Contribution ID: **101** Type: **Workshop Talk**

Probing Stellar Reactions and Fundamental Symmetries with Indirect Methods at Low Energies

Thursday, 27 November 2025 09:30 (35 minutes)

Indirect nuclear astrophysics methods are essential for determining stellar reaction rates, especially when direct measurements are challenging. This contribution will highlight recent advances using the Trojan Horse Method (THM) [1,2] to investigate key reactions in stars, such as carbon burning (12C+12C and 12C+16O fusion). Our studies focus on the dominant alpha and proton evaporation
channels, revealing resonant structures in the cross-sections that significantly boost reaction rates at stellar temperatures. Furthermore, this presentation will discuss a unique application of indirect techniques to probe the charge symmetry breaking of nuclear forces. We achieve this through the measurement of the Coulomb-free proton-proton scattering length via the quasifree p(d,pp)n reaction. These diverse applications, achievable with low-energy accelerators, underscore the power of indirect approaches in unraveling fundamental nuclear properties and their impact on stellar evolution, including the influence of nuclear clustering on reaction pathways.

[1] A. Tumino, C.A. Bertulani, M. La Cognata, L. Lamia, R.G. Pizzone, S. Romano and S. Typel, Annual Review of Nuclear and Particle Science 71, (2021) 033642
[2] A. Tumino et al., Progress in Particle and Nuclear Physics 143 (2025) 104164

Primary author: TUMINO, Aurora

Presenter: TUMINO, Aurora

Session Classification: Workshop

Track Classification: Workshop Talks