Contribution ID : **121** Type : **poster**

$\alpha + d \rightarrow {}^6\mathrm{Li} + \gamma$ astrophysical S-factor and its implications for Big Bang Nucleosynthesis

Saturday, 9 June 2018 14:30 (1:30)

Collaboration

Abstract content

The $\alpha + d \rightarrow {}^6\mathrm{Li} + \gamma$ radiative capture is studied in order to predict the ^{6}Li primordial abundance. Within a two-body framework, the α particle and the deuteron are considered the structureless constituents of ^{6}Li. Five $\alpha + d$ potentials are used to solve the two-body problem: four of them are taken from the literature, only one having also a tensor component. A fifth model is here constructed in order to reproduce, besides the ^{6}Li static properties as binding energy, magnetic dipole and electric quadrupole moments, also the S-state asymptotic normalization coefficient (ANC). The two-body bound and scattering problem is solved with different techniques, in order to minimize the numerical uncertainty of the present results. The long-wavelength approximation is used, and therefore only the electric dipole and quadrupole operators are retained. The astrophysical S-factor is found to be significantly sensitive to the ANC, but in all the cases in good agreement with the available experimental data. The theoretical uncertainty has been estimated of the order of few % when the potentials which reproduce the ANC are considered, but increases up to $\simeq 20\%$ when all the five potential models are retained. The effect of this S-factor prediction on the ^{6}Li primordial abundance is studied, using the public code PArthENoPE. For the five models considered here we find ^{6}Li/H$= (0.9 - 1.8) \cdot 10^{-14}$, with the baryon density parameter in the 3-σ range of Planck 2015 analysis, $\Omega_b h^2 = 0.02226 \pm 0.00023$.

Primary author(s) : GRASSI, Alessandro (Jagiellonian University)

Presenter(s) : GRASSI, Alessandro (Jagiellonian University)

Session Classification : Poster Session