Abstract Submitted
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Resonant enhancement of the FFLO state in 3D by an optical potential[1] JEROEN DEVREESE, SERGHEI KLIMIN, MICHIEL WOUTERS, JACQUES TEMPERE, Universiteit Antwerpen, TQC (THEORIE VAN KWANTUMSYSTEMEN EN COMPLEXE SYSTEMEN) TEAM — In a two component Fermi gas, spin-imbalance leads to a competition between Cooper-pairing with zero momentum and with nonzero momentum. The latter gives rise to the Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) state. Hitherto this state has not been observed in a 3D Fermi gas. We propose a new way to enhance the presence of the FFLO state, by adding a 1D periodic potential. To investigate the effect of this potential, we study the ground state properties of the system, starting from the partition sum of an imbalanced Fermi gas in path-integral representation. To describe the FFLO state, a saddle point is chosen in which the pairs can have nonzero momentum. Minimizing the resulting free energy leads to the phase diagram of the system. The stability region of the FFLO state is found to be greatly enlarged due to the presence of the periodic potential, compared to the ordinary 3D case. We find that the FFLO state can exist at higher spin imbalance if the wavelength of the optical potential becomes smaller. We propose that this concept can be used experimentally to enhance the FFLO state.

[1] Jeroen P.A. Devreese, S.N. Klimin, and J. Tempere, Phys. Rev. A 83, 013606 (2011).
[2] Jeroen P.A. Devreese, M. Wouters, and J. Tempere, J. Phys. B 44, 115302 (2011); Phys. Rev. A 84, 043623 (2011).

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