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Energy dependence of localization with interactions and disorder: The generalized inverse participation ratio of an ensemble of two-site Anderson-Hubbard systems[1] RACHEL WORTIS, JAYANAYANA PERERA, Trent University — We explore the effect of interactions on novel features found in non-interacting disordered systems. Johri and Bhatt [PRL **109** 076402 (2012), PRB **86** 125140 (2012)] showed that for non-interacting particles moving in a disordered potential Lifshitz states lead to a decrease in localization at the band edges. This is reflected in an abrupt decline in the inverse participation ratio following a sharp peak. We consider an ensemble of two-site Anderson-Hubbard systems and study a generalization of the inverse participation ratio applicable to interacting systems. With on-site Coulomb repulsion U, two types of resonances can occur: As in the non-interacting case, the potentials at the two sites may be similar. In addition, the potential at one site may differ from its neighbor by U. We demonstrate that these two types of resonance and the diversity of transitions in the interacting case result in much more varied dependence of localization on energy, with multiple local minima, including a strong suppression and more structure near the Fermi level. Opportunities for experimental observation are considered.

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