Asymptotic Normalization Coefficients from 3He + 4He and Astrophysical Factor for 3He + 4He -> 7Be + gamma[1] SUSAN ZHANG, Undergraduate Student at Princeton University — The 3He + 4He $\rightarrow$ 7Be + gamma reaction is an especially important pp-chain reaction for the determination of high-energy neutrino-flux from 8B decay. The goal of this project is to draw the attention of experimentalists toward the possibility of determining the astrophysical factor for this reaction using elastic scattering 3He + 4He phase-shift data at $l = 1$. Since this reaction is peripheral at astrophysically relevant energies, the only unknown quantity for calculating the S factor is the asymptotic normalization coefficient (ANC) of 3He + 4He $\rightarrow$ 7Be. This ANC can be determined by extrapolating the scattering amplitude to the poles in the momentum plane corresponding to the ground and excited states of 7Be. For extrapolation, the effective-range theory has been used in the form of the Padé's approximation. Unfortunately, the available measurements are outdated and have large uncertainties, which lead to a corresponding spread in the extracted ANC values. For the astrophysical factor I obtain, $0.36 < S(0) < 0.51$ keV b. Improvement of experimental phase-shift data will allow one to obtain a more accurate value of the ANC and $S(0)$. The same technique can be applied for other important astrophysical reactions.

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