

News

News about viXra.org & LHC

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March 30, 2010: [LHC first collisions at 7TeV \(CoM\)](#)

Today we witnessed the first collision events at the Large Hadron Collider at 7 TeV (centre of mass energy). The build-up started at around 6am European Time when they started the first attempt to ramp the energy of the beams up to 3.5 TeV. In fact it was not until the third attempt that they finally got the beams up to the required energy and saw the first events at 1pm. In case you missed it, here is a recording of the webcast from CERN at the crucial moment:

<http://www.youtube.com/watch?v=PE4dCTrWjU0>

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1. News about viXra.org

viXra.org is an e-print archive for papers in science and mathematics that was created in reaction to the restrictive submission policies of the well-known arXiv.org physics archive. Since its launch just 8 months ago we have received 790 articles from more than 180 different authors. That is about 1% of the corresponding figures for arXiv.org and we consider that a very good result.

The policy of viXra.org is to accept as many submissions as we can, provided there is at least some scholarly content and no obvious legal issues. In fact only two authors have had rejections on such grounds so far and the same authors have had other papers accepted by us, so we feel we are living up to our main goal. Of course this policy means that we are open to submissions of a very low quality and many people have been very quick to criticise us for it. However the reality has proven to be quite different. Yes there are some articles that have very obvious faults, but at the same time there are many papers of a very high scientific quality. In fact viXra.org has over a hundred articles with comments indicating that they are already published in peer-reviewed journals. It is alarming to find that so many worthy papers could not be archived in arXiv.org because of its moderation policy. Another criticism we have faced is that as a small time operation we may not offer a permanent archive for these documents. The reality of this concern is demonstrated by a similar archive sciprint.org that ran for a few years before vanishing last summer. The good news is that with the help of the administrators of sciprint.org we have been able to recover most of the papers from a backup of the site and have begun restoring them to viXra.org using the original dates. In addition, we now have a mirror site rxiv.org that is run entirely independently. This greatly increases the robustness of the archive and we aim to set up further mirrors of this sort.

Blog.viXra.org has been set-up to report news on development of the viXra.org archive, but also to report general news from the world of science and mathematics. It is a good time to begin such a venture because tomorrow the LHC is scheduled to restart and it should soon be providing new science results. We plan to follow the progress from here. Hope you join us for the adventure.

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2. LHC Is Ready to Go

Barring any further incidents, the large hadron collider will be ready to start injecting beams tomorrow. The current plan is to test the power systems overnight by running up the magnets. Tomorrow morning they will test the tracking of beam runs and dumps with real beams being injected in the afternoon. That moment will signal the kickoff for this years run during which we hope some real new physics will emerge. Of course the plan changes constantly so we will have to see.

At first they will run the beams at the energy of 450 GeV. The beams can be injected into the main ring at this energy without further acceleration. The intensity will also start low with probably just one bunch of protons circulating each way in the rings. The real excitement will begin when they start ramping up the energy to 3.5 TeV by accelerating them in the main ring of the LHC. Last year they were only able to ramp up to 1.18 TeV so when they pass that mark they will be on new ground. When they collide beams circulating in both directions at 3.5 TeV they will be putting 7TeV into each collision. That is well above what has done before anywhere, so anything can happen. One thing we know that will happen is a big press conference. It is likely to take about 4 weeks to reach that point but the actual progress will depend on what goes wrong. We will be watching closely from the sidelines.

From that point they will progress by collecting physics data while gradually increasing the collision rate. This will be done mostly by increasing the number of bunches of protons circulating in each beam. Last year they had 16 bunches in each beam but the accelerator can fit up to about 2800 of them. They will also work on focusing the beams into a tight squeeze at the points where they collide inside the experiments. The net result will be huge numbers of collisions on a scale never seen before. The computer arrays collecting data will be tested at full capacity.

