

Polaron interaction in superfluids

Wednesday, 13 September 2023 22:40 (20 minutes)

We investigate the induced Casimir interaction between two impurities in superfluid atomic gases. With the help of effective field theory (EFT) for a Galilean invariant superfluid, we find that the induced impurity-impurity potential at long distance does not fall off exponentially as a Yukawa potential, but instead exhibits a universal power-law scaling. We show that the exchange of two phonons leads to a relativistic van der Waals-like attraction ($\sim 1/r^7$) at zero temperature and a nonrelativistic van der Waals attraction ($\sim T/r^6$) at finite temperature.

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Session Classification: Poster Session III

Track Classification: Superfluidity and Supersolidity