New progress in the experimental studies of the ${}^{46}\mathrm{Mn}\;\beta^+$ decay channel

Monday, June 10, 2024 4:00 PM (25 minutes)

The 44 Ti nucleosynthesis takes place in Core Collapse Supernova (CCSN) explosions, the final process suffered by stars with initial mass greater than 8 M $_{\odot}$. This, alongside its characteristic gamma decay chain, turns the isotope into a good gamma tracer of Supernovae events. Besides, the comparison between observations and models of the synthesized 44 Ti in CCSN gives important constraints to the models in which reaction networks are used for modeling nucleosynthesis occurring in the last stages of those stars with thermonuclear reaction rates as its inputs [1,2,3].

Indirect methods, such as the β -delayed proton emission, may help us to approach narrow isolated resonances which are very difficult to study in a direct way by the current nuclear laboratories. This is the case of the ${}^{45}V(p,\gamma){}^{46}Cr$ reaction, one of the candidates to be sensitive to the nucleosynthesis of ${}^{44}Ti$ in CCSN explosions [1,4,5].

In the current work, we present the advances achieved at analyzing the 45 V(p, γ) 46 Cr reaction by means of the 46 Mn β^+ decay channel. For that purpose and to study the excited states of his daughter nucleus 46 Cr, the 46 Mn was selected among other species in the cocktail beam delivered by LISE fragment separator at GANIL (Caen, France). As part of our results, we present the proton and gamma emission peaks related to the 46 Mn decay and compare them with the work from references [6,7]. Also, we present a p- γ coincidence study to identify the processes linked to the γ emission. Furthermore, we compare the intensities obtained from the γ peaks with those of previous works [6].

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