As outsiders we, "the public", will be able to monitor a lot of what is going on through the world wide web. That is what they invented for, right? Last year we were even able to see live graphics of collision events from one of the experiments LHCb. Hopefully there will be more of that this year. If you want to watch yourself, the site to go to is <http://lhcpportal.com>.

One thing we won't know immediately is the scientific results. The groups of collaborators on each experiment will keep that secret until they have official announcements to make. What will they find?

3. Smiling Snowman as LHC Restarted for 2010

On February 27, 2010, the LHC started injecting beams into the main ring for the first time in 2010. The last week has been frustrating for the LHC scientists with a series of minor problems related to components such as the new quench protection system delaying the restart. Finally at about 2 a.m. today the beams were circulating briefly and the main operations display included the characteristic smiling snowman plot first seen last year.

This is the kickoff for science runs this year that could discover new physics beyond the standard model. Over the next few weeks the energy of the protons will be pushed up to 3.5TeV. When they collide this energy can be converted to mass to create new particles never seen before, if they exist! So what is the probable outcome? A major goal of the LHC is to find the Higgs Boson. The Tevatron in the US has been searching for it over the last few years and has excluded some mass ranges but without a positive result. The most likely scenario from both experiment and theory is that its mass

lies in the 115 – 140 GeV range, although other possibilities are still viable. If this is the case then it will be hard to find at the LHC because its decay modes are hard to detect. We cannot expect to see it this year before the LHC is shut down for further upgrade work lasting a whole year at least.

But could the LHC make any other breakthrough discoveries this year? Of course the answer is “yes, maybe”. If there are particles in a mass range of about 200 – 700 GeV with the right properties then there is a good chance that they might be seen. We just have to hope that nature has been kind to us.

Oh, did I forget to mention black holes? The idea that the LHC could create black holes is one of those wild ideas which if posted to viXra would be completely ignored, but because it came from some Ivy League research department people take it very seriously. A more convincing idea is that such small blackholes would not be different from any other type of elementary particles of the same size. It's only because we do not understand quantum gravity well enough to unify the two concepts of black hole and particle that people invent the idea that they can be different. Black Hole production at the LHC is a red-herring.

4. 3.5TeV Beams Circulate at LHC

There is great news from CERN this morning with word that beams have been accelerated to 3.5TeV, three times the highest accelerator energies ever seen before. This is the energy that the LHC will run at this year. It will be a huge relief to everyone because until this point nobody could be really sure that the magnets could take the required current of 6000A without a drastic failure like the one seen in 2008. For the next two weeks or so they will be performing further tests including the first collisions this year at 450 GeV. There will also be runs with 4 on 4 bunches which are required so that all the experiments can see collisions at the same time. Then on 30th March they will perform the first collisions at 3.5TeV and that will signal the start of real science at the LHC. For further reports around the signal the start of real science at the LHC. For further reports around the blogosphere try [Cosmic Variance](#) and [Not Even Wrong](#). Meanwhile the Atlas collaboration have posted their first paper using data from last years collisions at 900 GeV. For details on that you want [The Collider Blog](#).

5. Vote for Your Choice of FQXi Essay Contest Topic!

The [Foundational Questions Institute](#) is gearing up to launch its third essay contest, and this year they are holding a vote on what the subject of the essay should be. The topics for the previous two years were “The Nature of Time” and “What is Ultimately Possible in Physics?” The great thing about this contest is that it is open to everyone. The FQXi are one of the few organisations that accept submissions as freely as viXra.org does, so many people who use this archive will also be interested in this contest.

Even better is that the last two years have seen essay submissions from amateur and professional scientists alike, so it is a wonderful David and Goliath fight. So far the score is 2-0 to Goliath but I think the organisers genuinely want to see some outsiders win something, so anything is possible. Even if you don't win you will have the opportunity to discuss your essay and other people's work on the same subject in the FQXi forums prior to judgment day. That is more valuable for many people than the potential prizes. So if you are interested go over to the [voting page](#) now and have your say on the essay topic. Whether you are a David or a Goliath you should feel encouraged to enter.