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Atomic picture versus covalent picture for the breaking of N=8 magic number in 12Be

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The breaking of N=8 magic number in 12Be is suggested by recent experimental observations (anormalous deformation length, and low-lying 1- and excited 0+ and so on). In the present report, we will discuss the low-lying states of this nucleius based on the microscopic cluster model of alpha+alpha+4N. We will investigate the breaking of N=8 magic number from the viewpoints of the covalent picture and the atomic or ionic one. In the covalent picuture, we employ the so-called molecular orbital (MO) model which is successul to describe the many kinds of properties in 9,10Be. In the MO picture, the competition between the normal configuration ((0p)6) and the 2hw one ((0p)4(sd)2) occurs, and the latter state becomes the ground states due to the strong effect of the spin-orbit interaction. On the other hand, in the atomic (ionic) picutre, we perform the coupled channel calculation among the 4He+8He, 6He+6He, and 5He+7He. We will show the former two configurations (4He+8He and 6He6He) is insufficient to describe the normal and 2hw configuration simultaeously, and the odd-odd cluster, 5He+7He, plays important role for the formation of a pair of the 0+ state. We will also discuss the monopole transition between the ground 0+ and excited one from the viewpoint of the covalen picutre where the delicate competition between the normal configuration and the 2hw one occurs.

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