

α -CLUSTER STRUCTURE OF ^{18}O AND ANC MEASUREMENTS ON $(^6\text{Li},d)$ REACTIONS

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Two experiments performed at Florida State University will be presented in this work. The first one is the study of the α -cluster structure of ^{18}O and the second one uses the direct α -transfer at sub-Coulomb energies to determine resonance properties at near-threshold energies on $(^6\text{Li},d)$ reactions.

- The α -cluster structure of ^{18}O was studied through $\alpha+^{14}\text{C}$ elastic scattering using the Thick Target and Inverse Kinematics (TTIK) technique. The analysis was performed using a multi-level, multi-channel R-Matrix approach. It was found that ^{18}O has an elaborate α -cluster structure, including two unusual states with α widths exceeding the single particle limit. A comparison of the observed ^{18}O α -cluster structure with the predictions of the potential model approach was performed.
- Combination of the sub-Coulomb α -transfer reaction and application of the Asymptotic Normalization Coefficient (ANC) technique in the analysis of the experimental data practically eliminates all dependence of the result on model parameters, making this approach a very valuable tool to determine the astrophysical S-factor and astrophysically important reaction rates. In this study we report the ANC measurements of near threshold states for the reactions: $^{16}\text{O}(^6\text{Li},d)^{20}\text{Ne}$, $^{13}\text{C}(^6\text{Li},d)^{17}\text{O}$ and $^{12}\text{C}(^6\text{Li},d)^{16}\text{O}$.