Theoretical Elementary Particle (TEP) Physics Seminar

UCLA

Thursday, March 2 @ 10:45 AM
Physics & Astronomy Building (PAB) 4-330

Hidden Sectors and New Signatures

David Curtin (University of Maryland)

The fundamental reasons to expect physics beyond the Standard Model are more urgent than ever, making null results of searches at the Large Hadron Collider (LHC) and other experiments especially puzzling. This points us towards new theories for addressing these fundamental mysteries, and new experimental approaches for discovering them. I will discuss how theories of Hidden Sectors can realize Naturalness, Baryogenesis, or Dark Matter. My focus is the detailed phenomenology of Neutral Naturalness, which can solve the Hierarchy Problem while escaping current LHC constraints. Fortunately, these and other Hidden Sector scenarios are discoverable via dedicated collider searches for long-lived particles (LLPs), and cosmological or astrophysical observations. I outline the implications for future colliders, as well as our ongoing efforts to create a systematic LLP search program at the LHC in collaboration with ATLAS, CMS and LHCb experimentalists. Exploring this Lifetime Frontier also requires new detectors, and our proposed MATHUSLA experiment will boost the sensitivity of the HL-LHC by orders of magnitude.

Bio: David Curtin is a postdoc working in high-energy phenomenology at the University of Maryland. He previously worked at the C. N. Yang Institute for Theoretical Physics at Stony Brook University, and completed his PhD in 2011 at Cornell University under his advisor Csaba Csaki. He was born in Germany and did his undergraduate studies in Australia. His main research interests include theories of Hidden Sectors like Neutral Naturalness, new searches and new experiments for long-lived particles, collider phenomenology, using the Higgs Boson to look for new physics, early-universe cosmology, finite-temperature field theory and electroweak baryogenesis, and future colliders.