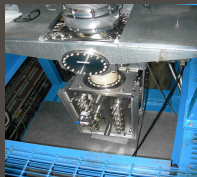


Collinear laser spectroscopy results from December 2011

Matthew Pearson

ISAC science forum

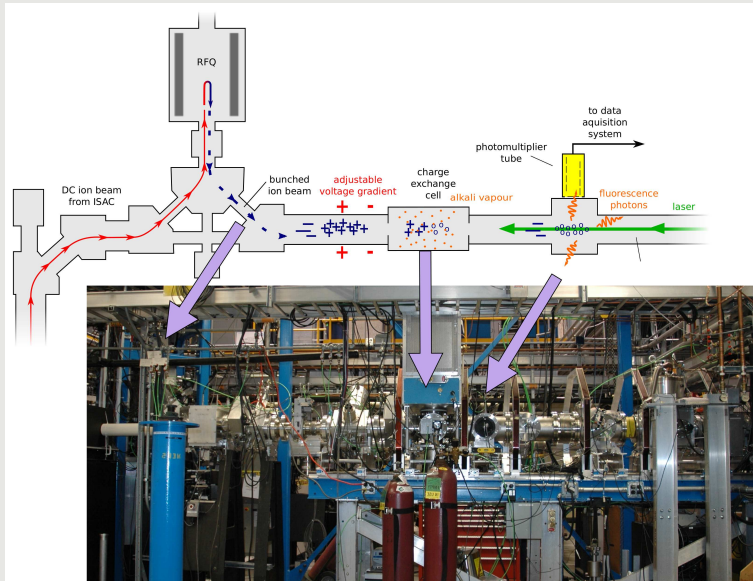
February 1, 2012



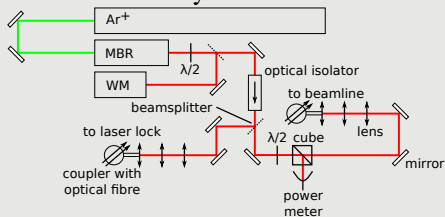
Collinear laser spectroscopy on bunched beams

S1341 RMS charge radii of the heavy Rb isotope

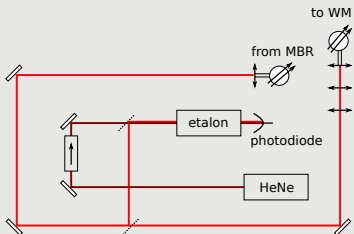
S1010 Hyperfine anomaly measurements in Neutron deficient Fr isotopes



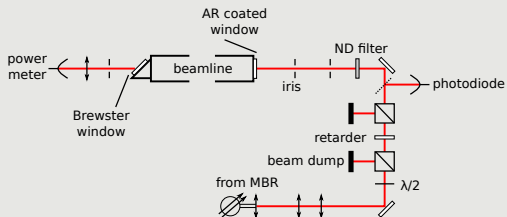
Main laser system → TRINAT

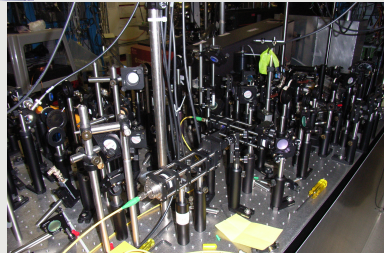
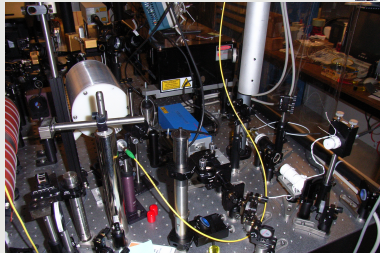
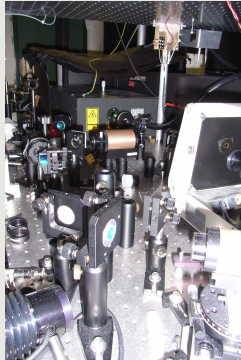


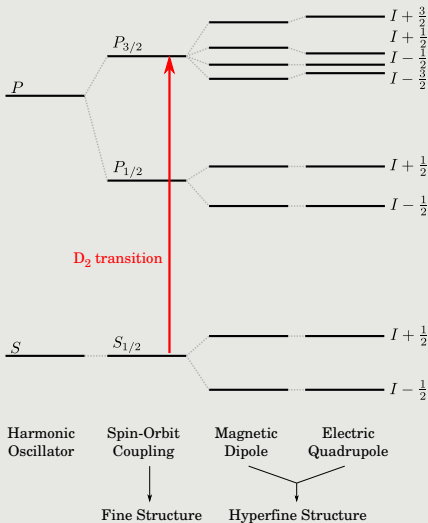
spectroscopy beamline → ISAC hall



long term stabilisation
→ polarised beams







$$\Delta E = \frac{A}{2} C$$

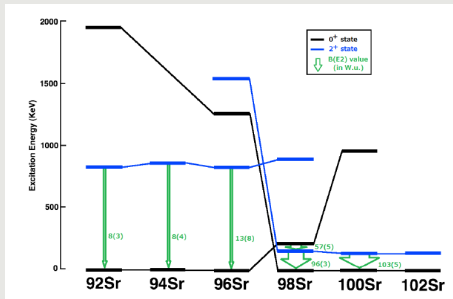
$$+ B \frac{\frac{3}{2} C(C+1) - 2IJ(I+1)(J+1)}{4IJ(2I-1)(2I-1)}$$

