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Effect of random positions for coherent dipole transport[1] FRANCIS ROBICHEAUX, Purdue University, N. M. GILL, Auburn University — We calculate the effect of two kinds of randomness on the coherent motion of an exciton whose transport is governed by the dipole-dipole interaction. As our example, we use the idealized case of stationary Rydberg atoms on a lattice. We present calculations for how fast the excitation can move away from its starting position for different dimensional lattices and for different levels of randomness. We also examine the asymptotic in time final position of the excitation to determine whether or not the excitation can be localized. The one-dimensional system is an example of Anderson localization where the randomness is in the off-diagonal elements although the long-range nature of the interaction leads to nonexponential decay with distance. The two-dimensional square lattice shows a mixture of extended and localized states for large randomness, while there is no visible sign of localized states for weak randomness. The three-dimensional cubic lattice has few localized states even for strong randomness.

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