
Low-lying dipole response within the second RPA in $^{40,48}\text{Ca}$ nuclei

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Résumé

The low-lying dipole strength distributions of ^{40}Ca and ^{48}Ca , in the energy region of the excitation spectrum between 5 and 10 MeV is studied within the second RPA with Skyrme interaction. Experimentally a significant amount of strength is found for ^{48}Ca while RPA models do not usually predict any presence of strength in this energy region. On the contrary Second RPA calculations provide several low-lying states and many of them, despite being essentially 2 particle - 2 hole states, show quite large B(E1) values. These results are in reasonable agreement with other beyond mean-field predictions and with the corresponding experimental measurements. A detailed analysis of the properties of some of these states is done in terms of their 1 particle -1 hole nature, their transition densities and their collectivity. In particular, the coherence of the 1 particle-1 hole configurations in building the total transition probability is analyzed. The issue whether or not these states exhibit some features generally associated with the so-called pygmy dipole resonance is also addressed and discussed.

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