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Measurement of the neutron capture cross section of ^{64}Ni at n_TOF

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The neutron capture cross section of ^{64}Ni is an important parameter in nuclear astrophysics to accurately simulate stellar nucleosynthesis and validate stellar models. ^{64}Ni is among the seeds of the s-process and acts as an effective bottleneck for the production of the heavier nuclei in the s-process path. For this reason, its neutron capture cross section has been found to be one of the three key nuclear parameters that dominate the uncertainty on the predicted abundances of many nuclei produced by the s-process up to Lead. Moreover, a discrepancy observed in SiC presolar grains between measured ^{64}Ni isotopic ratios and predictions from a promising model for mixing in AGB stars suggests a possible incorrectness of the recommended value of the neutron capture cross section of ^{64}Ni. Experimental measurements available in literature are indeed very scarce and discrepant, especially concerning time-of-flight measurements that are ultimately needed to determine Maxwellian Average Cross Sections (MACS) at different temperatures. For these reasons, a new accurate time-of-flight measurement of the neutron capture cross section of ^{64}Ni has been performed at the n_TOF facility at CERN, taking advantage of its high instantaneous neutron flux and using a highly enriched ^{64}Ni sample. The preliminary results show interesting discrepancies with respect to the cross section recommended in the most recent releases of the evaluated nuclear data libraries. In particular, a huge resonance reported before at 9.52 keV is not observed. As a consequence, a significant impact on the currently adopted MACS in the range of astrophysical interest is expected. The astrophysical motivations, the measurement and the preliminary results will be presented in this contribution.

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