Soft Giant Dipole Modes in Ca Isotopes in the Relativistic RPA

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Abstract: The isovector giant dipole resonance in Ca isotopes is investigated in the framework of the fully consistent relativistic random phase approximation. The calculations are performed in an effective Lagrangian with a parameter set NL3, which was proposed for satisfactorily describing nuclear ground state properties. It is found that a soft isovector dipole mode for Ca isotopes near drip lines exists at energy around 6~7 MeV. The soft dipole states are mainly due to the excitation of the weakly bound and pure neutron (proton) states near Fermi surface as well as the correlation of isoscalar and isovector operators. For nuclei with the extreme value of N/Z, the contributions of isoscalar mesons in the isovector mode play a non-negligible role.

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