Bosonization of Fermi surfaces and co-adjoint orbits
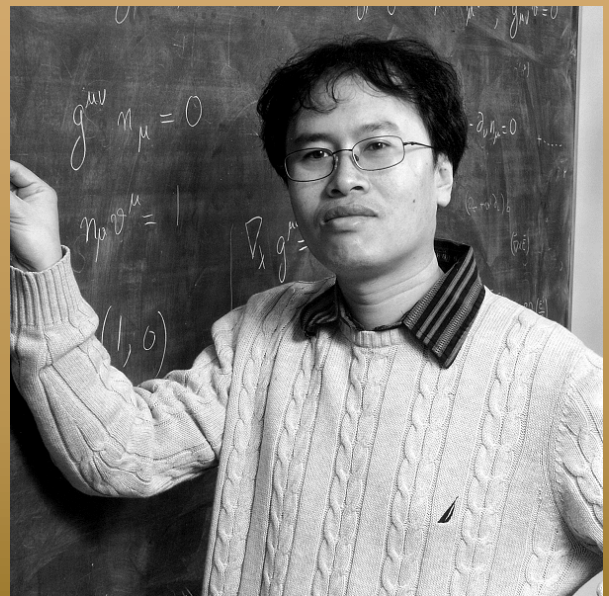
(Zoom Seminar)

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Zoom link shall be shared separately

Fermi liquid theory is a cornerstone of condensed matter physics. However, Landau's formulation of Fermi liquid theory does not fit in the paradigm of effective field theory. We describe a new field-theoretical reformulation of Landau Fermi liquid theory. In this approach, the space of low-energy states of a Fermi liquid is identified with a coadjoint orbit of the group of canonical transformations. The method naturally leads to a nonlinear bosonized description of the Fermi liquid. The Berry phase that the Fermi surface acquires when it changes shape is given by the Kirillov-Kostant-Souriau symplectic form. We show that the resulting local effective field theory captures both linear and nonlinear effects in Landau's Fermi liquid theory. Possible extensions and applications of the theory are outlined.

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