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# Structural properties and energetics of diffuse $^{87}\text{Rb}$ clusters in three-dimension

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**Article history** 

A correlated two-body basis function is used to describe the three-dimensional bosonic clusters interacting via two-body van der Waals potential. We calculate the ground state and the zero orbital angular momentum excited states for  $\text{Rb}_N$  clusters with up to  $N = 40$ . We solve the many-particle Schrödinger equation by potential harmonics expansion method, which keeps all

possible two-body correlations in the calculation and determines the lowest effective many-body potential. We study energetics and structural properties for such diffuse clusters both at dimer and tuned scattering length. The motivation of the present study is to investigate the possibility of formation of  $N$ -body clusters interacting through the van der Waals interaction. We also compare the system with the well studied He, Ne, and Ar clusters. We also calculate correlation properties and observe the generalised Tjon line for large cluster. We test the validity of the shape-independent potential in the calculation of the ground state energy of such diffuse cluster. These are the first such calculations reported for Rb clusters.

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