

## Collinear resonance ionization spectroscopy of neutron rich $^{218\text{m}}, ^{219}, ^{229}, ^{231}\text{Fr}$ isotopes

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The physics results on the neutron rich  $^{218\text{m}}, ^{219}, ^{229}, ^{231}\text{Fr}$  isotopes from the Collinear Resonance Ionization Spectroscopy (CRIS) experimental run in October 2012 at ISOLDE, will be presented. These isotopes are located on the borders of the actinide region in which nuclei are known to possess reflection asymmetric shapes.  $^{218\text{g}}, ^{219}\text{Fr}$  have previously been interpreted as octupole vibrational nuclei in the transitional region between nuclei possessing stable octupole deformation and nuclei with spherical shapes.  $^{229}, ^{231}\text{Fr}$  are located on the neutron rich side of this region of reflection asymmetry and have not been studied in detail before.

The magnetic dipole moment values as well as the relative mean square charge radii of these isotopes were extracted from the measured hyperfine spectra. This allows conclusions to be presented based on the general trend of the relative mean square charge radii of Fr isotopes. Additionally, the relation of the odd-even staggering effect of the isotope shift and presence of reflection asymmetric shapes will be discussed for the case of Fr. Finally, information on the valence nucleon orbital occupation for  $^{219}, ^{229}, ^{231}\text{Fr}$  and its implication on the spin values of  $^{229}, ^{231}\text{Fr}$  will be presented.

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