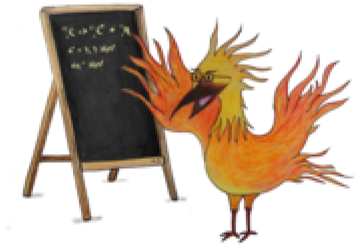

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Study of key resonances in the 30P(p,γ)31S reaction in massive classical novae

Classical novae outbursts are the third most energetic explosions in the Universe after gamma-ray bursts and supernovae. During this explosive burning, nucleosynthesis takes place and the newly synthesized material is ejected into the interstellar medium. In order to understand these objects, the study of presolar grains and γ-ray emitters are of specific interest since they can give direct insights into the nucleosynthesis processes and isotopic abundances.

The 30P(p,γ)31S reaction is one of the few remaining reactions with a rate uncertainty which has a strong impact on classical novae model predictions. Sensitivity studies have shown that it has the largest impact on the predicted elemental abundance ratios of Si/H, O/S, S/Al, O/P and P/Al, which can be used to constrain physical properties of classical novae. The 30Si/28Si isotopic ratio, which is an important signature that helps to identify presolar meteoritic grains of a likely nova origin, depends also strongly on the 30P(p,γ)31S reaction rate.

To reduce the nuclear uncertainties associated to this reaction we performed an experiment at ALTO facility of Orsay using the 31P(3He,t)31S reaction to populate 31S excited states of astrophysical interest. The tritons were momentum analyzed using the Enge Split-Pole magnetic spectrometer and the decaying protons were detected in coincidence in an array of DSSSDs (Double Sided Silicon Stripped
Detectors). The comparison of the focal plane spectra obtained for single and coincidence events will allow the extraction of the proton branching ratios.

In this poster we will present the astrophysical context of this work, the experiment set up
and the analysis of the single events from the Split-Pole focal plane detector.

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