

A SPATIAL RGM BASIS FOR SCATTERING

${}^4\text{He}(\alpha, \alpha){}^4\text{He}$

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S u m m a r y

Within the resonating group method (RGM), the spatial basis taking into account the structure evolution of colliding nuclei is used in the calculation of the parameters of single-channel $\alpha - \alpha$ scattering. A simple two-level step-like approximation for the radial dependence of the oscillator width of the shell model potential of ${}^4\text{He}$ together with a modified Volkov nucleon-nucleon potential enables to describe all scattering phase shifts in the energy region $0 < E(\text{c.m.}) \leq 40$ MeV if, at the internuclear distance less than 3.3 fm, the oscillator width decreases by $\approx 40\%$ comparatively with its phenomenological value at large distances.