Contribution ID: **18** Type: **Oral**

Theoretical study of muon capture in light nuclei

Tuesday 10 September 2013 15:20 (25 minutes)

In this talk we review the theoretical calculations of muon capture reactions in light nuclei performed within the chiral effective field theory (EFT). In this approach the pions and nucleons are retained as degrees of freedom, but their mutual interactions, and their interactions with an external electroweak current, are constrained by the the symmetries of QCD, in particular its (spontaneously broken)
chiral symmetry. In this way it is possible to construct in a consistent way both the nuclear strong-interaction potentials and the charge-changing weak currents. The unknown parameters entering the Lagrangian have been fixed to reproduce pion-nucleon scattering data,
nucleon-nucleon (NN) scattering data, the A=2 and 3 binding energies, and the triton Gamow-Teller matrix element, allowing for parameter-free predictions of the muon capture rates. We will present the results obtained in this approach for the muon capture on 2H and 3He nuclei. We will also present the results obtained for p-p fusion at energies of astrophysical interest.

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Session Classification: Tu - 3