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Measurement of the ^{154}Gd neutron capture cross-section at n_TOF (CERN), and its astrophysical implications

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Among the products of stellar nucleosynthesis heavier than Fe, ^{154}Gd together with ^{152}Gd have the peculiarity to be mainly produced by the slow capture process (the so-called s-process). Only a minor contribution may be produced in other processes. Their almost pure s-process origin makes them crucial for testing various models of the galactic chemical evolution (GCE). According to recent models, solar ^{154}Gd and ^{152}Gd abundances are expected to be 15-20% lower than the abundance of the s-only isotope ^{150}Sm , which is discrepant to observations.

The close correlation between stellar abundances and neutron capture cross sections calls for an accurate measurement of ^{154}Gd cross-section to reduce the uncertainty attributable to nuclear physics input and eventually rule out one of the possible causes of present discrepancies between observation and model predictions. To this end, the neutron capture cross section of ^{154}Gd was measured in a wide energy range and with high resolution in the first experimental area of the neutron time-of-flight facility n_TOF at CERN.

In this talk, after a brief description of the motivation and of the experimental setup used in the measurement, the preliminary results of the ^{154}Gd neutron capture reaction will be presented, together with their astrophysical implications.

Selected session

Nuclear Astrophysics

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