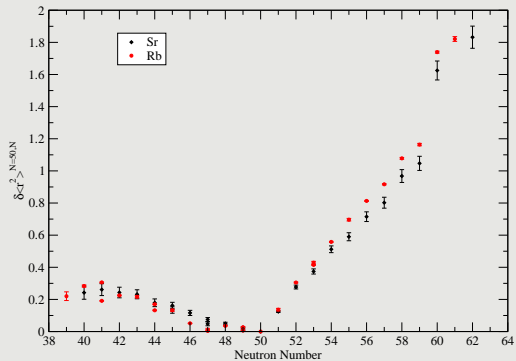
with

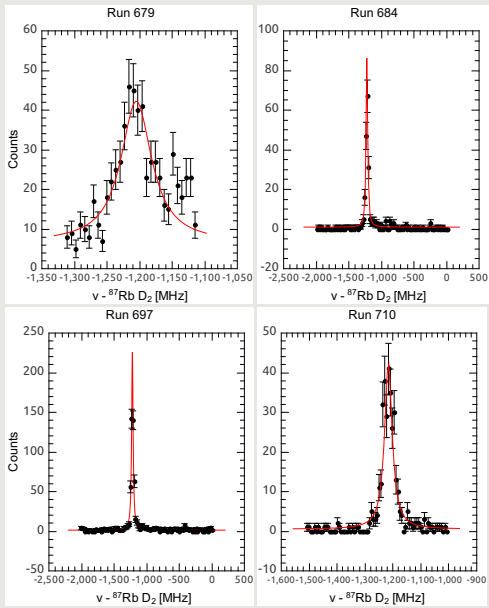
$$C = F(F+1) - I(I+1) - J(J+1),$$

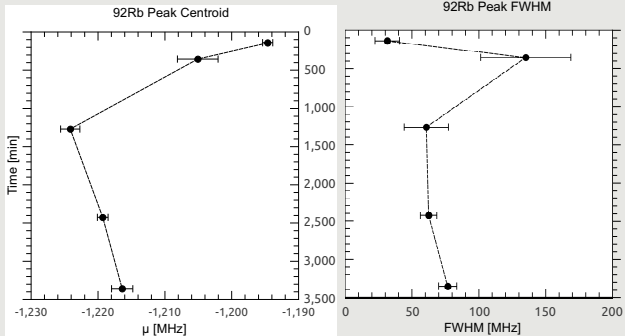
$$A = \frac{\mu B_e}{IJ} \quad \text{and} \quad B = e Q_s \left\langle \frac{\partial^2 V}{\partial z^2} \right\rangle$$

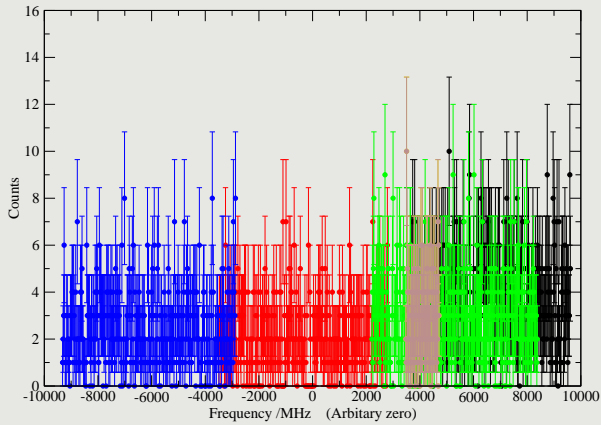
S1341 – Laser spectroscopy on neutron rich Rb isotopes



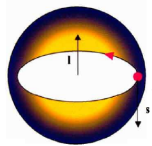
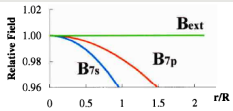




