

Indirect measurement of $^{22}\text{Ne}(\alpha,\gamma)^{26}\text{Mg}$ via $^7\text{Li}(^{22}\text{Ne},t)^{26}\text{Mg}$ in inverse kinematics

The reaction $^{22}\text{Ne}(\alpha,\gamma)^{26}\text{Mg}$ is associated with several open questions in nuclear astrophysics and plays a crucial role in constraining stellar models. Among other scenarios, it plays a critical role in the creation of elements heavier than iron. A reliable evaluation of the stellar reaction rate at the energy of astrophysical interest must consider all the possible excited states of the compound nucleus ^{26}Mg in order to reliably predict the reaction cross section, and hence the stellar rate. Due to very low stellar energies and therefore very low cross sections, direct experiments in the laboratory have so far only provided highly uncertain data.

This poster focuses on a forthcoming indirect measurement of the $^{22}\text{Ne}(\alpha,\gamma)^{26}\text{Mg}$ reaction, aiming at providing information on the excited states of ^{26}Mg in the astrophysically important energy range, such as spectroscopic factors and decay widths. The ^{26}Mg states will be selectively populated via the alpha-transfer reaction in inverse kinematics $^7\text{Li}(^{22}\text{Ne}, t)^{26}\text{Mg}$. The combined use of the recoil mass separator EMMA coupled with the highly segmented tracking gamma-ray spectrometer TIGRESS and silicon detectors allows for the reconstruction of the outgoing kinematics and extraction of the properties of the populated excited level of ^{26}Mg . The measurements will be performed at the TRIUMF laboratory in Vancouver, Canada and represent a first step for the evaluation of the cross-section measurements for $^{22}\text{Ne}(\alpha,\gamma)^{26}\text{Mg}$, followed by a direct measurement in the of reduced background environment provided by the Bellotti Ion Beam Facility at LNGS, Italy.

Primary author(s) : MERCOGLIANO, Daniela (Università di Napoli Federico II - INFN sezione Napoli)

Presenter(s) : MERCOGLIANO, Daniela (Università di Napoli Federico II - INFN sezione Napoli)

Track Classification : Astrophysics & Astroparticle Physics