Few-Nucleon Reactions of Astrophysical Interest: a Review

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We present a review of theoretical studies of few-nucleon reactions of astrophysical interest. In particular, we will consider, in the energy range of interest for Big Bang Nucleosynthesis (BBN), the $d(p,\gamma)^3$He, the ^{4}He$(d,\gamma)^6$Li, and the ^{6}Li$(p,\gamma)^7$Be radiative captures. The first reaction has been studied within an *ab-initio* approach [1]: by using a realistic phenomenological model for the nuclear interaction and current, the astrophysical S-factor and differential cross section have been studied in a wide energy range. We will review also the consequences for the standard BBN predictions of the primordial deuterium abundance. The improvements for this study will be discussed. The theoretical predictions for the other two radiative reactions have been obtained within a phenomenological two-body framework, where the incoming nuclei are considered point-like and they are the constituents of the final bound state [2, 3]. Also for these reactions, we will discuss the present status as well as the possible improvements for their theoretical predictions.

References

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