ICFO

SEMINAR: Mutual friction and single vortex dynamics in strongly interacting Fermi superfluids

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12:00 to 13:00
Seminar Room

Mutual friction is a fundamental mechanism in finite-temperature superfluids, arising from vortex scattering with thermally excited quasiparticles and directly influencing vortex dynamics. Its microscopic origin is determined by the intrinsic properties of the system and the nature of its excitations. In Fermi superfluids, mutual friction represents an especially complex problem, as it is strongly affected by in-gap Andreev quasiparticles localized within vortex cores, occupying quantized Caroli-de Gennes-Matricon states. We investigate the two-dimensional motion of a single vortex orbiting a pinned anti-vortex in a unitary Fermi atomic superfluid at varying temperature. By analyzing its trajectory, we measure the yet-unknown longitudinal and transverse
mutual friction coefficients, which quantify the vortex-mediated coupling between the normal and superfluid components, finding good agreement with numerical simulations and an analytic model originally formulated for superfluid 3He [5]. Our work suggests that vortex dynamics in unitary Fermi superfluids is essentially affected by the interplay between delocalized thermal excitations and vortex-bound quasiparticles and provides a novel testbed for studying vortex dynamics at finite temperatures.

Hosted by: Leticia Tarruell