Development of a dual isotope rubidium co-magnetometer toward electron EDM search using laser cooled francium

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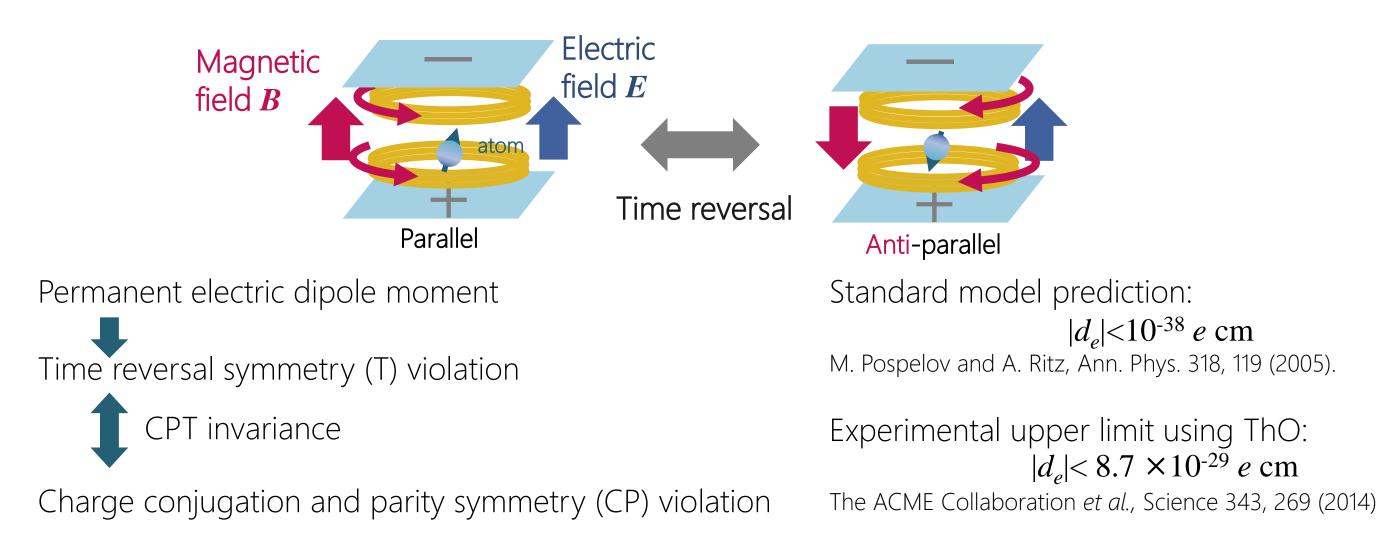
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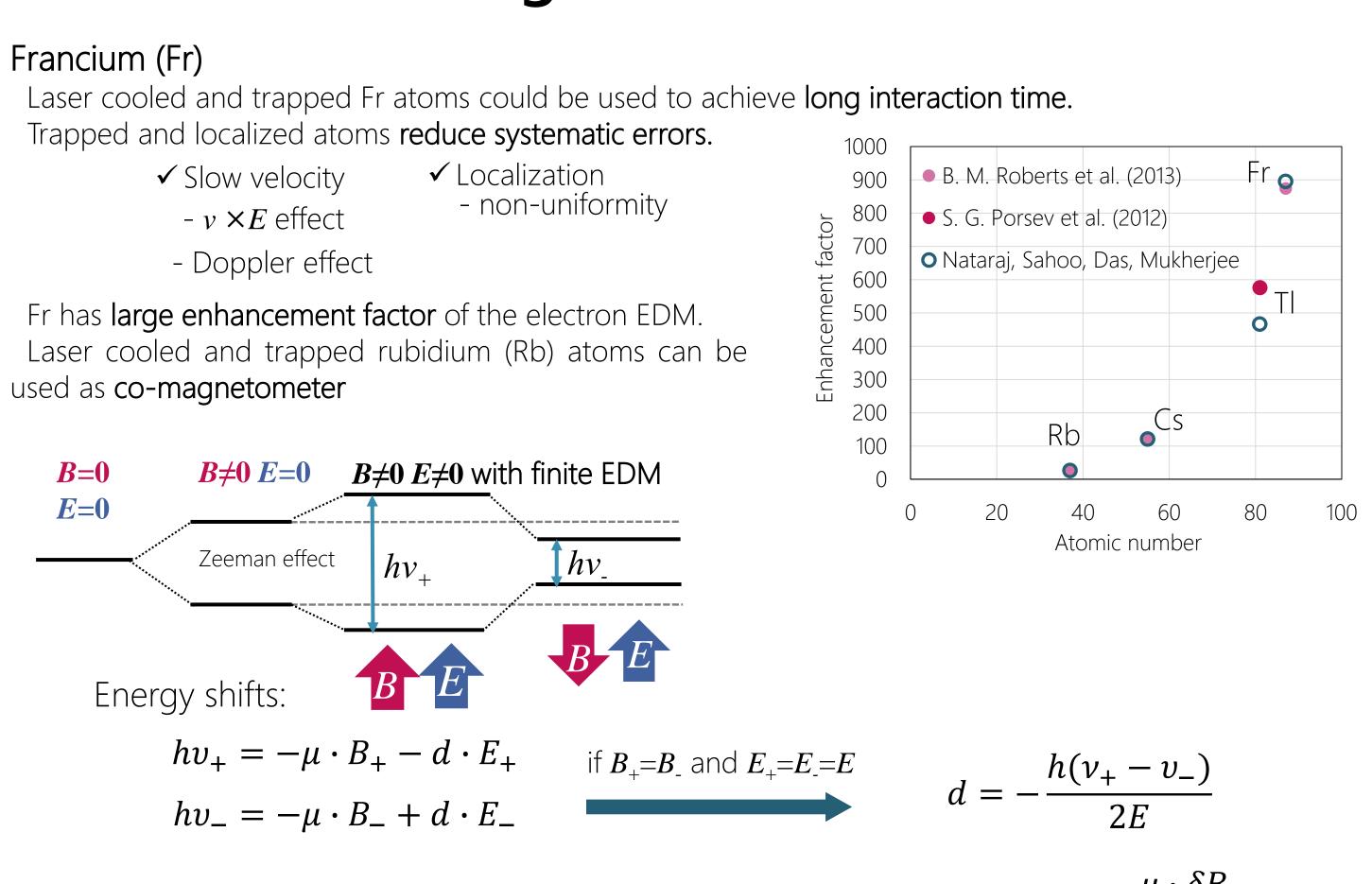
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A dual isotope rubidium co-magnetometer is being developed at CYRIC toward electron EDM search using laser cooled francium. This magnetometer can be used to measure not only the fluctuations of magnetic field and other shifts associated with trapping light. As a first step, 87Rb MOT has been realized with a single laser by creating sidebands with a fiber coupled electro optic modulator (EOM). The laser and RF system used in the present work for obtaining the MOT and the atom number variation as a function of FR frequency and RF power is discussed. This technique can be extended for trapping of 85Rb and 87Rb simultaneously.

