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How density of states singularities found in the Anderson model evolve with the addition of electron-electron interactions

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The influence of disorder on correlated electron systems remains poorly understood. Recent work [1], [2] by Johri and Bhatt shows singular behavior in the density of states (DOS) of non-interacting disordered systems. This is surprising because there was a significant and unsuccessful effort to find a singularity in the DOS after Anderson's prediction of localization in 1958. Furthermore, in two-site systems the singularity marks a transition to an energy range where the DOS contribution comes from pairs of sites with similar potential called resonant states. We are studying how the addition of electron-electron interactions affects this singularity in the DOS. We find that the singularity persists at lower interaction strengths and new singularities appear at higher values. We examine how these DOS features correlate with the resonant states present in two-site interacting systems.

[1] Johri, S., Bhatt, R. N., Singular behavior of eigenstates in Anderson's model of localization, Physical Review Letters 109, 7, 076402 (2012)

[2] Johri S., Bhatt R. N., Singular behavior of Anderson localized wave function for a two-site model, Physical Review B 86, 12, 125140 (2012)

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