Essay

CMS Looking Back

Philip E. Gibbs*

Abstract

The collaborations like to make big statements about how they do their analysis blind. This is supposed to mean that they don't look at the results until they have fixed the parameters of the analysis so that they cannot introduce any bias. From a CMS video, we can see what this really means in practice. They unblind the data as an early check then they "re-blind" it while they adjust the analysis. They unblind it again two weeks later with just 30% more data added. This is not quite in the spirit of how blind analysis is meant to work. Luckily the signal is so clear that it is indisputable in any case.

Key Words: LHC, CMS, ATLAS, CERN, Higgs, diphoton, blinding, unblinding.

The CMS collaboration have kindly posted a pleasant video [1] that reveals the moments when they "unblinded" their Higgs diphoton results within the collaboration in the run-up to the public discovery announcement in July.

I find it interesting to look back and see how these events relate to what was going on publicly on the blogs at the time. From the video we learn that the CMS collaboration was shown the first results on 15th June. The Higgs analysis group within CMS must have seen it at least a day or two before in order to prepare the plots for the talk. We can assume that ATLAS was seeing their results at about the same time. For two days the collaborations were able to walk around knowing that they knew stuff that the outside didn't until Peter Woit blew the lid with his leak about the new results. This was a little upsetting for them at first as shown by the response from CMS blogger Michael Schmitt who later calmed down a bit. One argument they gave was that they did not want the information to pass between the ATLAS and CMS collaborations because it would spoil their independence but if the rumour can reach the outside world so quickly it is clear that it would not be kept secret at CERN and other institutions where 3000 excited physicists from each collaboration share the same social spaces.

The rumours were saying that the diphoton excess was at around 4-sigma and the video shows that it was indeed around 4.3 for CMS. In my own analysis the next day I estimated that this was based on about 3/fb of the data which turns out to be exactly right for CMS as seen in the video when the camera zooms in at 2:20. I also pointed out that when they add the full dataset the signal could easily go down and in fact it did descend to 4.1-sigma as seen in the next part of the video. I am not always right but I was this time. Subsequently the New York Times reported an email from the spokesperson for ATLAS saying that they should not believe the blogs. Now we

* Correspondence: Philip E. Gibbs, Ph.D., Independent Researcher, UK. E-Mail: phil@royalgenes.com Note: This essay is adopted from http://blog.vixra.org/2013/01/30/cms-looking-back/

know that this was a euphemism for "please don't report what they are saying because it is perfectly accurate and we were hoping to keep it as a surprise for the next conference".

Another point worth making here is that the collaborations like to make big statements about how they do their analysis blind. This is supposed to mean that they don't look at the results until they have fixed the parameters of the analysis so that they cannot introduce any bias. From this video we can see what this really means in practice. They unblind the data as an early check then they "re-blind" it while they adjust the analysis. Then they unblind it again two weeks later with just 30% more data added. This is not quite in the spirit of how blind analysis is meant to work. Luckily the signal is so clear that it is indisputable in any case.

Getting more up-to-date, remember that CMS have not yet published the diphoton update with 13/fb at 8 TeV. Rumours revealed that this was because the excess had diminished. At the Edinburgh Higgs symposium some more details about the situation were given. The talks are not online but Matt Strassler who was there has told us that the results have now been deemed correct. It may be understandable that when the results are not quite what they hope for they will scrutinize them more carefully, but I find it wrong that they do not then publish the results once checked. It was clear that they intended to publish these plots at HCP2012 in November and would have done so if they showed a bigger excess. By not releasing them now they are introducing a bias in what is publicly known and theorists are left to draw conclusions based on the ATLAS results only which still show an over-excess in the diphoton channel. It will all be history once the final results with about 20/fb are released soon but it would be helpful if they could keep this sort of biasing factor to a minimum.

The March meeting at Moriond is slated as the occasion for the final update but only of they are happy with the results. Their analysis has been used and refined many times in the last two years and by now they should be confident enough to say that they will publish regardless of the result they get. The data for the last proton run was available before Christmas so by now the collaborations should have completed their final analysis. The fact that we don't have any rumours suggests that this time they have decided to confine knowledge of the results to the smaller Higgs groups within the collaborations and they may actually succeed in keeping them secret until the conference.

Update: Tommaso Dorigo's response is here [2].

References

1. http://youtu.be/gmpqakF7_ME

2. http://www.science20.com/quantum_diaries_survivor/cms_higgs_video_bias_and_variance-102421

3. http://blog.vixra.org/2013/01/30/cms-looking-back/