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Quasi-condensation in trapped two-dimensional Fermi gases[1]

BRANDON ANDERSON, James Franck Institute

It is well known that the Mermin-Wagner theorem prohibits true long range order 2D systems. Nevertheless, recent experiments [1,2] provide strong evidence that 2D Fermi gases undergo a form of pair condensation, along with aspects of BKT physics. In this talk we apply a BCS-BEC theory (which is compatible with the Mermin-Wagner theorem) to characterize the nature of pair (quasi-) condensation in 2D Fermi gases. Here we follow the same analysis and protocols of these recent experiments. We find a strong zero momentum peak in the pair momentum distribution which importantly occurs at a reasonably well defined onset temperature. We demonstrate that the resulting phase diagram, pair momentum distribution, and algebraic power law decay are compatible with these experiments throughout the continuum from BEC to BCS. Finally, we present sharp qualitative experimental signatures to test this physical picture. [1] Phys. Rev. Lett. 114, 230401 (2015) [2] Phys. Rev. Lett. 115, 010401 (2015) [3] Phys. Rev. Lett. (To be published.)

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