Abstract Submitted
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Thermodynamic properties of Fermi gases in states with defined many-body spins VLADIMIR YUROVSKY, Tel Aviv University — Zero-range interactions in cold spin-1/2 Fermi gases can be described by single interaction strength, since collisions of atoms in the same spin state are forbidden by the Pauli principle. In a spin-independent trap potential (even in the presence of a homogeneous spin-dependent external field), the gas can persist in a state with the given many-body spin, since the spin operator commutes with the Hamiltonian. Spin and spatial degrees of freedom in such systems are separated, and the spin and spatial wavefunctions form non-Abelian irreducible representations of the symmetric group, unless the total spin is $S = N/2$ for N atoms (see [1]). Although the total wavefunction, being a linear combination of products of the spin and spatial functions, is permutation-antisymmetric, the non-Abelian permutation symmetry is disclosed in the matrix elements and, as demonstrated here, in thermodynamic properties. The effects include modification of the specific heat and compressibility of the gas. 1.V. A. Yurovsky, Phys. Rev. Lett. **113**, 200406 (2014); Phys. Rev. A **91**, 053601 (2015).

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