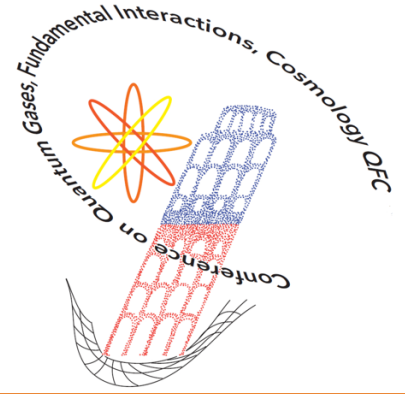


Gordon Baym

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25 October 2022 at 5pm

in Aula Gerace - Edificio C (second floor)

Superfluids from the cosmos to the lab:

from vortices in neutron stars and quark matter to searches for the neutron electric dipole moment and low mass dark matter

Abstract: In this talk I will discuss how condensed matter physics is surfacing anew in modern astrophysical and high energy contexts, pushing our understanding of superfluids, and enabling new experiments. Vortices in neutron stars raise tantalizing conceptual questions: in a neutron star, matter goes relatively smoothly from superfluid neutron matter at lower densities to superfluid quark matter at higher densities. Since singly quantized quark matter vortices nominally have three times the circulation of nuclear matter vortices, how smoothly though, in a rotating neutron star, can vortices in nuclear matter connect at the interface of the two phases to vortices in quark matter? Must there be boojums at the interface joining one quark vortex with three neutron vortices? (Spoiler: no!) I will also briefly mention using dilute solutions of He-3 in superfluid He-4 to search for the electric dipole moment of the neutron, and superfluid He-4 to search for dark matter in the MeV mass range.

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