

## Marcello Porta

*Tuesday, November 12, 2024 9:30 AM (45 minutes)*

Title: Dynamics of high density Fermi gases on a local scale

Abstract: In this talk I will discuss the dynamics of extended, relativistic Fermi gases, at high density. I will focus on the derivation of the Hartree equation, at zero temperature, as an effective description of many-body quantum dynamics. I will present a result that establishes convergence to the Hartree equation in the sense of expectation values of local observables, supported in regions with volume of order 1, independent of the density. The result applies to initial data describing systems at equilibrium confined in arbitrarily large domains, under the assumption that a suitable local Weyl-type estimate holds true. The proof is based on the approximation of the initial data through low temperature quasi-free states, for which a strong form of local semiclassical structure can be established, that also allows to capture decay of correlations in space. This plays a crucial role in the control of the growth of fluctuations created by the many-body dynamics on a local scale. Joint work with Luca Fresta (Bonn) and Benjamin Schlein (Zürich).