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Novel results on experimental studies of the 46Mn β+ decay channel and its connection to CCSN

The ^{44}Ti nucleosynthesis, alongside its characteristic gamma decay chain, is a good gamma tracer of Supernovae events. Specifically for Core Collapse Supernova (CCSN) explosions, the final process experienced by stars with initial mass greater than 8 $M_{\odot}$, where the nucleosynthesis takes place. Besides, the comparison between observations and models of the synthetized ^{44}Ti in CCSN gives important constraints to the latter, such as the explosion energy and duration as well as the remnant and ejected masses. In this context, reaction networks are used for modelling nucleosynthesis occurring in the last stages of those stars, using thermonuclear reaction rates as its inputs [1,2,3], among others (mass, half-lives, etc.).

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

In this talk we present the analysis of the ^{45}V(p,γ)^{46}Cr reaction rate 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 preliminary 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 p-γ and γ-γ coincidence studies used to identify the processes linked to the γ emission. From them we have obtained evidence of a possible larger number of proton transitions from the IAS of ^{46}Cr to ^{45}V excited states than the previously seen at [6].

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