

NUCLEAR ASTROPHYSICS WITH CHARGED PARTICLE DETECTORS AND GAMMA-BEAMS AT THE ELI-NP IN ROMANIA

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Gamma-ray beams provide a unique opportunity to address key questions in nuclear astrophysics by measuring the inverse photo-dissociation reaction; e.g the (γ, α) or the (γ, p) reactions. Such studies gain from the enhancement due to detailed balance and the smaller background. We formed a collaboration, the Charged Particle Working Group (CPWG) of the Extreme Light Infrastructure-Nuclear Physics (ELI-NP) facility under construction in Magurele near Bucharest in Romania, for measurements of selected key reactions in nuclear astrophysics including the $^{16}\text{O}(\gamma, \alpha)^{12}\text{C}$, $^{24}\text{Mg}(\gamma, \alpha)^{20}\text{Ne}$ and p-process reactions as well as photonuclear reactions taking place in the last evolutionary stages of massive stars.

The CPWG of the ELI-NP facility in Romania is approved to construct two detectors; an electronic readout TPC (eTPC) and silicon strip detector (SSD) array. A demonstration mini-eTPC was constructed, tested and delivered to the ELI-NP and we have built and tested a prototype of the SSD array using accelerated beams from the INFN-LNS Tandem. We will discuss the technical aspects of the eTPC and SSD array and review the proposed scientific program of the CPWG.