



The University of Chicago

Physics Department

Colloquium

Search for Dark Matter with Atomic Precision Spectroscopy



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3:30pm CDT, April 14, 2022

In-person: KPTC 106

Zoom information will be emailed to our events lists, to be added, send request to

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The Standard Model of particle physics describes virtually all measurements of elementary particles exquisitely well, and yet various astrophysical evidence points to new physics beyond the Standard Model. Recently it has been proposed to search for particles outside the Standard Model in an intermediate mass range (100 eV to 100 MeV) by means of precision isotope shift spectroscopy on narrow optical transitions. The exquisite precision of optical spectroscopy thus allows one to access high-energy physics with experiments at the eV scale. We report nonlinearities in so-called King plots of measured isotope shifts for trapped Yb⁺ ions. Such nonlinearities can indicate physics beyond the Standard Model, or be due to higher-order nuclear effects within the Standard Model. We also discuss how future more precise measurements on more transitions, in combination with improved atomic-structure calculations, can be used to distinguish between effects within and outside the Standard Model.

