PAIRING FLUCTUATIONS AND GIANT DIPOLE RESONANCE

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Apart from the higher limits of iso-spin and temperature, the properties of atomic nuclei are intriguing and less explored at the limits of lowest but finite temperatures (*T*). At very low *T* there is a strong interplay between the shell (quantal fluctuations), statistical (thermal fluctuations) and residual pairing effects as evidenced from the studies on giant dipole resonance (GDR) [1, 2, 3]. The behavior of nuclei at very low *T* is one among such area where the experimental results are scarce. Due to the recent developments in the experimental facilities, it is now possible to measure certain properties at very low *T* mainly through the GDR [4, 5]. The GDR has been proved to be a unique tool to study the structure of hot nuclei [6, 7]. Since the nucleus is a tiny system, the thermal fluctuations inherent in finite systems are expected to be large. The shape degrees of freedom being crucial for nuclear structure, the deformation parameters are closely associated with the order parameters for the related transitions. Hence the thermal shape fluctuations are the most dominant ones and at low *T* the fluctuations in the pairing field can also contribute significantly.

We discuss our results for certain nuclei and corroborate with the experimental data available. The thermal shape fluctuation model could explain the data successfully at low temperature only with a proper treatment of pairing and its fluctuations. More measurements with better precision could yield rich information about several phase transitions that can happen in warm nuclei.

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