Coherent Diffusion of Slow Light

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Thermal atomic motion is manifested as coherent diffusion of slow and stored light [1]. Specifically, the finite probability of diffusing atoms to return to origin in 1 and 2 dimensions results in a universal fat-tailed EIT spectra [2], delayed light generation yields optimal long diffusion time [3,4], Bessel-like light fields are shown to be invariant to coherent diffusion similar to coherent diffraction [5]. However, partially coherent fields behave dramatically different under coherent diffusion as compared to coherent diffraction in terms of both spatial behavior [6] and mode purity [7]. We will show that coherent diffusion can be used to find ground state of complex Hamiltonians by mimicking imaginary time evolution [7].

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7. "Purification by coherent diffusion", S. Smartsev and N. Davidson, in preparation.