APR15-2015-000459

Abstract for an Invited Paper for the APR15 Meeting of the American Physical Society

Henry Primakoff Award for Early Career Particle Physics Talk: The Search for Dark Sectors ROUVEN ESSIG, State Univ of NY- Stony Brook

Dark sectors, consisting of new, light, weakly-coupled particles that do not interact with the known strong, weak, or electromagnetic forces, are a particularly interesting possibility for new physics. Nature may contain numerous dark sectors, each with their own beautiful structure, distinct particles, and forces. Examples of dark sector particles include dark photons, axions, axion-like particles, and dark matter. In many cases, the exploration of dark sectors can proceed with existing facilities and comparatively modest experiments. This talk summarizes the physics motivation for dark sectors and the exciting opportunities for experimental exploration. Particular emphasis will be given to the search for dark photons, the mediators of a broken dark U(1) gauge theory that kinetically mixes with the Standard Model hypercharge, with masses in the MeV-to-GeV range. Experimental searches include low-energy e+e- colliders, new and old high-intensity fixed-target experiments, and high-energy colliders. The talk will highlight the APEX and HPS experiments at Jefferson Lab, which are pioneering, low-cost experiments to search for dark photons in fixed target electroproduction. Over the next few years, they have the potential for a transformative discovery.