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Study of 19F(p,α) Reaction in Nuclear Astrophysics

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^{19}F (p,α) reaction is one of the crucial reactions in the CNO Cycle. It has the utmost importance in the astrophysical region particularly below the Coulomb barrier [1]. In an astrophysical scenario, the importance astrophysical S-factor is crucial for the understanding of discrepancies in fluorine nucleosynthesis [2-4] and the contribution of direct or resonance at such low energies [5-9]. The THM measurements predicted the presence of 113 KeV resonance contribution to the S-factor [4] . The low energy S-factor also have significant contribution from non-resonant part. Our recent calculation shows an appreciable non-resonant contribution to S-factor in low energy region [9]. The S(0) from the DWBA calculation is found to be 20.357 MeV-b with 40 % uncertainty. The calculation is comparable to NACRE non-resonant value [10]. So, the measurement of ^{19}F (p,α) to get sufficient data points at low energy region is necessary. For that purpose, good quality of target is one of the key factors for this reaction. LiF targets are deposited on self-supporting Ag backing using vacuum evaporation. The thickness of deposited Lithium fluoride is measured by three line alpha sources (^{239}Pu, ^{241}Am, and, ^{244}Cm). The thickness of deposited LiF targets is ~224 μg/cm^2 . The XPS confirms the presence of Li and F on surface of targets. An experiment is planned at FRENA facility, Kolkata to measure astrophysical S-factor in low energy regions.

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Field of work

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