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Spinor dynamics in a ^{23}Na Bose-Einstein condensate HYEWON PECHKIS, JONATHAN WRUBEL, JQI, NIST and Univ. of Maryland, PAUL GRIFFIN, Univ. of Strathclyde, RYAN BARNETT, EITE TIESINGA, PAUL LETT, JQI, NIST and Univ. of Maryland — Spinor Bose-Einstein condensates (BECs) are characterized by an additional internal degree of freedom, which results in a vector order parameter. In particular, this system may be used to produce an internal state matter-wave amplifier, as well as spin-squeezcd states. In order to pursue these goals it is critical to have an accurate measurement of the spin-dependent interaction energy c_2, which is proportional to the difference in scattering lengths $a_{F=2}$ and $a_{F=0}$. The spin-dependent interaction energy determines the ground-state structure as well as the dynamical properties of spinor condensates. A recent result used Feshbach resonance measurements in a BEC to create realistic atomic potentials for sodium and yielded a value which is approximately a factor of two larger than the only measurement in a sodium spinor condensate. Here we discuss the difficulties associated with measuring c_2 in sodium, as well as a revised measurement from spinor dynamics. In addition we will discuss our experiments on microwave-dressed spinor states, seeded, and unseeded matter-wave amplification.

Hyewon Pechkis
JQI, NIST and Univ. of Maryland

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