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Origin of the Low-energy Enhancement in the γ -Strength Function

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The γ -strength function, as a function of the γ -ray energy, is a statistical measure of the probability of hot nuclei in the quasi-continuum to deexcite through emitting γ -rays. The γ -strength function is crucial in the (n,γ) cross sections, and is therefore related to the neutron capture processes in nucleosynthesis. The low-energy enhancement, which is a sharp spike of the γ -strength function at zero γ -ray energy, is being discovered in more and more nuclei in recent years. It has been demonstrated to have a large effect on the rapid neutron capture process (the r-process), and was believed to relate to the nuclear scissors motion. However, the origin of such an enhancement is not yet understood. In this talk the origin of the low-energy enhancement is discussed from a collective point of view, with the collective degree of freedom in the scissors motion considered. It is found that the low-energy enhancement arises from the scissors motion in the weakly deformed limit. In this case the scissors motion becomes approximately free, which is called “scissors rotation” in order to distinguish from the well-known scissors vibration.

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