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Advances in the beta-decay experimental studies of the 46Mn β+ decay channel

Core Collapse Supernova (CCSN) explosion is the final process suffer by starts with initial mass greater than 8 M⊙. In such processes the 44Ti nucleosynthesis takes place, doing the isotope a good gamma tracer of Supernovae events, due to its characteristic gamma decay chain. The comparison between observations and models of the synthetized 44Ti in CCSN gives important constrains to the models in which reaction networks are used for modelling nucleosynthesis occurring in the last stages of those stars with thermonuclear reaction rates as its inputs [1,2,3].
One of the candidates to be sensitive to nucleosynthesis of 44Ti in CCSN explosions is the 45V(p,γ)46Cr reaction. However, reach a direct study of the reaction cited, is a difficult task for the current nuclear labs. In this context, the indirect methods as the β-delayed proton emission, is one of the opportunities to approach narrow isolated resonances which is the case [1,4,5].
In this work we present new advances and results of analysing the 46Mn decay channel as a way to study the 45V(p,γ)46Cr reaction. The 46Mn was selected among other species in the cocktail beam delivered by LISE fragment separator at GANIL (Caen, France) in order to study its β decay and the excited states of his daughter nucleus 46Cr. We present the proton and gamma emission peaks related to the 46Mn 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 obtained the intensities of the γ peaks for the pure beta emitters, 42Ti and 46Cr which were also detected in this experiment, to corroborate our results.

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Abstracts

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