury which is also positively charged would be repelled from the Sun and fly away, out of the solar system at a million miles per hour. This has never happened. Therefore the Higgs boson is not positively charged.

Case 2. Now imagine a negatively charged Higgs boson. Then the Sun would be negatively charged and attract the planet Mercury which would promptly fly into the Sun at a million miles per hour. This hasn't happened either, so we conclude the Higgs is not negatively charged.

Case 3. Now imagine a neutral Higgs boson (strictly speaking the imagining part isn't necessary since we know the Higgs boson is neutral). The Mercury wouldn't care and nothing would happen.

From this argument, we conclude that the Sun is neutral. The only assumption we have made is that Mercury is positively charged, which is uncontroversial, as shown in Figure 3.

4.4 Age

We can put a firm early bound of the age of the Higgs boson at July 2012, when it was discovered by CERN. However, it is likely that the Higgs boson is considerably older than this.

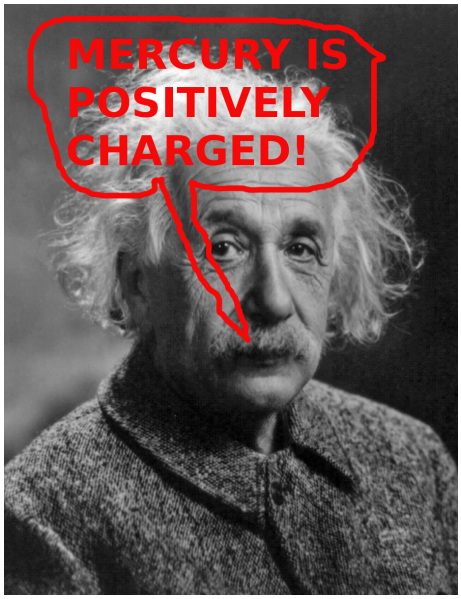

Figure 3: Albert Einstein making his classic, oft-quoted and unchallenged observation about Mercury.

Given that the Higgs boson gives mass to particles, it follows that there must have been unobserved Higgs bosons around for as long as there has been mass in the universe. Unfortunately, mass is not mentioned in [4], but we speculate that mass, and so the Higgs boson, has existed since before the dawn of civilisation. We regret that this is so speculative and is not qualitative, but it is the best we can do.

4.5 Is it an integer?

No, the Higgs boson isn't even a number. It's a particle.

4.6 Is it a mammal?

Mammals are warm-blooded animals with fur (unless they have been shaved but this does not matter because artificially removing hair that would been there is cheating). Figure 4 shows a lion, which is an example mammal with sharp teeth.

It is unknown if the Higgs boson is a mammal. Some postulate that the chance of the Higgs boson being a mammal are 50%, but we find fault with this argument. The reasoning goes that the Higgs boson either is a mammal or it isn't a mammal. This is two choices, and there is no way telling which it is, so

Figure 4: An example mammal. This one is an angry lion. We are not sure, but we think the messy cropping may be the reason why it is so angry in this picture.

it could be one or the other. Therefore the chance the Higgs is a mammal is 50%.

However, this naive argument neglects the possibly that the chances of the Higgs being a mammal are 50-50. They might not be 50-50. Either the chances are 50-50 or they're not. The correct way to combine these probabilities is multiplying them together, so the chances of the Higgs boson being a mammal are 25%.

4.7 Does it pass airport security restrictions?

Strangely, yes. There are no restrictions that prevent a Higgs boson being taken onto a flight as hand luggage. This is probably an oversight and we expect it will soon be rectified.

4.8 Speed

How fast does the Higgs boson travel? This is an unknown question, but one of great importance. Given the recent precedent for neutrinos [7], there is a real possibility of the Higgs bosons being found to travel faster than the speed of light (the speed of light in vacuum is equal to c). This is something we feel the CUNTS at CERN should look into because we'd like to know the answer.

5 Conclusions and open questions

We conclude that studied solar Higgs bosons is a good idea and should definitely be done.

One of the two issues of particular interest is the question of the speed of the Higgs boson, which would yield fascinating results if it turned out to be really fast or was unable to move at all. It would be much less interesting if the Higgs bosons moved a medium speeds, but it's worth a try.

The other interesting question is whether the Higgs boson is a mammal. Given our calculation, we put the probability at 25%, so we make the prediction in this paper that it probably isn't. It would be a good demonstration of the correct scientific method if this prediction made in this paper were tested experimentally, so we strongly encourage CUNTS to do so.

References

[1] Everybody knows this. Ask your mum.

[2] See URL http://www.bbc.co.uk/news/science-environment-21421460, 2013.

[3] See URL http://www.bbc.co.uk/news/world-21411304, 2013.

[4] Epic of Gilgamesh, stone tablets, ancient Mesopotamia.

[5] See URL http://en.wikipedia.org/wiki/Galileo_Galilei#Death.

[6] United States Declaration of Independence, USA, July 4, 1776.

[7] See URL http://www.bbc.co.uk/news/science-environment-15017484, 2012.