Contribution ID: 3

Type: not specified

Level densities from high-resolution spectra

Monday 24 March 2025 15:30 (45 minutes)

I present the extraction of level densities from a fluctuation analysis of high-resolution spectra. In cases where the spectral fluctuations arise from the incoherent overlap of a single class of states with given quantum number J^{π} , a connection can be made between the magnitude of the signal in an autocorrelation analysis and the level spacing. This condition is best fulfilled in experiments selectively enhancing a single giant resonance. The resulting level densities are complementary to most other experiments: they provide data in the excitation energy region of giant resonances (typically 10 - 20 MeV) and they are spin-parity resolved facilitating direct comparison with microscopic calculations.

I then discuss our research plans for the period of the CRP: (1) a comprehensive analysis of data on the ISGMR, IVGDR and ISGQR for a set of key nuclei with a newly developed code providing a systematic uncertainty treatment, (2) studies of the spin dependence based on the set of derived J = 0, 1, 2 level densities, (3) extension to cases with two or more classes of states (e.g. 1^- and 1^+) and test with coincident γ -decay experiments for resolved final states, and (4) exploration of a novel technique to determine level densities in nuclear resonance fluorescence self-absorption experiments.

Author: VON NEUMANN-COSEL, Peter (Institut für Kernphysik, Technische Universität Darmstadt)
Presenter: VON NEUMANN-COSEL, Peter (Institut für Kernphysik, Technische Universität Darmstadt)
Session Classification: Experiments (45' talks, 30' coffee)