THE RESONATING GROUP MODEL DESCRIPTION OF
THE RADIATIVE CAPTURE REACTION $^3\text{He}(\alpha,\gamma)^7\text{Be}$

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The radiative capture reaction $^3\text{He}(\alpha,\gamma)^7\text{Be}$ plays an important role in the stellar kinetics and significantly contributes to $^7\text{Li}$ production in the Big Bang nucleosynthesis. Abundance of this isotope, in turn, is an important indicator of barion-photon ratio in the Universe. Capability of various experiments to measure the cross sections, $S$-factors, and branching ratios of population of $^7\text{Be}$ levels at astrophysical energies is limited because of the smallness of the cross sections. Therefore, calculations of these values are one of the hottest points of theoretical nuclear astrophysics.

A microscopic approach to the discussed problem using the algebraic version of the resonating group model (AVRGM) \cite{1,2} is built. The modified Hasegawa-Nagata $NN$-potential \cite{3} is involved in the calculation. Two adjustable parameters – the oscillator radius $r_0$ and the intensity of central Majorana forces $g_c$ were tuned to reproduce the energies of $^4\text{He}$, $^3\text{He}$, and $^7\text{Be}$ (in the ground and first excited states) nuclei \cite{4,5} together with the experimental data for the $S$-factor \cite{6–8}. As these results as the ones concerning reaction $^3\text{H}(\alpha,\gamma)^7\text{Li}$ obtained by us earlier \cite{9} demonstrate a good agreement with the experimental data and confirm a capability of the AVRGM to be used to account the properties of astrophysical fusion reactions.