Physics group looks ahead past LHC to LEP3

August 8 2012, by Bob Yirka

(Phys.org) -- A group of physicists is looking beyond the usefulness of the Large Hadron Collider (LHC) to a new collider that would sit in the tunnel still occupied by the LHC, to an updated version of what was there before, the Large Electron-Positron Collider (LEP). The new one would be called, aptly enough, LEP3. The group, from the UK, Russia, Japan, Switzerland and the US, say the collider would be used to study the Higgs boson.

The infamous LHC, is of course, the large circular piece of machinery that sits in a tunnel beneath the ground near Geneva, Switzerland and is used to study what happens when sub-atomic particles are smashed together at very high speeds. Two projects there, ATLAS and CMS, part of the CERN research effort, recently made worldwide headlines after proving the existence of a “Higgs-like” particle that most believe to be

the elusive Higgs boson. Current research efforts on that project are still undergoing, with both teams still hoping to offer definitive proof that the particle they are observing is indeed the Higgs. But then what? That's the question on the minds of many as plans for utilizing the massively expensive experimental equipment look as far ahead as perhaps the 2030's. And because such equipment takes years of planning and construction, physics teams have already been formed looking towards the next phase.

First, virtually all agree that the LHC equipment will be upgraded over the next decade or so, to bump up its energy and luminosity. After that though, it appears the next step will depend on what researchers turn up using the LHC. Most assuredly, more will be learned about the Higgs, but if new experiments also uncover more particles, such as the supersymmteric particle, than physicists will want to be able to study those as well, which would dim the prospects of a project that could only study the Higgs, such as LEP3. That's where other proposals such as the International Linear Collider (ILC) and the Compact Linear Collider (CLIC) come in, both are capable of including the study of other particles, but both would also cost more.

One major difference between the LHC and LEP3 would be the type of particles that are smashed together. The LHC runs protons into protons, whereas LEP3 would run electrons into positrons or vice-versa. LEP3 also calls for two accelerator rings rather than just the one used by the LHC. The team says they believe the LEP3 could be built in as little as ten years using the existing infrastructure and could even coexist with the LHC for some amount of time if necessary.