

Title: Low-energy electro-weak reactions: from QCD to astrophysics

Speaker: Doron Gazit (INT, University of Washington) Abstract:

Recent theoretical developments, in low energy description of the strong interaction and in few-body methods, enable a description of light nuclei, essentially without free parameters, from their nucleonic degrees of freedom. This opens a ray of oppurtunities, ranging from QCD to astrophysics. In astrophysics, I will present ab-initio calculations of neutrino inelastic scattering on the trinuclei and ^4He , which are unavailable experimentally. These can affect the explosion mechanism of core-collapse supernova, and determine the amount of ^7Li produced in this scenario. In nuclear physics, describing triton β -decay using χPT gives us an objective look at short range correlations in the nucleus, and the elusive three nucleon forces. The same process in ^6He helps us assess fundamental problems, such as the $g_A \rightarrow 1$ problem. In addition, I will discuss the process of muon capture on ^3He , where precision experimental data and theoretical evaluation combine together to grant a deep look into the weak structure of the nucleon, giving the strongest bounds on the induced pseudoscalar form factor, and on the conservation of vector current (CVC) hypothesis. Finally, I will present a recent proposal of calculating weak interaction within the AdS/QCD correspondence, and its prospect in calculating the low-energy-constants in the nuclear Lagrangian.