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Many-channel cluster microscopic theory of resonance states and scattering in ^{9}Be and ^{9}B

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We applied a many-configurational microscopic cluster model to study the nature of high-energy resonance states in ^{9}Be and ^{9}B near ^{7}Li+d and ^{7}Be+d decay thresholds and to reveal the influence of the states on the astrophysical S-factors of the reactions $^{7}\mathrm{Li}(d,n)\,\alpha\alpha$ and $^{7}\mathrm{Be}(d,p)\,\alpha\alpha$ related to the cosmological lithium problem. Parameters of the above-mentioned resonance states in ^{9}Be and ^{9}B were established. The dominant decay channels were determined for each resonance state.

Two coupled three-cluster configurations $\alpha+\alpha+n$ and $\alpha+d+^{3}$H in ^{9}Be and $\alpha+\alpha+p$ and $\alpha+d+^{3}$He in ^{9}B were considered to invoke dominant binary channels in ^{9}Be and ^{9}B, respectively. The model is an extension of the three-cluster model, formulated in [1], which uses Gaussian and Oscillator basis to describe the internal structure of the binary systems and their asymptotic behavior. The model suggests a realistic description of energy spectrum of ^{9}Be and ^{9}B in a wide range of energy, where many decay channels of the nuclei are open.

[1] V.S. Vasilevsky, F. Arickx, J. Broeckhove, and T.P. Kovalenko, Nucl. Phys. A, vol. 824, p.37, 2009.

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