



DFNA
Seminar

Applied Nuclear Physics Department Seminar

24th of November, 2022, 10:00 am

DFNA Seminar Hall,
building 33, 1st floor

Zoom

<https://dfna.nipne.ro/>

Direct measurement of the $^{19}\text{F}(p,\alpha_{\pi})^{16}\text{O}$ reaction at astrophysical energies using silicon strip detector array

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The $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction is of paramount importance for understanding the fluorine abundance in the outer layers of asymptotic giant branch (AGB) stars and it might also play a role in hydrogen-deficient post-AGB star nucleosynthesis. Up to now, theoretical models overproduce F abundances in AGB stars with respect to the observed values, thus calling for further investigation of the reactions involving fluorine. Despite its importance, the S-factors and the branching ratio between the α_{ν} , α_{π} and α_{γ} outgoing channels in the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction are still largely uncertain at astrophysical energies, emphasizing the need for better measurements. Indeed, while the (p,α_0) rate is well constrained by the present existing data, down to the lowest energies, almost nothing is known from experiments on the (p,α_{π}) and (p,α_{γ}) rates at very low energies.

We propose to investigate the cross section and angular distribution of the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction in the energy range between 350 keV and 750 keV in the center-of-mass system, where up to now no definite conclusions have been drawn with direct measurements, by means of a devoted charged particle detection array developed in a common effort between Extreme Light Infrastructure- Nuclear Physics (ELI-NP) and Istituto Nazionale di Fisica Nucleare- Laboratori Nazionali del Sud (INFN-LNS). The simultaneous employment of ELISSA and LHASA will ensure a good energy and position resolution that is a crucial parameter for the measurement and the separation between the three open channels.

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