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Improvement in Quantum Storage Fidelity via Subradiance TYLER THURTELL, PERRY RICE, Miami University — The recent push to develop quantum computing devices has created a need for systems that can store a quantum state. Such a system should be able to record superpostions and entanglements of quantum states. An atomic system capable of doing this is a three-level atom experiencing electromagnetically induced transparency (EIT). EIT is optical effect in which the presence of a control laser field renders a medium transparent to a frequency it was previously opaque to. Such a system can record a photon state if the control field is manipulated properly. A limit is placed on the storage fidelity by spontaneous emission. For an isolated atom, the spontaneous emission rate is fixed by properties of the atom but if several atoms are brought to within a wavelength of the light emitted this is not the case. Symmetric superpositions emit more quickly than isolated atoms while antisymmetric superpositions emit more slowly. These are the phenomena of super and subradiance respectively. It has recently been shown that selectively radiant states exist for which some modes are subradiant and others are superradiant, that such states can be prepared in three level atoms undergoing EIT coupled to a nanofiber and that such states exponentially improve storage fidelity. We expand upon this.

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