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Spectroscopy of natural parity states in 20Ne via the 19F(p,alpha0) and 19F(p,alphapi) reactions at low energies

The 19F(p,α)16O reaction has a twofold importance: it allows to investigate the spectroscopy of low angular momentum high-energy states in the self-conjugate 20Ne compound nucleus and, at low energy, it is involved in astrophysical models aiming at describing the fluorine nucleosynthesis in stars.

Despite its importance, fragmentary (and often contrasting) experimental data on its absolute reaction cross section were reported in the literature. Recent direct experiments [1,2] triggered by prediction based on indirect techniques [3] led to a better understanding of the low energy behavior of the S-factor for the α0 channel, and pointed out the contribution due broad states in 20Ne. Furthermore, a comprehensive and careful revision of all the data available in the literature has been recently performed [4]; this constitutes an excellent starting point for a general re-analysis on the spectroscopy of high-energy natural-parity states in 20Ne.

In this talk we will discuss preliminary results of a detailed R-matrix analysis of 19F(p,α0)16O and 19F(p,αpi)16O cross section data, and the consequent implications on the reaction rate played by the states contributing to both these reaction channels.

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