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Nonthermal symmetry-broken states
and nonequilibrium criticality in the Hubbard model

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Quenches from the antiferromagnetic to the paramagnetic phase of the Hubbard model are studied within nonequilibrium dynamical mean field theory. In the strong correlation regime, the system can get trapped in a nonthermal, symmetry-broken state. We argue that this is due to the long life-time of artificially created doublons and the "entropy cooling" effect of the spin sector. In the weak-coupling regime, a different type of trapping phenomenon can be observed, which is related to the integrability of the model in the lowest-order (Hartree) approximation. Our results may be relevant for the interpretation of symmetry breaking and symmetry restoration transitions in correlated materials.

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