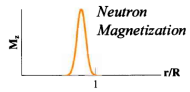




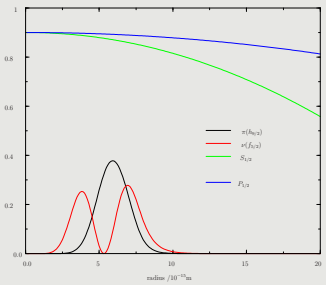
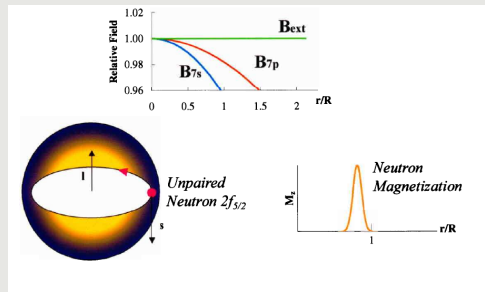
S1010 – Hyperfine anomaly measurements in Neutron
deficient Fr atoms



Unpaired Neutron $2f_{5/2}$



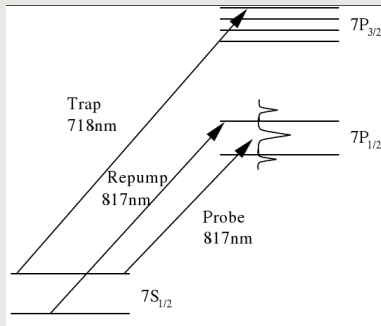
Neutron Magnetization



Bohr Weisskopf effect

$$A = A_{pt}(1 + \epsilon)$$

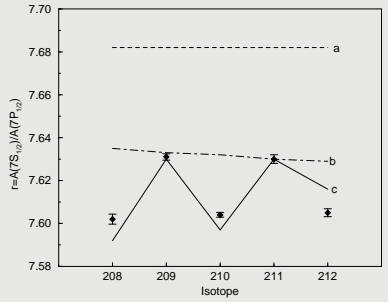
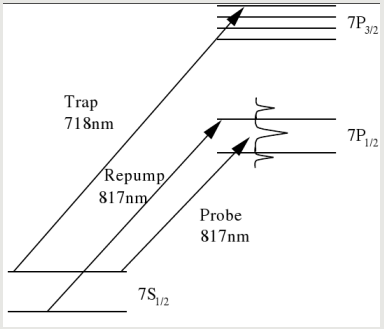
$$\frac{A}{A'} = \frac{A_{pt}(1+\epsilon)}{A'_{pt}(1+\epsilon')} \approx \frac{A_{pt}}{A'_{pt}}(1 + \epsilon - \epsilon') = \frac{A_{pt}}{A'_{pt}}(1 + \Delta)$$

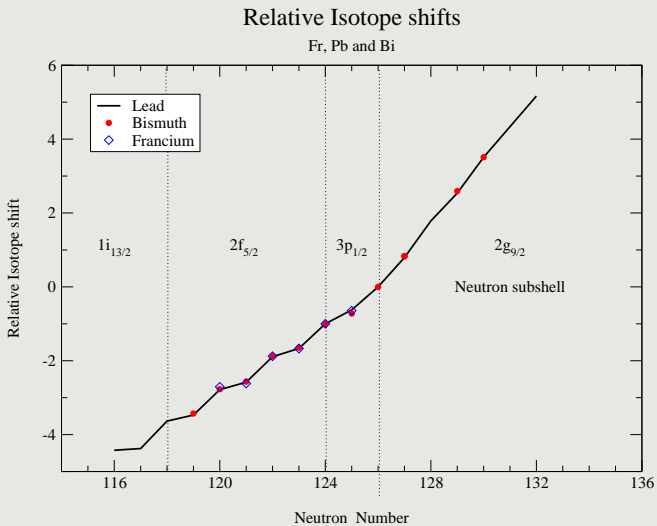


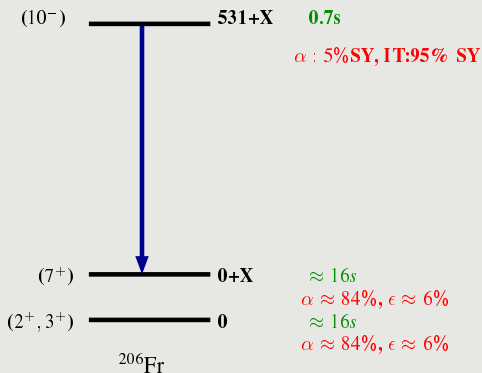
Bohr Weisskopf effect

$$A = A_{pt}(1 + \epsilon)$$

$$\frac{A}{A'} = \frac{A_{pt}(1 + \epsilon)}{A'_{pt}(1 + \epsilon')} \approx \frac{A_{pt}}{A'_{pt}}(1 + \epsilon - \epsilon') = \frac{A_{pt}}{A'_{pt}}(1 + \Delta)$$







