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Pairing in highly excited nuclei

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Recent achievements in the study of pairing effects on the properties of highly excited nuclei are discussed. In particular, the nuclear level density and radiative gamma-ray strength function are simultaneously described within a consistent approach based on the exact pairing in good agreement with the experimental data for 170 - 172 Yb isotopes. The gamma-ray strength function is described within the phonon-damping model, which explains the increase of the width of the giant dipole resonance with temperature and angular momentum [1]. Exact pairing is also important in describing the data of angular-momentum gated nuclear level densities in hot rotating 96 Tc nucleus within the interval of excitation energy of 5 - 15 MeV [2]. It is also shown that pairing plays an important role in maintaining a nearly constant value of temperature at low excitation energy, and offers in this way a consistent description of the nuclear level density, which goes smoothly from the low-energy region below 5 MeV to the higher one (up to 20 MeV for Ni isotopes and 10 MeV for Yb isotopes) without the need for matching the constant-temperature model at low energy and the Fermi-gas one at high energy as often performed by using the composite level-density formula [3]. Finally, the effect of exact pairing is incorporated in the Skyrme-Hartree-Fock mean field to study the properties of bubble nuclei 22 O and 34 Si nuclei [4] at finite temperature.

References

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