Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Anisotropy in the Interactions of Ultracold Dysprosium[1] SVETLANA KOTOCHIGOVA, ALEXANDER PETROV, Physics Department Temple University — The ground $4f^{10}6s^2$ configuration of atomic dysprosium has an unfilled $4f^{10}$ shell lying beneath a closed $6s^2$ shell. This so-called "submerged-shell" atom has a large orbital ($L = 6$) and total ($J = 8$) electron angular momenta and, consequently, an extremely large magnetic moment of $10\mu_B$. Only recently the first laser cooling and trapping experiment of dysprosium atoms has been reported [1]. The experiment suggested that the anisotropy from the submerged shell and magnetic moment plays a significant role in the interactions of dysprosium atoms. Here, we explore the anisotropies from the electrostatic dispersion and magnetic dipole-dipole interactions. We use a relativistic configuration interaction valence-bond method to obtain short-range chemical potentials. Dispersion coefficients have been calculated using known atomic data. Comparison of the strengths of dispersion and magnetic dipole interactions shows that the anisotropy in the dispersion dominates for atomic separations less than 50 bohr and can lead to a rapid reorientation of the Dy angular momenta.

[1] M. Lu, S. Ho Youn, and B. Lev, Phys. Rev. Lett. **104**, 063001 (2010).

[1]We acknowledge support from the AROSR.

Svetlana Kotochigova
Physics Department Temple University

Date submitted: 25 Jan 2011 Electronic form version 1.4