

Proton-proton weak capture in chiral effective field theory

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Chiral effective field theory (chiEFT) provides a unique opportunity to study nuclear reactions within a framework, where the nuclear Hamiltonian and the nuclear electro-weak transition operators are consistently derived. We have applied such a framework to study muon capture on light nuclei [1], and we have verified that the calculated total capture rate is in agreement with the available experimental data, as well as with the results obtained in the "old-fashion" potential-model approach [2]. Encouraged by these results, we have applied the same chiEFT framework to study the proton-proton weak capture reaction, in a wide energy range (0-100 keV). After reviewing the main aspects of this calculation, I will present the results for the astrophysical S-factor, and discuss their implications.

[1] L.E. Marcucci et al., Phys. Rev. Lett. 108, 052502 (2012);

[2] L.E. Marcucci et al., Phys. Rev. C 83, 014002 (2011).