An electronic current driven through a conductor can induce a current in another conductor through the famous Coulomb drag effect. Similar phenomena have been reported at the interface between a moving fluid and a conductor, but their interpretation has remained elusive. I will present our recent theoretical work, which predicts that a globally neutral liquid can generate an electronic current in the solid wall along which it flows [1], building on the idea of solid-liquid quantum friction [2]. This hydrodynamic Coulomb drag originates from both the Coulomb interactions between the liquids charge fluctuations and the solids charge carriers, and the liquid-electron interaction mediated by the solids phonons, consistently with experimental observations [3]. Our results provide a roadmap for controlling nanoscale liquid flows at the quantum level. In particular, we predict a fluidic equivalent of electron tunnelling, termed flow tunnelling: a flowing liquid may transfer momentum to another liquid through a solid wall. We directly observe this phenomenon in semi-classical molecular dynamics simulations, paving the way to a wealth of nanofluidic applications inspired by condensed matter physics.

Friday, February 2, 2024 01:00pm - 02:15pm
Office Bldg West / Ground floor / Heinzel Seminar Room (I21.EG.101)

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.