The Mythos of the Large Hadron Collider

Billions of years from now, a father and his young daughter may be enjoying the twinkling beauty of a clear summer night when she asks, “Dad, how did all those stars get there?” To which he will reply, “It all started with a big bang.” Today, as the Large Hadron Collider (LHC) ramps up to speed, speculations abound as to whether science is on the verge of the biggest breakthrough in history or on the event horizon of creating a black hole. Even some physicists are concerned that while we think we are safely recreating only the first instant of the Big Bang, we may actually be hitting the “Reset” button on the entire cycle of creation instead.

High energy particle colliders are nothing new. The first ones were developed in the 1930s and called cyclotrons. This type of device used large magnets to guide and accelerate particles ever faster through a spiral configuration. By the early 1940s, such a device was used to enrich uranium for the Manhattan Project. The cyclotrons were eventually developed into extreme high-energy particle colliders which were the biggest machines ever conceived and can only be seen in their entirety from the air because, instead of spiral tracks, they use full circles that are miles wide. They are often referred to as “atom smashers” because they send two particles at high speed around a circle in opposite directions and then document their collision. There are currently seventy-five particle colliders located on six continents around the world. Of the largest, one is the International Linear Collider located at Fermilab. The other is the Large Hadron Collider built for CERN, which is the European Organization for Nuclear Research.

The expanded use of so many colliders opened the door for multiple research projects revealing the existence of one new particle after another. Of course, with every new particle came its anti-particle twin. The cornucopia of new particle discovery was so plentiful that it eventually became known as “the particle zoo.” It’s important to realize that few, if any, of these anti-particles have actually been recorded. They are merely theorized to keep the mathematical equations balanced. This same sort of theoretical balancing act is also applied to the existence of many fields and forces. For every force, there must be a particle to carry it. Conversely, every new particle found by the colliders must be associated with a force.

The most elusive of these particles, and one that the LHC was specifically designed to find, is the Higgs Boson, which is associated with the Higgs Field. It is commonly referenced in science circles as the “God particle” and is thought to be the reason why things have mass. The force of gravity is associated with mass. In Einstein’s pursuit of a single Theory of Everything (TOE), he simply could not get gravity to play well with relativity theory. And neither could anyone else. Mass and gravity have successfully provided a monkey wrench to thwart all attempts by physicists to establish a Grand Unified Theory (GUT).

Considering the fact that much of the science behind the experiments that will be conducted at the LHC are, at best, theoretical, is it any wonder so many folks are nervous about what might happen? Let’s get a historical perspective. Even though theories of the world being round instead of flat were recorded as early as fourth century B.C., many still thought that Columbus would certainly fall of the edge of the Earth if he sailed west into the unknown. Many people, scientists among them, thought that a plane would simply explode if it attempted to break the sound barrier. When the U.S. was ready to send a living being into orbit, they chose a chimp rather than a human because they were concerned about unknown contaminations from space. It’s often overlooked that Einstein did not win his Nobel Prize in Physics for E=mc2. At the time, relativity theory was looked upon with a raised eyebrow and the scientific community withheld its laurels until the theory could be substantiated. History shows us that new theories are usually not embraced immediately. More often than not, they are fully accepted only after they are proven.

Will the LHC create an uncontrollable Big Bang or a black hole big enough to swallow the Earth and all its surrounding space, as sensationalized by the popular media? Not likely. It’s more likely that the quantum leap of faith taken by a few contemporary physicists will demonstrate a lack of

fear based on an understanding that transcends the science and the math. In doing so, they just might give us a small glimpse from a unique perspective into the nature of reality.