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Many body localization in the presence of a single particle mobility edge SUBROTO MUKERJEE, RANJAN MODAK, Indian Institute of Science — In one dimension, noninteracting particles can undergo a localization-delocalization transition in a quasiperiodic potential. Recent studies have suggested that this transition transforms into a many body localization transition upon the introduction of interactions. It has also been shown that mobility edges can appear in the single particle spectrum for certain types of quasiperiodic potentials. Here we investigate the effect of interactions in models with such mobility edges. Employing the technique of exact diagonalization for finite-sized systems, we calculate the level spacing distribution, time evolution of entanglement entropy, optical conductivity and return probability to characterize the nature of localization. The localization that develops in the presence of interactions in these systems appears to be different from regular Many-Body Localization (MBL) in that the growth of entanglement entropy with time is linear (like in a thermal phase) but saturates to a value much smaller than the thermal value (like for MBL). All other diagnostics seem consistent with regular MBL.

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