NNDC

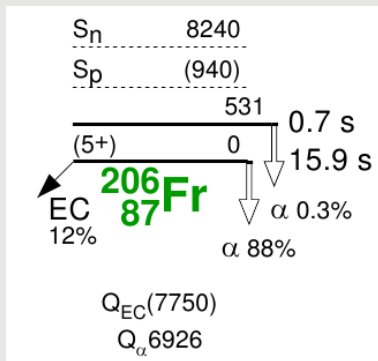
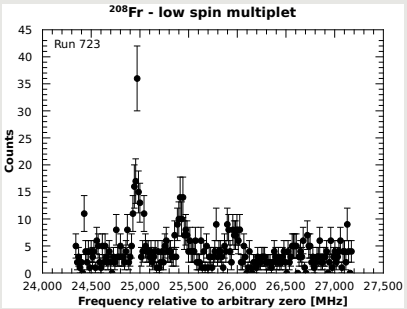
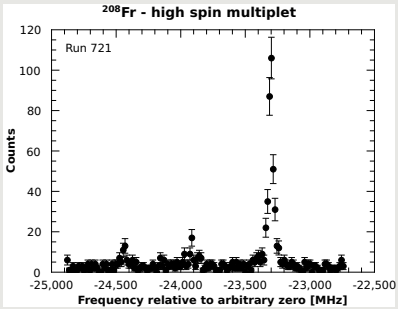
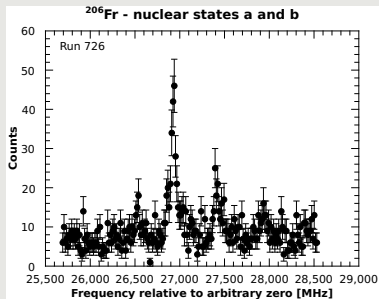
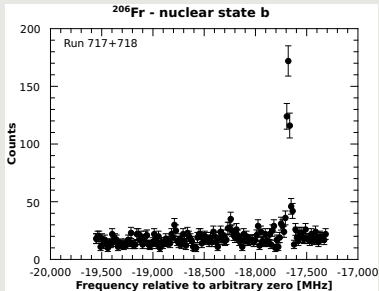
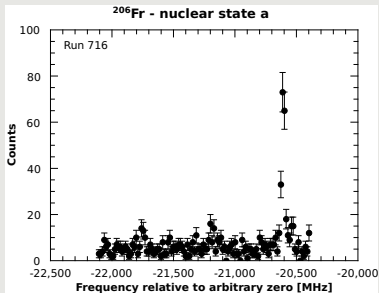
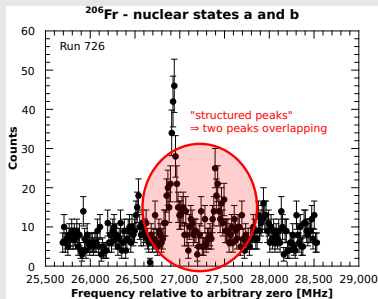
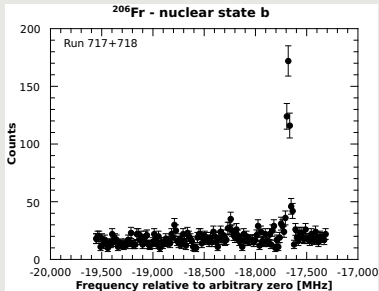
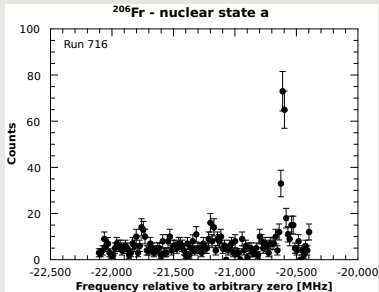
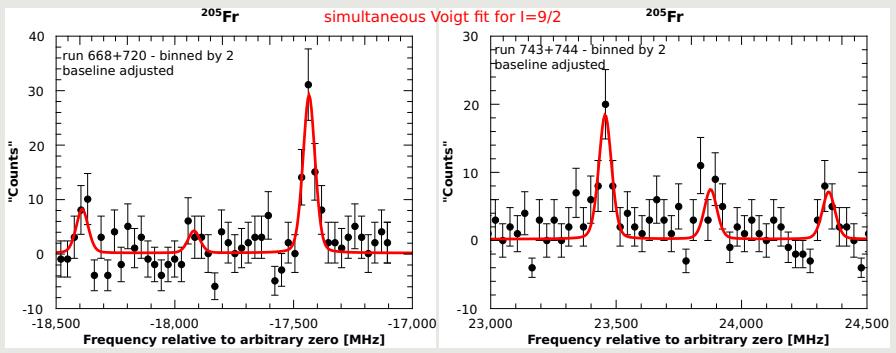


Table of Isotopes









- ^{92}Rb fluoresced successfully
- $^{206,206m}\text{Fr}$ identified, spins, moments and RMS charge radii will be extracted.
- ^{205}Fr seen, spin, moments and RMS charge radius will be extracted

