A New Proposal to the High Intensity Gamma-Ray Source (HI$\gamma$S) PAC-10

A new high-efficiency $\gamma$-ray spectroscopy setup for HI$\gamma$S

- The $\gamma^3$ Collaboration -

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1 Experiment Summary

We propose to considerably extend the existing Nuclear Resonance Fluorescence (NRF) setup at the HIγS facility in order to perform γ-γ coincidence experiments with sufficient efficiency. This will allow to investigate the decay behavior of photo-excited states with up to now unprecedented sensitivity. The method of γ-γ coincidence experiments has been used in the past with great success in particle-induced reactions in order to study in detail the decay pattern of nuclear excitations. However in contrast to the NRF reaction, particle-induced reactions often do not (or only weakly) excite low-spin states, especially $J = 1$ states, at high excitation energy. The combination of a γ-ray spectroscopy setup with sufficient efficiency to perform γ-γ coincidences and the mono-energetic high-intensity photon beam of HIγS will thus provide a worldwide unique experimental site to investigate the decay pattern of dipole excitations in atomic nuclei.

This proposal is the initiative of the involved groups in order to implement and commission this new setup. Several experiments are proposed separately to form a campaign, which makes use of the high efficiency and γ-γ coincidence capabilities. The proposed experiments will be part of the thesis of several PhD students, who will also significantly contribute to the implementation and commissioning of the setup.