A Unitary Fermi Supersolid: The Larkin Ovchinnikov State from a DFT

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Abstract:

In this talk I shall review the Asymmetric Superfluid Local Density Approximation (ASLDA), a Density Functional Theory (DFT) that quantitatively describes models strongly interacting Fermi gases. The ASLDA is a minimal extension of the oft-used -- but quantitatively incorrect -- Bogoliubov de-Gennes (BdG) equations. The ASLDA takes into account the missing self-energy corrections in a way that includes the most accurate thermodynamic information available about these systems. The ASLDA provides a means of "interpolating" between small systems amenable to ab-initio calculations, and large scale thermodynamic systems accessible with experiments. This approach leads to qualitatively new physics, such as the prediction that a Larkin-Ovchinnikov Fermi supersolid phase should be realized in polarized unitary Fermi gases.