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Origin of the zero-bias anomaly in the Anderson-Hubbard model¹ RACHEL WORTIS, W.A. ATKINSON, HONGYI CHEN, Trent University — The combination of disorder and electron-electron interactions is known to suppress the density of states at the Fermi level, with two important examples being the Altshuler-Aronov anomaly in metallic systems and the Efros-Shklovskii Coulomb gap in the atomic limit. In both these cases the interactions are nonlocal. Recent Monte Carlo and exact diagonalization studies of the Anderson-Hubbard model, in which the interaction is purely local but strong, obtain a zero-bias anomaly with a curious linear dependence on hopping. Here we demonstrate that this anomaly arises not from diagonal terms in the self energy but from renormalization of the hybridization function, and that it is specifically associated with neighboring sites for which the lower Hubbard orbital on one site is near in energy to the upper Hubbard orbital on the other. Based on these two points, we construct an approximate analytic expression for the anomaly and physical understanding of the linear dependence on hopping.

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