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Introduction to Laser Spectroscopy at the TRIGA-SPEC Facility

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On-line laser spectroscopy allows us to study the nuclear ground-state properties of short-lived exotic isotopes by measuring their hyperfine structure and isotope shifts. The properties that can be extracted from this are the nuclear spin, the magnetic moment, the spectroscopic nuclear quadrupole moment, and the change in the mean-square nuclear charge radii between isotopes. Experimental data can be determined with high precision and the nuclear parameters can be extracted in a nuclear-model free way. Collinear laser spectroscopy has played an important role in obtaining hyperfine structures and isotope shifts of short-lived isotopes and is still a versatile tool for the exploration of long isotopic chains reaching far from the valley of nuclear stability. At the TRIGA research reactor at the University of Mainz a collinear laser spectroscopy experiment is currently being installed, which will allow us to study short-lived fission products created by neutron induced fission of, e.g., ^{249}Cf near the reactor core. A gas-jet transport system will be employed to guide the nuclei from the production site close to the nuclear reactor core to an ECR ion source, where ion beams of a large variety of elements including refractory elements will then be produced and after mass separation be guided to the TRIGA-Laser experiment. We will present the technical outline of the experiment, show the results of first beam line performance tests with a surface ion source and report on first specification measurements by laser spectroscopy on a fast beam of stable Rb atoms.

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no

Would you prefer your contribution to be an oral presentation? (please answer yes or no)

yes

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