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Universal dynamical scaling of two-dimensional vortices in a strongly interacting fermionic superfluid XIANG-PEI LIU, XING-CAN YAO, YOUJIN DENG, XIAO-QIONG WANG, YU-XUAN WANG, CHUN-JIONG HUANG, University of Science and Technology of China, XIAOPENG LI, Fudan University, YU-AO CHEN, JIAN-WEI PAN, University of Science and Technology of China — Dynamical formation and annihilation of vortices and antivortices play a key role in the celebrated Berezinskii-Kosterlitz-Thouless (BKT) theory, a universal topological mechanism describing exotic states of matter in low dimensions. Here we study the annihilation dynamics of a large number of vortices and antivortices generated by thermally quenching a fermionic superfluid of Li6 atoms in an oblate optical geometry. Universal algebraic scaling laws in both time and space are experimentally revealed over a wide interaction range, from the attractive to the repulsive side across the Feshbach resonance, and further found to agree with a Glauber dynamics in Monte Carlo simulation of the classical XY model and with field-theoretical calculations. Our work provides a direct demonstration of the universal vortex dynamics underlying the BKT theory.

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