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Phase diagram, extended domain walls, and soft collective modes in a three-component fermionic superfluid GIANLUIGI CATELANI, EMIL YUZBASHYAN, Rutgers University — We study the phase diagram of a three-component Fermi gas with weak attractive interactions, which shows three superfluid and one normal phases. At weak symmetry breaking between the components the existence of domain walls interpolating between two superfluids introduces a new length scale much larger than the coherence length of each superfluid. This, in particular, limits the applicability of the local density approximation in the trapped case, which we also discuss. In the same regime the system hosts soft collective modes with a mass much smaller than the energy gaps of individual superfluids. We derive their dispersion relations at zero and finite temperatures and demonstrate that their presence leads to a significant enhancement of fluctuations near the superfluid-normal transitions.

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