Abstract Submitted
for the DAMOP06 Meeting of
The American Physical Society

The angular momentum of a magnetically trapped atomic condensate HSIANG-HUA JEN, PENG ZHANG, LI YOU, GEORGIA INSTITUTE OF TECHNOLOGY TEAM — The angular momentum of a magnetically trapped atom includes both an orbital and an internal part. The sum of the two, or the axial component of total angular momentum, is conserved in a cylindrically symmetric trap. For an Ioffe- Pritchard trap, whose magnetic field is not axially symmetric, we find that the difference of the orbital and internal angular momentum component becomes conserved. With an atomic condensate, the above constraints remain valid provided atomic interactions are isotropic, i.e. involving only s-waves as often assumed for low energy collisions. We have investigated the precise values of the sum/difference angular momentums (s) of the ground state of a spinor condensate inside a magnetic trap and proved that the values of s is limited to $[-F, F]$. We confirm and illustrate our analytical analysis with numerical simulations and our results imply that a magnetically trapped spinor condensate will necessarily possess persistent currents of different winding numbers when its spinor components are observed in the lab frame.

Peng Zhang
Georgia Institute of Technology

Date submitted: 27 Jan 2006 Electronic form version 1.4