

High-Precision Spectroscopy Applied to the Study of Nuclear Structure of Exotic Nuclei

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This presentation outlines my research on the development of high-precision atomic spectroscopy techniques aimed at probing the nuclear structure of stable and exotic nuclei. A particular focus is placed on accessing magnetic octupole moments, which are extremely challenging to measure experimentally and provide unique sensitivity to neutron magnetization and nuclear correlations. The approach follows a staged methodology, combining laser and radio-frequency spectroscopy on neutral atoms with ultra-high-resolution spectroscopy of trapped ions in a linear Paul trap. The experimental developments are conceived for integration within major radioactive-beam facilities, including GANIL, CERN-ISOLDE, and the University of Jyväskylä. By exploiting long interaction times and precise control of the electromagnetic environment, this research aims to reach the sensitivity required to access extremely small hyperfine shifts in short-lived nuclei, opening new perspectives for studies of nuclear structure far from stability.

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