LHC throws up yet another surprise

By T V Venkateswaran

New Delhi, April 19 (India Science Wire): The announcement of the results from one of the Large Hadron Collider 'beauty' experiments has startled the scientists, perhaps indicating possible revolution in physics akin to Dalton, Rutherford, Newton and Einstein, dismantling the current 'Standard Model' of particle physics by finding 'intriguing anomalies in the way some fundamental particles decay.'

While deer and moose have antlers and zebras and horses don't, the anatomical structure of all these are very closely related as they evolved from a common ancestor. In the same way, a muon although 200 times heavier than the electron, in the Standard Model, is expected to behave the same way in a property known as lepton universality. The LHCb experiments tested if this indeed is true by counting how many times B meson decays into K meson and a pair of oppositely charged muons or into K meson and an electron-positron pair.

The Standard Model, predicts "up to a small and calculable effect due to the mass difference, electron and muons should be produced with the same probability in this specific B0 decay". The results announced on Tuesday show that the decays involving muons occur less often and indicating 'discrepancy with the Standard Model occurs at the level of 2.2 to 2.5 sigma'.

"Whether this would result in dramatic change or alteration, this result means significant modification of the Standard Model", says Dr Rahul Sinha, a faculty member at The Institute of Mathematical Sciences, Chennai. Significantly it was Dr Sinha and his collaborators who way back in 2000 had computed this rare and very sensitive decay mode to discover physics beyond the Standard Model.

The standard model is what physicist have as an answer to the question, 'what are we made up of?' This elegant theory tries to explain what the world is made up and how they interact with each other producing variety of materials from atoms of gold to why water is less dense when frozen. The LHCb (standing for "Large Hadron Collider beauty") experiment is one of seven particle physics detector experiments conducted using the accelerator at European organisation for nuclear research (CERN), testing the limits of the Standard Model.

Does the startling announcement made this Tuesday imply Standard Model is consigned to the dustbin? In the history of science, after the planet Uranus was discovered by William Herschel in 1781 when the anomaly in its orbit was discovered, some astronomers claimed that there was yet another undiscovered planet beyond Uranus exerting gravitational pull resulting in the perturbation. While some others asserted that Newton's laws of gravity are not applicable in the celestial realm. Ultimately Neptune was discovered putting to rest the controversy. However, a similar perturbation observed in the orbital path of Mercury was resolved only with the Einstein's revolution, replacing Newton's physics.

Dr Sinha says, 'given the data reported on Tuesday and corresponding mode measured earlier, we can be conclusive that we need to change; whether it would be dramatic like Rutherford model replacing the earlier indivisible idea of the atom we cannot say at this point'.

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