

Quantum Matter Theory

Staff (2024):

- Program professor (PAP): Annica Black-Schaffer
- Faculty members: Jonas Fransson, Lars Nordström, Erik Sjöqvist, Roope Uola (from Dec-2024, with Nordita)
- Ph.D. students: 7 (present: Lucas Baldo)
- Postdocs: 10 (present: Quentin Marsal)
- Permanent Researchers: 2 (present: Jorge Cayao)
(entirely on external funding)



Research focus

Describing **quantum many-body systems and matter** using conceptual and **effective low-energy models** to understand the physics of condensed matter on a **unifying level**.

Main Research Areas		% of program	FTE Faculty	Type
1	Unconventional and topological superconductivity, incl non-Hermitian	75%	1	Basic
2	Quantum information	10%	1	Basic
3	Spin-based phenomena, non-equilibrium	10%	1	Basic
4	Complex and unconventional magnetism	5%	1	Basic

KoF24 report, Table 3.1



Key enablers for research

- External funding for basic science
 - Excellence funding used during evaluation period: 3xERC, 6xKAW + 1 new KAW Scholar, 8xVR
 - Problem: lack of overhead funding from ERC,KAW
- Being able to attract (and retain) excellent students, postdocs, and faculty
- Collaborations, theory and experiments
 - Local (incl Materials theory program), National (incl Nordita), International
- Supercomputing allocations (through NAISS)



Program priorities

(KoF24 report summary, Chapters 8-10)

Prio 1 (program): New UL recruitment

Strengthen quantum matter theory research, reaching a more sustainable faculty member level

Prio 2 (department): More uniform research salary support for faculty members

Providing more stable support for research for all faculty members in dept

(Same Prio 2 for all 3 theory programs)

Prio 3 (faculty): Quantum Information

Strengthen UUs activity in quantum information, quantum computing, and technology

→ Merged into **joint Physics&Astronomy and Mathematics departments** priority:

Center for Geometry and Physics: from geometry to quantum information



