Ultracold Fermi gases in a box

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The realization of homogeneous quantum gases has marked a milestone in quantum many-body physics with ultracold atoms [1]. These uniform gases have since opened many new research avenues by simplifying the interpretation of experimental measurements and by enabling previously inaccessible experiments. In this talk, I will present recent investigations of fundamental problems of stability in homogeneous Fermi gases: the case of the spin-1/2 Fermi gas with repulsive contact interactions [2], and of the three-component Fermi gas with spin-population imbalance. Both studies lead to surprising results, highlighting how spatial homogeneity not only simplifies the connection between experiments and theory, but can also unveil unexpected outcomes.

[1] N. Navon, R.P. Smith, Z. Hadzibabic, Nat. Phys. 17, 1334 (2021)

[2] Y. Ji et al., arXiv:2204.03644 (2022)