Katie Prescott

History of Science and Technology

I pledge my honor that I have abided by the Stevens Honor System.

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Was It Worth It?

The film *Particle Fever* detailed the project of the Large Hadron Collider, and the discoveries it did and did not make after being turned on, and what it means for the field of physics. With annual operating costs of $1 billion, and a total investment of $13.25 billion to find the Higgs-Boson particle (Knapp), this project has a substantial price tag.The Large Hadron Collider (LHC) has not provided as much information or knowledge gain as initially predicted. The physicists did not confirm nor deny any major theories besides that the Higgs-Boson particle exists. As of yet, there has not been enough educational gain to justify the enormous costs of building the LHC. Although physicists at CERN predict more knowledge gains in the future, the LHC and its discoveries, has not been able to validate the financial investment it took to make it a reality.

Before being turned on, there were questions as to whether there would be any financial gains from the LHC. Rather than this question, economists should have been asking if the costs would be justified by the knowledge gained. In theory, the LHC would help physicists make astounding discoveries, most importantly the discovery of the Higgs-Boson particle, and how these discoveries would change the way we define our world, and change our understanding of the universe. However, all the LHC has actually determined is that the Higgs-Boson particle does in fact exist. Physicists had hoped that the LHC would confirm one of two conflicting theories, the Supersymmetry theory or the Multiverse theory. With the mass of the Higgs-Boson particle (126 GeV) in between the 115 GeV needed to prove the Supersymmetry theory and the 140 GeV needed to prove the Multiverse theory (*Particle Fever*), the LHC did not actually end the debate of the rival theories; rather, it demonstrated that we still cannot confirm nor deny either theory. While the LHC made significant discoveries with respect to the existence of the Higgs-Boson particle, it has yet to justify the immense building and operating costs it has incurred.

Another question about the universe that physicists had hoped the LHC was going to answer was about the cosmological constant, and what that means for religion; is there some being that cared enough to “twiddle” this number to be just right to allow life to happen, or is it all just random chaos in the multiverse? This is, what one of the physicists, Nima Arkani-Hamed, called a “big-scale question” that the LHC is “going to push us in, one way or another” (*Particle Fever*). This question is essentially asking if God, or a god-like figure, exists, and created the universe to allow us to be here, or is our existence a random act of chance? The idea of the multiverse and the cosmological constant is a complete dichotomy of our understanding of the universe, and without being able to prove the multiverse (one way or another), physicists still cannot prove with certainty what the cosmological constant means for our reality. The LHC was supposed to be able to answer the question of whether or not religion is valid. Using what they learned about the Higgs-Boson particle and its relationship to the Multiverse theory, physicists still cannot answer this provocative question. They simply have not learned enough from the LHC to come to any conclusions of their big-scale questions; therefore, the discoveries from the LHC do not warrant the price.

Although physicists detest the idea of the multiverse because it raises questions they will never hope to answer, the results of the LHC experiments have not proven whether or not the multiverse exists. These results also tell us noting about the cosmological constant, or the Supersymmetry theory. This project brought together thousands of scientists from around the world, and forced rival countries to work together to make this project as successful as it is. Over the course of this nearly 40-year project, there have been many technological advancements, from the particle accelerator itself to the Internet, and many discoveries about our world that we would not have know without the LHC. There is no denying the significance of this project, and what we can learn from the LHC. Physicists unfortunately just have not been able to answer the big questions they set out to answer at the start of the project. For this reason, the financial investment of this project has not been justified.

Works Cited

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