Localization of lattice fermions: lessons for overlap

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Abstract: Lattice fermions in a fluctuating gauge field can show localization, much like electrons in a disordered potential. We study the spectrum of localized and extended states of supercritical Wilson fermions, in gauge ensembles generated with plaquette and improved actions. When the Wilson fermion operator is used to construct the overlap kernel, the mobility edge, that is the boundary between the localized and extended states, determines the range of the kernel.