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Gamma ray and recoil coincident measurements , application in lifetime determination of a short-lived nuclear state

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A considerable improvement of measured &gamma-spectra can be achieved when &gamma-rays are detected in coincidence with fusion-evaporation reaction residues selected by the Recoil Filter Detector (RFD). RFD provides a velocity vector of fast recoils and allows for significant Doppler broadening minimization. This unique feature of RFD permits as well to evaluate a lifetime-&tau of an excited state. If &tau is comparable to or shorter than the transit time of the recoil through a target material it can be deduced from the intensity distribution of the gamma transition emitted promptly inside the target, thus giving rise to a tail of the &gamma-line.
In the talk examples of lifetime measurements with the use of RFD coupled to gamma ray arrays as EUROBALL and GASP will be given. In particular, results concerning SD bands in the A~70 mass region will be presented. Perspectives of using such a device at radioactive beams with the AGATA gamma-ray spectrometer will be discussed.

Primary author: BEDNARCZYK, Piotr (IFJ-PAN)

Presenter: BEDNARCZYK, Piotr (IFJ-PAN)

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