PHYSICS COLLOQUIUM

September 18; 4pm; Rm 118 Nieuwland

Fundamental Physics with Electroweak Probes of Nuclei

Prof. Saori Pastore
Department of Physics
Washington University in St. Louis

The past decade has witnessed tremendous progress in the theoretical and computational tools that produce our understanding of nuclei. Microscopic calculations of nuclear structure and reactions have successfully explained the available experimental data, yielding a complex picture of the way nuclei interact with electrons and neutrinos. This achievement is of great interest from the pure nuclear-physics point of view. But it is of much broader interest too, because the level of accuracy and condence reached by these calculations opens up the concrete possibility of using nuclei to address open questions in other sub-elds of physics that study, e.g., fundamental properties of neutrinos, or the particle nature of dark matter.

In this talk, I will review recent progress in microscopic calculations of lepton-nucleus interactions, including beta and neutrinoless double-beta decay rates. I will illustrate the key dynamical features required to explain the available experimental data, and present a novel framework to calculate neutrino-nucleus cross sections for A > 12 nuclei relevant to current and planned neutrino oscillation experimental programs.