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Thermal and colliding solitons in fermionic superfluids. TARIK YEFSAH, ARIEL SOMMER, MARK KU, LAWRENCE CHEUK, WENJIE JI, WASEEM BAKR, MARTIN ZWIERLEIN, MIT — We study solitons in strongly interacting Fermi gases of ^{6}Li in an elongated axisymmetric geometry. We investigate the formation of thermal solitons which spontaneously emerge at finite temperature as a consequence of phase fluctuations of the order parameter in the axial direction of the clouds. Using a rapid-ramp technique, we convert phase fluctuations into density fluctuations, which can be directly imaged. While the recorded density distribution is very smooth for the coldest clouds, we observe the formation of stripes along the radial direction, whose number and visibility increase with temperature. We interpret strong phase variations as thermal solitons. When temperature is increased even more, the radial phase stiffness is progressively lost and stripes are no longer observed. We also describe progress towards the study of colliding solitons across the BEC-BCS crossover. In this case two solitons are created by the mean of phase-imprinting. While solitons collide elastically in the BEC regime, it has been predicted that such collisions become more and more inelastic toward the BCS side, which is thought to be in part due to the occupation of localized Andreev bound states in the solitons.

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