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We demonstrate how cold dense atomic ensembles can respond to light differently from thermal atoms. In cold samples strong light-mediated resonant dipole-dipole interactions between atoms can be utilized in a control and storage of light. The method is based on a high-fidelity preparation of a collective atomic excitation in a single correlated subradiant eigenmode in a lattice. We demonstrate how a simple phenomenological model captures the qualitative features of the dynamics and sharp transmission resonances that may find applications in sensing.

[1] Storing Light with Subradiant Correlations in Arrays of Atoms, PRL 117, 243601 (2016)