

Subradiance and Superradiance of a Dense Ensemble of Cold, Isotropic Atoms

F C BRAMBILA¹, P G S DIAS¹, A CIPRIS², AND R C TEIXEIRA¹

¹*Departamento de Física, Universidade Federal de São Carlos, São Carlos, Brazil*

²*Institute of Physics in Sao Carlos, University of São Paulo, São Carlos, Brazil*

Contact Email: felipecbrambila@gmail.com

The phenomenon of light scattering by an atomic cloud has two well-known effects in the literature called subradiance and superradiance, in which the decay of the fluorescence observed after a rapid excitation pulse has its characteristic curve altered. The present study aims to monitor the consequent modifications of the universal power decay curves emitted by the cloud in a dense regime after turning off the incident excitation laser light. For this, numerical simulations are carried out which, using a certain geometry for the atomic cloud, obtain the eigenvalues of the eigenmodes of the cloud and thus its average decay curve, enabling the analysis of sub- and superradiance phenomena for different values of density and optical depth of the sample.