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Spin and parity dependent level densities in exotic calcium isotopes

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Level densities are fundamental quantities in the description of many-body systems. Besides their importance as a basic nuclear structure property, it is well known that, through the statistical model of nuclear reactions, level densities have a strong impact on the results of calculations of other nuclear physics observables. This is particularly so for thermonuclear rates in nucleosynthesis models, in fission and fusion reactor design, and for the derivation of γ−strength functions from the decay of highly excited nuclei. Experimental information on level densities is largely confined to low excitation energies, where knowledge of the excited states is rather complete, and just above the particle emission thresholds, where resonance spacings can be determined from capture reactions. Theoretical model calculations exist for all ranges of nuclei from the highland of stability up to the most exotic nuclei. Nevertheless, there are no experimental data to corroborate these calculations. With the advent of Radioactive Ion Beams of different intensities, many opportunities will be provided in elucidating this important property experimentally. A long range of exotic calcium isotopes level densities will be investigated.

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