Role of pairing correlation in the radiative strength function

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The enhancement of radiative strength function (RSF) in the region of low γ-rays energy ($E_\gamma \leq 12$MeV), which is caused by the pygmy dipole resonance (PDR), is treated within the phonon damping model (PDM) plus exact pairing (EP) at finite temperature without adding any extra PDR fitting peak. The numerical calculations performed for $^{161\text{-}163}$Dy show that, because of the effect of exact thermal pairing, the EP+PDM can describe reasonably well the total RSF data in both low- and high-energy regions of γ-rays. Consequently, as compared to the conventional description within the phenomenological generalized Lorentzian (GLO) and standard Lorentzian (SLO) models, the EP+PDM calculations are free from at least eight free parameters. This indicates the important role of microscopic approaches towards the precise prediction of the RSF. In particular, temperature is found to have significant contributions to the RSF below the neutron separation energy, questioning again the validity of the Brink-Axel hypothesis.

Key words: Radiative strength function, Exact pairing, Phonon-damping model, SLO, GLO.