“Searching for whispers from beyond the standard model”

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Monday, April 8th
PAB 4-330 at 10:30AM

Searches for high energy signatures from beyond the standard model physics have advanced greatly, but a lot of ground remains to be covered for soft, low energy signals. At the LHC, searches for long-lived particles are such an example, as qualitative gains are possible by making full use of the LHCb cavern in the phase II upgrade. In the context of dark matter direct detection, future single-phonon detectors will be sensitive to dark matter with a mass as low as roughly 10 keV.

In this regime, the conventional nuclear recoil picture no longer applies and new theoretical tools are needed to correctly compute the scattering rate. I will discuss the prospects for detector concepts based on superfluid helium and polar material targets, where in the latter case we find a large daily modulation of the scattering rate.

Simon Knapen is a postdoc at the Institute for Advanced Studies (IAS) - Princeton studying theoretical particle physics. He completed his PhD in 2014 at Rutgers University - New Brunswick, NJ, on the impact of the discovery on the Higgs boson on supersymmetric extensions of the Standard model. Before joining the IAS in September of 2018, he was a postdoc at UC Berkeley and Lawrence Berkeley National Lab. His primary focus is on identifying new ways to search for subtle signatures of beyond the standard model physics, at the LHC and in dark matter direct detection experiments.