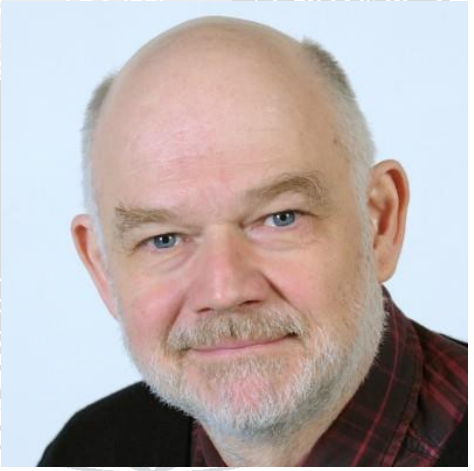
Großes Physikalisches Kolloquium an der Universität zu Köln



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16^{30} Uhr
HS III

Measurement of the isolated nuclear two-photon decay

The nuclear two-photon or double-gamma (2γ) decay is a second-order electromagnetic decay process whereby a nucleus in an excited state emits two gamma rays simultaneously. Compared to first-order decay pathways, such as single photon emission or internal conversion, the two-photon decay branch is very small. Ideal cases for this search are $0^+ \rightarrow 0^+$ transitions, where single photon emission is prohibited. So far, this decay was only observed in ^{16}O, ^{40}Ca and ^{90}Zr, where the high transition energy is favorable for the 2γ branch. At lower energies the 2γ branch becomes prohibitively small for γ-ray spectroscopy (10^{-6-7}). We have therefore combined Schottky + Isochronous Mass Spectrometry (S+IMS) at the Experimental Storage Ring at GSI. This novel technique allowed us to conduct the first measurement of the half-life for the isolated nuclear two-photon decay of the 0^+ isomer in ^{72}Ge. The obtained mass resolving power enables future experiments on nuclear isomers with excitation energies down to ~100 keV and half-lives as short as ~10 ms.