

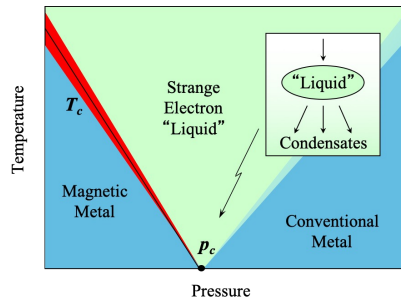
Quantum Matter Group

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Discovery research in quantum materials

We study **quantum materials** that pose a challenge to current theory and exhibit quantum phenomena with technological applications:

- materials discovery, guided by theory
- investigation at low temperature, high pressure, high magnetic field



Summary

Strongly correlated systems:

Charge and spin order, electronic structure determination, unconventional superconductivity (Cu- or Fe-based, heavy fermion, layered materials), ferroelectrics and multiferroics, topological states of matter

Quantum functional materials:

New superconductors, refrigerants (magnetic, electric, Peltier), battery technology

Instrumentation and techniques:

Materials synthesis and crystal growth
High pressure measurements into the mega-bar regime
Low temperature, high magnetic field; quantum oscillations

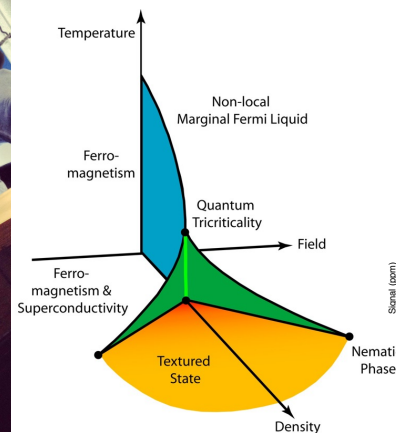
Web www.qm.phy.cam.ac.uk , email mott.hub@phy.cam.ac.uk

Temperature



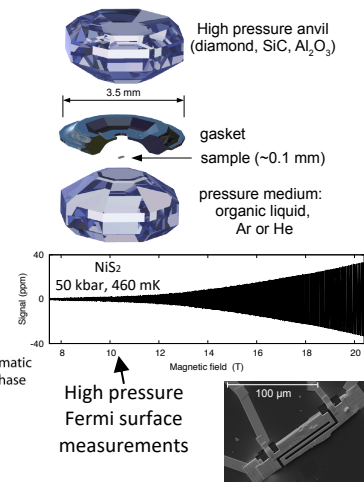
20.4 Tesla cryomagnet for Fermi surface studies

Magnetic Field



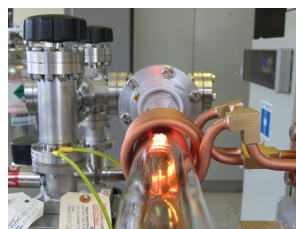
Schematic phase diagram of electronic states as a function of temperature, field and pressure

Pressure

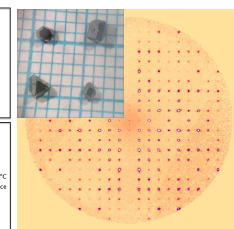
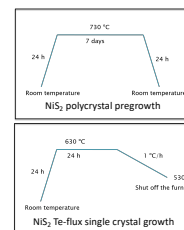


Sample handling on the microscale

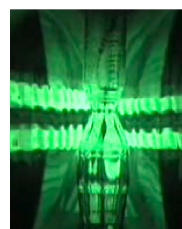
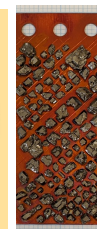
Crystal growth and characterisation



Induction furnace



Flux growth



Mirror furnace