Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Tuning the Scale Factor and Sensitivity of a Passive Cavity with Optical Pumping KRISHNA MYNENI, RDMR-WSS, U.S. Army Research, Development, and Engineering Command, Redstone Arsenal, AL 35898, DAVID D. SMITH, Spacecraft and Vehicle Systems Dept., NASA Marshall Space Flight Center, EV43, Huntsville, AL 35812, JAMIU A. ODUTOLA, Dept. of Natural and Physical Sciences/Chemistry, Alabama A&M University, Normal, AL 35762, CHARLES A. SCHAMBEAU, Department of Physics, University of Alabama in Huntsville, Huntsville, AL 35899 — Recent measurements of mode pushing in a Fabry-Perot cavity, by an intra-cavity medium of atomic vapor, demonstrated that *both* the cavity scale factor, S, and the cavity sensitivity (defined by the ratio of S to the mode width, W) may be enhanced in the region of anomalous dispersion associated with an absorption resonance of the vapor[1]. The enhancement is dependent on the net gain of the medium, even for a passive cavity. We demonstrate tuning the cavity scale factor and sensitivity for the passive cavity with an intra-cavity Rb87 vapor cell, using optical pumping between the two ground hyperfine levels. Since hyperfine pumping efficiency increases monotonically with the pump beam intensity, it is possible to achieve continuous tuning of the cavity scale factor from the region of finite enhancement, across its pole along the gain axis, and into the region of mode splitting with a fixed length vapor cell. [1] D.D. Smith, K. Myneni, J.A. Odutola, and J.C. Diels, Phys. Rev. A **80**, 011809(R) (2009).

Krishna Myneni
RDMR-WSS, U.S. Army Research, Development, and
Engineering Command, Redstone Arsenal, AL 35898

Date submitted: 21 Jan 2010 Electronic form version 1.4