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Bose Condensates with Small s-wave Scattering Lengths: Effect of Dipolar Interaction YONG CHEN, Department of Physics and Birck Nanotechnology Center, Purdue University, West Lafayette IN 47907, D. DRIES, J. HITCHCOCK, R.G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston TX 77005 — Using a variational approach, we have calculated the *in-situ* size and time-of-flight (TOF) expansion of a cylindrically symmetric Bose-Einstein Condensate (BEC) when the s-wave scattering length (a_s) is close to zero (which can be realized via, for example, a Feshbach resonance). We have specifically investigated the effect of dipolar interactions when the magnetic moment of the atoms is nonzero, and examined the dependence of the dipolar effect on the number of atoms, trap geometry and a_s. For a ^{52}Cr BEC, we obtain quantitative agreement with observations in recent experiments [1], and predict a collapse due to dipolar interaction to occur at positive a_s ($\sim 14 \pm 1 a_o$, using parameters similar to those in [1]). We have also performed calculations for BECs of alkali atoms, where the dipolar interactions are much weaker than in ^{52}Cr. We will show how our calculations may help measure small a_s and locate the zero- crossings.
[1] T. Lahaye *et al.*, Nature **448**, 672 (2007); J. Stuhler *et al.*, Phys. Rev. Lett. **95**, 150406 (2005)

Yong Chen
Purdue University

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