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Pair condensation in excited states of neutron-rich nuclei

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Recently we have analysed two types of excited states generated from a ground state described by a pair condensate [1].
One type is obtained by breaking a pair from the ground state condensate and replacing it by ”excited” collective pairs built on time-reversed single-particle orbits. The second type is described by a condensate of identical excited pairs. The structure of these excited states is analysed for the valence neutrons of ^{108}Sn. For a state-dependent pairing interaction, the first type of excited states agree well with the J=0 states which are known in ^{108}Sn.
The states corresponding to the excited pair condensate (EPC) appear at low
energies, around the energy of the second excited state of the first type, and they do not have a simple correspondence with the exact eigenstates of the pairing Hamiltonian. At a much higher excitation energy, of about 20 MeV, we have found an EPC state which is similar in structure to an exact eigenstate. It is shown that this EPC state has features in common with a giant pairing vibration.

[1] Th. Popa, N. Sandulescu, and M. Sambataro, Phys. Rev. C 107 (2023) 034318

Primary author(s) : Mr. POPA, Theodor (Horia Hulubei National Institute of Physics and Nuclear Engineering); Dr. SANDULESCU, Neculai (Horia Hulubei National Institute of Physics and Nuclear Engineering); Dr. SAMBATARO, Michelangelo (Istituto Nazionale di Fisica Nucleare - Sezione di Catania)

Presenter(s) : Mr. POPA, Theodor (Horia Hulubei National Institute of Physics and Nuclear Engineering)

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