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Title: **Gamma-ray Strength Functions in Thermally Excited Rotating Nuclei**

Author(s): T Døssing[1] and B. Herskind[1]
Affiliation: [1]*The Niels Bohr Institute, Blegdamsvej 17, DK-2100 Copenhagen Ø, Denmark*

The study of γ-ray cascades in rotating nuclei probes to investigate the gradual transition with increasing temperature from ordered rotational bands of specific structure to chaotic rotation with fragmented quadrupole transition strength.

Recent data collected by the Gammasphere and Euroball multi-detector arrays provide spectra with enough counts to allow for a detailed study of interactions between excited bands in various temperature ranges. The data are sorted into three-dimensional $E_{\gamma_1} \times E_{\gamma_2} \times E_{\gamma_3}$ spectra, or two-dimensional spectra with specific gates. For the nuclei ^{168}Hf and ^{163}Lu, typically 10^6 triplet consecutive transitions are recorded, such as for example the three steps of cascades connecting angular momenta $34 \rightarrow 32 \rightarrow 30 \rightarrow 28\,\hbar$. The coincidences arising from such sequences are located at specific places, close to the "central valley" at $E_{\gamma_1} = E_{\gamma_2} = E_{\gamma_3}$.

The most intense and most strongly fluctuating regions in the spectra are the the "ridges" in three dimensions, carrying strong transitions emitted from ordered rotational bands. Somewhat wider and more smooth ridges are formed by transitions from interacting bands with fragmented quadrupole strength, still carrying significant rotational energy correlations. The width of such ridges is related to the compound damping width, that is the spreading width of the basis bands. Equivalent wide ridges in two dimensional gated spectra are displayed below. Finally, the most smooth regions of the spectra, the "valleys", contain transitions from highly fragmented rotational decay, emitted from states of temperature up to around 0.5 MeV in rare earth nuclei.

Current studies of fluctuations of such spectra and covariances between gated spectra will be presented. The aim is to obtain clear information about the energy scales characterising the rotational motion of warm nuclei: (*i*) the energy for onset of fragmentation of the rotational transitions, (*ii*) the compound damping width, (*iii*) the rotational damping width.

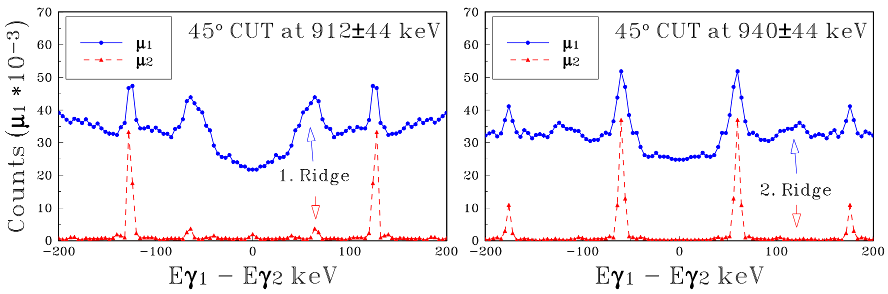

Figure 1: Two "perpendicular cuts" of a two-dimensional spectrum and its second moment, measuring the fluctuations of the spectrum, gated by the S-band in ^{168}Hf. The cut centred at 940 keV contains a coincidence on the S-band on the first ridge. At 912 keV, the cut contains a coincidence on the second ridge, and the first ridge becomes wide and smooth, containing about 100 different coincidences.

Invited talk.