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US lab eyes more time to hunt Higgs boson particle

By Paul Rincon

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A US "atom smasher" may get three more years of life in order to continue its hunt for the so-called God particle.

The Tevatron accelerator could now remain operational until 2014, as physicists there now think the Higgs boson is within their reach.

The elusive Higgs boson is a sub-atomic particle considered crucial to the current theory of particle physics.

Scientists gave details of the discussions here at a major physics conference in Paris.

The International Conference on High Energy Physics (ICHEP) runs from 22-28 July.

The Tevatron, based in Batavia, Illinois, is operated by the Fermi National Accelerator Laboratory (Fermilab).

The accelerator is the principal US rival to the Large Hadron Collider (LHC), which is located on the French-Swiss border.

Both machines aim to be first in the hunt to find the Higgs.

Extending the lifetime of the US accelerator is a potential game-changer.

Some physicists say the LHC may not be in a position to detect the Higgs for 2-3 years.

The European machine will continue its current science run at around half its design energy until 2011. It will then be shut down for up to a year for maintenance work.

An extension to 2014 could give the Tevatron an advantage in the Higgs race.

Advantage Tevatron?

The LHC is capable of higher energies than the Tevatron. But the US accelerator is currently capable of greater luminosities. This describes the intensity of the particle beams and determines the number of collisions that are possible with them.

Current experimental data constraining the mass range in which the Higgs is expected to be found appear to bode well for the US accelerator.

Stefan Soldner-Rembold, spokesman for the DZero experiment at the Tevatron, told BBC News: "We have made big progress at the Tevatron... we have collected lots of data over the last couple of years and this will help us to exclude a significant range of possible Higgs masses.

"This will make the region where the Higgs boson can hide smaller and smaller."

Speaking at ICHEP, Dr Donatella Lucchesi commented: "These Higgs mass ranges are within reach of the Tevatron."

Dr Lucchesi, who works on the Collider Detector (CDF) experiment at Fermilab, said: "Tevatron can do it."

By the end of 2011, the Tevatron is expected to be delivering more data per experiment, she explained. Improved analysis techniques could further boost the chances of detecting a Higgs signal.

A decision could be taken by the end of this year on an extension for the Tevatron. The financing has yet to be worked out, as has staffing.

The components in the machine may also be a limiting factor - they are exposed to high radiation levels during operation, which can hinder their performance over time.

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