



LABORATORY FOR ELEMENTARY-PARTICLE PHYSICS (LEPP)

Joint Experimental and Theory Seminar in Particle Physics and Cosmology

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New Directions in the Search for Light Dark Matter



Weakly Interacting Massive Particles (WIMPs) have been the main focus of the Dark Matter (DM) community for many years. However, there are both experimental clues and theoretical motivation to think beyond the WIMP paradigm and consider new ideas in the search for DM. I discuss two such new directions. First I explore a novel low-threshold direct-detection concept for DM, based on the breaking of chemical bonds between atoms. This includes the dissociation of molecules and the creation of defects in a lattice. With thresholds of a few to 10's of eV, such an experiment could probe the nuclear couplings of dark matter particles as light as a few tens of MeV. I also discuss the possibility of detecting solar neutrinos, including pp neutrinos, with this experimental concept. Second, I discuss the possible application of similar physics for the detection of ultra-light, strongly interacting DM, by searching for emission lines caused by vibrational and rotational excitations of molecules, within cold molecular clouds in the Milky Way.

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1:00pm

401 Physical Sciences Bldg.