Hot topic presentation

Measurement of the g factor of ground-state ^{87}Sr at the parts-per-million level using co-trapped ultracold atoms

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We demonstrate nuclear magnetic resonance of optically trapped ground-state ultracold ^{87}Sr atoms. Using a scheme in which a cloud of ultracold ^{87}Rb is co-trapped nearby, see Fig. 1, we improve the determination of the nuclear g factor, g_I, of atomic ^{87}Sr by more than two orders of magnitude, reaching accuracy at the part-per-million level. We achieve similar accuracy in the ratio of relevant g factors between Rb and Sr. This establishes ultracold ^{87}Sr as an excellent linear in-vacuum magnetometer. These results are relevant for ongoing efforts towards quantum simulation, quantum computation and optical atomic clocks employing ^{87}Sr, and these methods can also be applied to other alkaline-earth and alkaline-earth-like atoms.

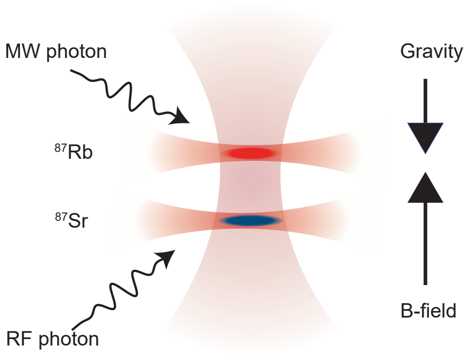

Figure 1: Schematic of the experimental setup used to measure g_I of ^{87}Sr in the electronic ground state. Clouds of Rb and Sr atoms are confined in respective crossed optical dipole traps, where the (near-)vertical dipole trap beam is common to both traps. The microwave radiation is emitted using a dedicated microwave antenna, whereas the radio frequency radiation is emitted using coils carrying alternating current.