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Singlet and triplet superfluids in a two-component Fermi - dipolar Bose mixture[1] BEN KAIN, HONG LING, Rowan University — We consider a mixture of a two-component Fermi and an (electric) dipolar Bose gas in a low temperature regime where the dipolar gas can be approximated with a condensate of dipolar bosons plus a collection of phonon modes which obey an anisotropic dispersion relation. The interaction between bosons and fermions induces an effective interaction between two fermions, which inherits the phonon mode anisotropy. We show that the anisotropy of such a Fermi-Fermi interaction, in the long wavelength limit, strongly favors scattering of high order partial waves, which are otherwise suppressed in the usual Fermi-Bose mixture. This, along with the ability to independently tune the dipolar interaction with an electric field and the s-wave scattering length between two fermions of opposite spins with a magnetic field, makes our proposed model an attractive alternative for the exploration of the physics of phase transitions or even phase coexistence between the singlet and triplet superfluids. We anticipate that the optimal critical temperature for triplet pairing can be realized in the mixed phase that separates from the Bose-Fermi mixture.

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Hong Ling
Rowan University

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