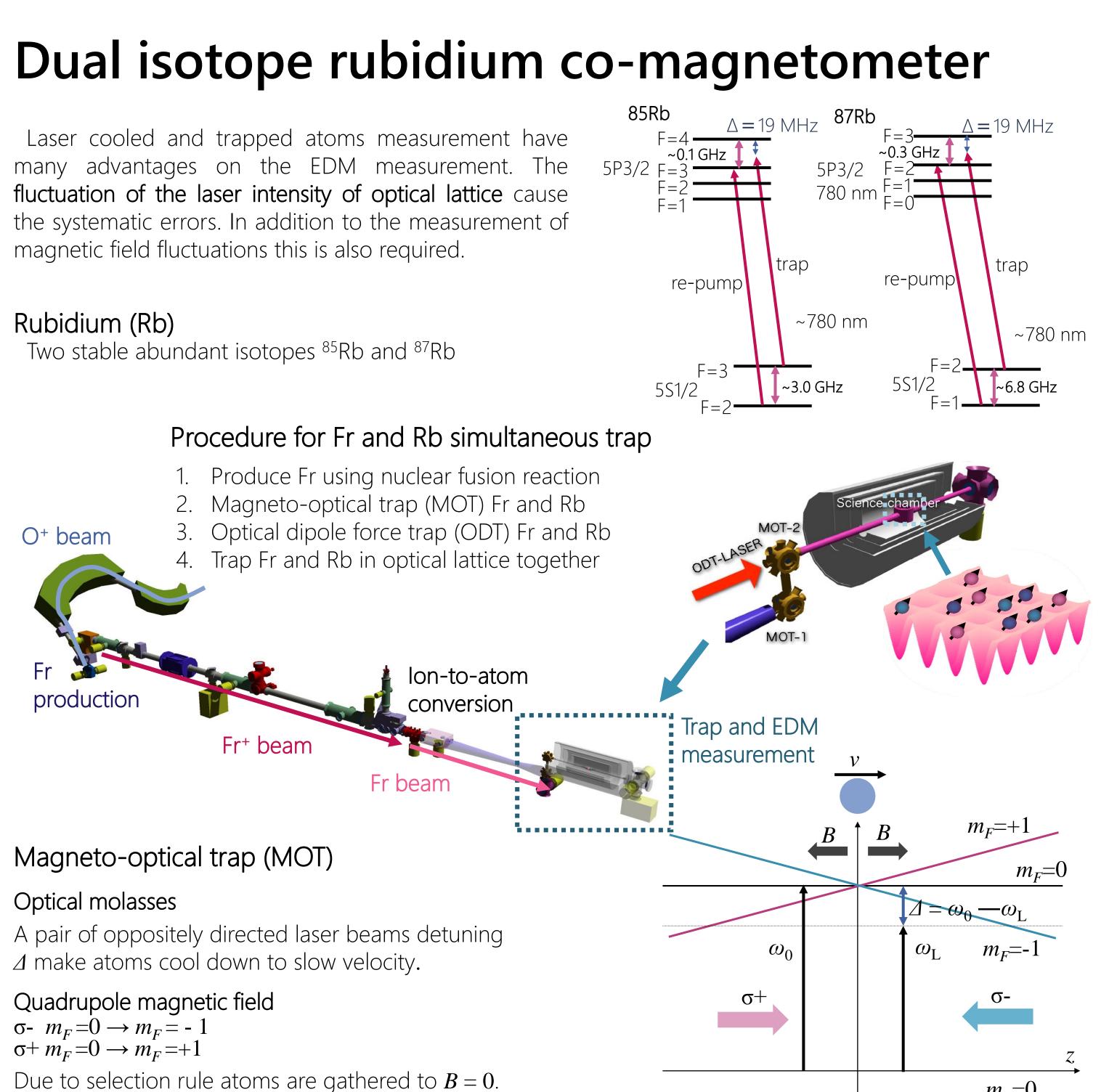
Motivation to search for the permanent electron electric dipole moment



