Preliminary results of ¹⁹F(p,α)¹⁶O reaction at astrophysical energies via direct and indirect methods T. Petruse

The ¹⁹F(p, α)¹⁶O reaction plays a key role in the study of fluorine destruction channel in the proton-rich outer layers of asymptotic giant branch (AGB). The discrepancy between models and observations in the abundances of ¹⁹F requires a revision of the nuclear reaction rates involved in the production and destruction of ¹⁹F in AGB stars. The main destruction channel of fluorine in proton-rich environment is the ¹⁹F(p, α)¹⁶O reaction. This reaction happens in the outer layer of an AGB star, at T₉~0.2. This temperature corresponds to E_{cm}<500 keV.

In the energy range between ~450 keV and ~1000 keV, up to now, no definite conclusions are drawn with direct measurements. To this purpose we used a ¹⁹F beam provided by the LNS Tandem at several energies from 9 up to 20 MeV impinging on CH_2 target, 100 µg/cm2 thick.

Another experiment was performed by means of Trojan Horse Method (THM). The LNS 15 MV Tandem provided a 55 MeV ¹⁹F beam impinging on a 100 ug/cm² CD₂ target. In this case, the investigation of the relevant ¹⁹F(p,α)¹⁶O two-body reaction is performed by selecting the QF-contribution of the ¹⁹F(d,α ¹⁶O)n three-body reaction, using the deuteron target as TH nucleus.

The experimental conditions and the experimental set-ups as well as some preliminary results will be presented for both direct and indirect measurements.