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Long-range spatial correlations in one-dimensional Anderson models[1] GREG PETERSEN, NANCY SANDLER, Ohio University, NQPI TEAM — The study of metal-insulator transitions (MIT) in one-dimensional (1d) Anderson disordered systems remains an active topic of research. Analytic and numerical results have confirmed the scaling prediction on the absence of MIT for short-range correlated disorder potentials. Solutions for long-range correlated potential models (i.e. the dimer model and those with power-law spectral densities) have shown MITs in 1d. However, long-range correlations remain poorly understood. In order to gain some insight, we study a 1d Anderson model with disorder potential correlations described by a power-law model with $\langle \epsilon_r \epsilon_0 \rangle = 1/(1 + r/a)^\alpha$. Here ϵ_i, r, a, and α are the on-site energy, position, lattice constant, and strength of the correlation respectively. We obtained results with various methods (wave packet diffusion, particpatio ratio, transfer matrix and Green's function) that support the absence of a MIT in these models in. We further show that an analysis of the beta function provides evidence for the validity of the same one-parameter scaling law valid for short-range correlated potentials.

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