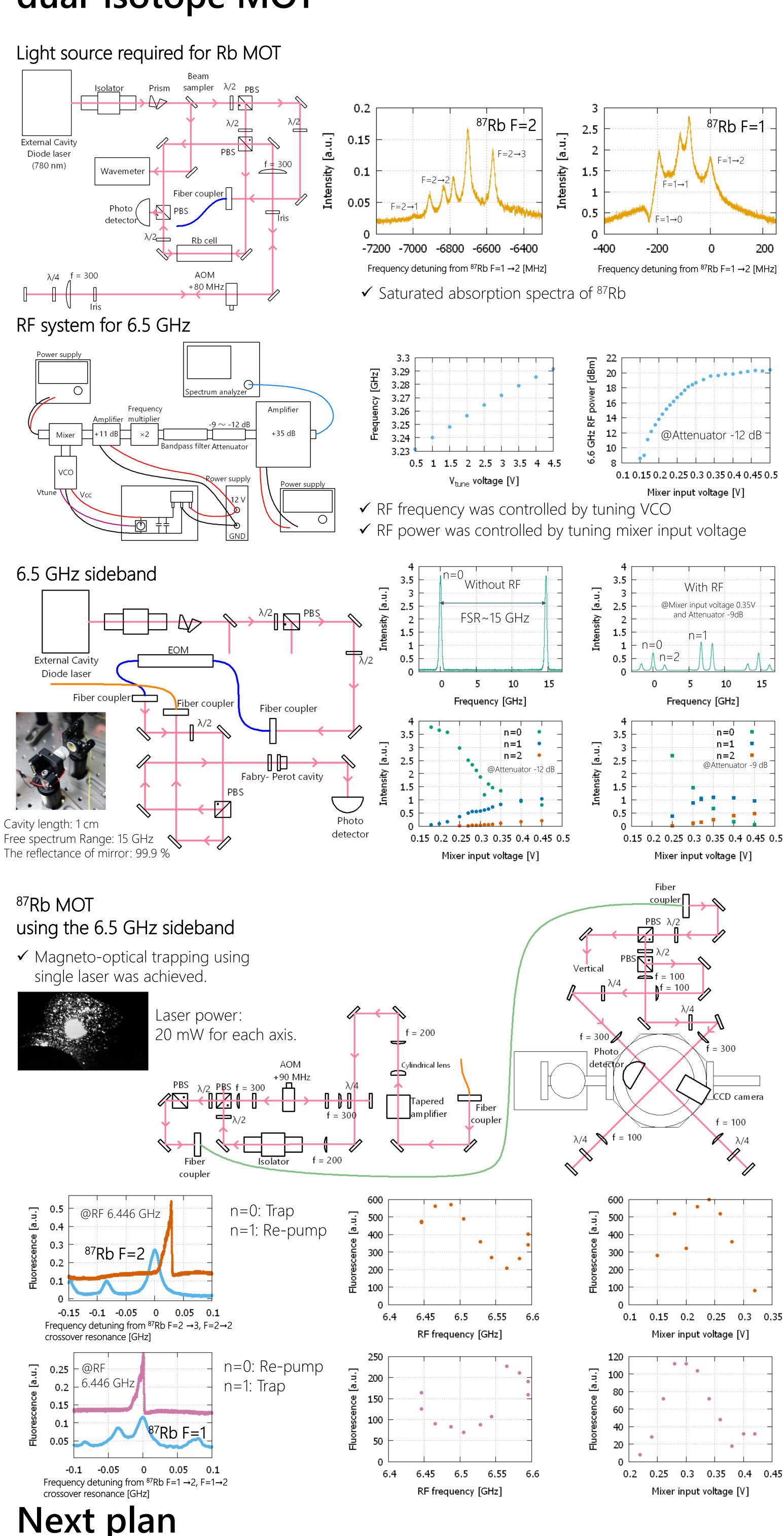
EDM search using cold francium atoms



One of the errors of the EDM is restricted by the fluctuation of the magnetic field. $\delta d > \frac{\mu \cdot \delta B}{\sqrt{2}E}$ $/d_e$ <10⁻²⁹ e cm δB <10 fT with E=100 kV/cm



Development ⁸⁷Rb MOT for simultaneous dual-isotope MOT



Measurement of magnetic field and laser intensity simultaneously with Rb dual isotope

 $m_F = 0$

Dual isotope MOT with single laser.

Dual isotope ODT

- Development of RF system for ⁸⁵Rb

- Comparison the combination of laser and RF frequency