

Abstract Submitted
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Coherent Forward Broadening in Cold Atom Clouds¹ R.T. SUTHERLAND, FRANCIS ROBICHEAUX, Purdue University — It is shown that homogeneous line-broadening in a diffuse cold atom cloud is proportional to the resonant optical depth of the cloud. Further, it is demonstrated how the strong directionality of the coherent interactions causes the cloud's spectra to depend strongly on its shape, even when the cloud is held at constant densities. These two numerical observations can be predicted analytically by extending the single photon wavefunction model. Lastly, elongating a cloud along the line of laser propagation causes the excitation probability distribution to deviate from the exponential decay predicted by the Beer-Lambert law to the extent where the atoms in the back of the cloud are more excited than the atoms in the front. These calculations are conducted at low densities relevant to recent experiments.

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