

# Symposium Hydrodynamic Electronics: Transport in ultra-pure Quantum Systems (SYHE)

jointly organized by  
the Low Temperature Division (TT),  
the Magnetism Division (MA), and  
the Dynamics and Statistical Physics Division (DY)

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The fluid flow of liquids is governed by the laws of hydrodynamics. Nonlocal transport behavior and turbulence are among the hallmarks of hydrodynamic flow. Recently, major experimental and theoretical progress has been made in identifying and investigating quantum materials with hydrodynamic flow of electrons. Examples are ultraclean graphene, Weyl semimetals, and delafossites, where momentum-conserving collisions dominate over all other scattering processes. Hydrodynamic transport coefficients, such as the electron viscosity or energy diffusivities, reveal key information about the strength of interactions and the nature of thermalization in a quantum many-body system. These issues are of relevance in systems as diverse as cold atomic gases, the quark gluon plasma, and the above electronic materials. The phenomena to be discussed include non-local transport, hydrodynamic magneto-transport, super-ballistic current flow, flow vorticity in graphene, extreme thermal conductivities, coupled energy-charge solitons, and electron-phonon fluids. New theoretical concepts include nonlinear flow responses, quantum-critical transport, bounds on transport coefficients, and applications of string theoretical methods to capture the physics of hydrodynamic electronics. The aim of this symposium is to bring together the leading experimental and theoretical experts, and thus to directly address some of the most pressing controversies in this field.

## Overview of Invited Talks and Sessions

(Lecture hall H1)

### Invited Talks

SYHE 1.1	Wed	9:30–10:00	H1	<b>Hydrodynamic theory of dissipative magnetophonons</b> — ●SEAN HARTNOLL
SYHE 1.2	Wed	10:00–10:30	H1	<b>Unconventional transport in mesostructures of ultra-pure delafossite metals</b> — ●ANDREW MACKENZIE
SYHE 1.3	Wed	10:30–11:00	H1	<b>Topological Materials with liquid electrons</b> — ●CLAUDIA FELSER, JOHANNES GOOTH
SYHE 1.4	Wed	11:15–11:45	H1	<b>Hydrodynamic approach to electronic transport</b> — ●BORIS NAROZHNY
SYHE 1.5	Wed	11:45–12:15	H1	<b>Electron hydrodynamics in graphene: introduction and status</b> — ●DENIS BANDURIN

### Sessions

SYHE 1.1–1.5	Wed	9:30–12:15	H1	<b>Hydrodynamic electronics: Transport in ultra-pure quantum systems</b>
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