Beyond the Future Circular Collider

by Clark M. Thomas

After more than thirteen billion dollars has been spent on the CERN Large Hadron Collider (LHC) and its operation – and with little more than the Higgs boson in 2012 to show for it all – the particle physics community has decided to ask the world for a much larger supercollider that would start operating about 2040. Tentatively called the Future Circular Collider (FCC), this beast would share the Geneva plane with the LHC. The LHC is 17 circular kilometers, and the FCC will be 100 circular kilometers.

Other than providing future work for thousands of technicians and experimental physicists, there is nothing of value guaranteed. The residual idea is to do more research on the Higgs boson, something that a proposed linear collider in Japan could do for less money. The expanded idea is to go where no circular particle collider has ever gone, whatever that will be.

There is a second FCC-like project proposed in China. Only one costly machine is likely to be built. Having a potential Chinese competitor looming, it may be easier to get the big dollars from western countries already pressured by accelerating climate change and population issues. The full price tag for this Swiss FCC should be about what it would take to build a racist Trump border wall to keep out brown refugee families.

I am very much in favor of wisely spending billions in pursuit of quality science. In just the area of astrophysics it has been

suggested that a similarly expensive giant radio telescope on the far side of the Moon, or even a space-based gravity wave LIGO, could be more scientifically productive.

I am not alone in questioning a larger, but not qualitatively more powerful, collider:

> Not everyone is convinced the super collider is a good investment. "There is no reason to think that there should be new physics in the energy regime that such a collider would reach," says Sabine Hossenfelder, a theoretical physics [sic] at Frankfurt Institute for Advanced Studies in Germany. "That's the nightmare that everyone has on their mind but doesn't want to speak about."[1]

Beyond the FCC and its Physics Paradigm

When I use the word "beyond" in this essay, I am not just talking about calendar time beyond the FCC's construction and operation. The more important type of "beyond" entails a deep discussion of the scientific models underlying every experiment, and the operational limitations for such machines.

[This essay only touches on the paradigm shifts needed for this level of experimental technology to bear fruit, assuming modern human civilization itself survives the next two centuries. *Please read the six footnoted references below for important details*.]

There are several challenges awaiting future particle physics experiments. It is hoped that these new machines can by brute force help explore some of these questions. However, because of fundamental paradigm flaws, it is unlikely that the FCC and its kin will understandably move the needle. It's one thing to find a few new minor particles – but another to blow a hole in the model. Even particulate discoveries may only *correlate* with real physics, not essentially explain the full *causation*.

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[1] https://www.scientificamerican.com/article/physicists-lay-out-plans-for-a-new-supercollider/

Here are some challenges and opportunities that CERN will encounter:

> CERN's current king of colliders, the LHC, is one of a complex of particle accelerators on the Swiss-French border near Geneva. Its loop of superconducting magnets nudges opposing streams of protons towards 0.999999990 light speed, supplying each with 6.5 teraelectronvolts of energy – enough to condense a variety of particles out of the carnage of their impacts. The most famous of these was the Higgs boson, a particle first predicted in the 1960s as responsible for missing mass, and finally experimentally confirmed in 2012.
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> Its discovery completed the set of predicted objects that make up the fundamental building blocks of reality, a theory we call the Standard Model. But even with the model confirmed, our search for understanding is far from over. There are plenty of big questions we have yet to get a grip on, and current technology just isn't up to the challenge of providing the evidence we need to answer them:
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> Why is gravity so weak, compared to the other forces? Where does the neutrino's tiny mass come from? Why is the Higgs boson so incredibly light? Where is all the Universe's antimatter? And what is the true nature of this thing we call dark matter?[2]

The last paragraph above presents the two great trophies for this FCC: *understanding matter/antimatter, and dark matter*. Both of these fundamental physics questions cannot be solved by the FCC or any currently conceived experiment with similar energy regimes and old paradigms, however grandiose in scale.

These great questions were clearly resolved by me months and years ago. To date I have received no scientific rebuttal, except for the contextually meaningless complaint: "Where's the experimental evidence?" Fine, but such myopia is no reason to ignore new theory that is logically elegant and parsimonious.

Even beautiful math equations are meaningless, if their axiomatic elements are derived from incorrect older theories:

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[2] https://www.sciencealert.com/cern-has-just-described-its-next-gen-particle-smasher-and-it-s-a-monster

"Exhibit A" is string theory, and "Exhibit B" is the holographic universe.

Antimatter and Matter in Our Local Universe[3]

The difference between particulate matter and antimatter is in their opposite electrical charges. When matter and antimatter directly interact each will destroy the other. The reason mass in our universe is nearly all matter, rather than antimatter, has been a fundamental mystery for physics. There is no way either the Chinese or Swiss proposed FCC can solve this mystery within the currently popular paradigm. However, changing one element in the paradigm, and keeping the Higgs boson, reveals an elegant solution:

The Higgs is a vector resonance. The exact mass of this boson is less important than how it acted within our earliest universe to reveal potential baryonic mass within the plasma energy soup, thereby completing the standard model of particle physics.

How and when the Higgs *first appeared* inside our post-Big-Bang plasma is unexplained by the Standard Model. We thus have a historical problem similar to the first appearance of God. Regressing back in time yields no clear explanation for the first appearance of God. We can always ask, "Who or what created God?" This question invites infinite regression, or a better model.

Same with the primal Higgs, except that our historical Big Bang doesn't go back very far. Keep on going back in time before the local big bang, and you will encounter the seemingly eternal four dimensional multiverse. When we understand that our local big bang is like just another "bubble" in a "bubble bath" multiverse, we envision how the Higgs appeared: *It was already here in our space before our local Big Bang*.

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[3] http://astronomy-links.net/Antimatter.pdf

Why is matter and not antimatter omnipresent? Again, the multiverse[4] explains it: The local "bubbles" within the multiverse are matter-dominant, each being the product of previous local matter-dominant universes. Antimatter baryons could have been dominant everywhere – but it looks like matter won out eons ago, maybe by chance that perpetuated itself throughout a multiverse with matter-producing Higgs bosons transforming each new local big bang plasma.

What are Dark Matter, Dark Energy, and Gravity?[5]

Dark matter is another mystery that cannot fully be answered by kinetic experiments inside a supercollider. Understanding the various elements constituting Dark Matter requires understanding the yin/yang particulate constituents that are dimensionally beyond the revealing powers of any currently envisioned FCC.

Dark energy is subsumed within incorrectly named General Relativity, which itself is properly subsumed within real general relativity. Dark matter can be separated from Dark Energy ideas, but ultimately all are interrelated in the yin/yang, matter/energy dance of ultimate particles, alone and orchestrated into larger dimensions. These sub-Planck particles can be described both from classical and quantum perspectives.

Gravity itself is properly seen from a push/shadow perspective within the new paradigm, not from the ridiculous cross-brane tractor-beam model.

The unity of four apparent forces finds its Theory of Everything rooted at the bottom of the particle physics pantheon – exactly where the FCC model would be insufficient to explain.[6]

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4 http://astronomy-links.net/Universe.pdf

5 http://astronomy-links.net/Quanta.and.General.Relativity.pdf

6 http://astronomy-links.net/LightSpeed.pdf