



“Fundamental Physics and the LHC: A Progress Report”

Last July's discovery of a “Higgs-like” particle at the Large Hadron Collider was a triumph for both experiment and theory in fundamental physics. But the Higgs also introduces major conceptual paradoxes that strongly suggest we are missing essential new physical principles. Chief amongst these is the severe “naturalness” or “fine-tuning” problem, which arises in trying to answer a simple question: why is there a macroscopic universe? It has long been thought that this mystery would be solved by new symmetries or dynamics at the distance scales probed by the LHC. If so, what should we make of the absence of obvious signs of new physics at the LHC so far? Are entirely different kinds of explanations possible? And what should we be looking for from the LHC when it restarts in 2015? In this talk, I will summarize this excitingly confusing state of affairs, and discuss what we can hope to learn by 2020.

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