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Partial breakdown of quantum thermalization in a Hubbard-like model JAMES R. GARRISON, JQI/QuICS (NIST/UMD), RYAN V. MISHMASH, Caltech, MATTHEW P. A. FISHER, UC Santa Barbara — We study the possible breakdown of quantum thermalization in a model of itinerant electrons on a one-dimensional chain without disorder, with both spin and charge degrees of freedom. The eigenstates of this model exhibit peculiar properties in the entanglement entropy, the apparent scaling of which is modified from a "volume law" to an "area law" after performing a partial, site-wise measurement on the system. These properties and others suggest that this model realizes a new, non-thermal phase of matter, known as a quantum disentangled liquid (QDL). The putative existence of this phase has striking implications for the foundations of quantum statistical mechanics.

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