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Results on francium isotopes at the collinear resonance ionisation spectroscopy (CRIS) setup

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Exotic isotopes of francium with yields as low as 100 ions/second have been examined with high efficiency and low background at the CRIS experiment, by the coupling of collinear laser and resonance ionisation spectroscopy techniques [1]. In addition, pure state beams have been examined even in the midst of isobaric contamination: previous highlights include the separation of overlapping ground and isomeric states in 202Fr and 204Fr with complementary decay spectroscopy techniques [2, 3], and reaching the very neutron-rich isotopes of francium, up to 231Fr [4].

Recently, the use of high-resolution laser techniques has allowed the quadrupole moment of 219Fr to be determined for the first time [5]. In addition, the ability to run at an improved duty cycle has resulted in the first measurements of 214Fr, which with a half-life of 5 ms represents the shortest-lived isotope to be measured online with laser spectroscopy [6]. Laser-assisted nuclear decay spectroscopy of 206Fr has also been performed at the decay spectroscopy station [7]. All of these results will be presented, in light of the improvements made at the CRIS setup.

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[3] M. M. Rajabali et. al., Nucl. Instrum. Methods Phys. Res., Sect. A 707, 35 (2013)

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[5] R. P. de Groote et. al., Phys. Rev. Lett. 115, 132501 (2015)

[6] G. J. Farooq-Smith et. al., In Preparation (2015)

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