Symposium Electronic Structure Theory for Quantum Technology: From Complex Magnetism to Topological Superconductors and Spintronics (SYES)

jointly organised by
the Surface Science Division (O),
the Low Temperature Physics Division (TT),
the Magnetism Division (MA),
the Crystalline Solids and their Microstructure Division (KFM),
the Semiconductor Division (HL), and
the Metal and Material Physics Division (MM)

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The next generation of quantum technologies will utilize microscopic properties without classical counterparts, often encoded in the quantum-mechanical wave function phase. These properties unify phenomena like noncollinear magnetism, multiferroicity, and superconductivity. Noncollinear magnets create emergent electromagnetic fields driving novel transport effects for spintronics, while superconductors enable dissipationless supercurrents and working qubits for quantum computers. Combining magnetic and superconducting materials can produce quantum entities like Majorana states, relevant to topological quantum computing. In this context, exciting developments based on ab-initio methods will be discussed at the symposium, providing an ideal platform for fostering collaboration among experts, students, and early-career researchers.

Overview of Invited Talks and Sessions

(Lecture hall H1)

Invited Talks

SYES 1.1	Fri	9:30–10:00	H1	**Ab-initio Design of superconductors** — •Lilia Boeri
SYES 1.2	Fri	10:00–10:30	H1	**Topological superconductivity from first principles** — •László Szunyogh
SYES 1.3	Fri	10:30–11:00	H1	**First-principles study and mesoscopic modeling of two-dimensional spin and orbital fluctuations in FeSe** — •Myrta Grüning
SYES 1.4	Fri	11:15–11:45	H1	**Non-collinear magnetism in 2D materials from first principles: Multiferroic order and magnetoelectric effects.** — •Thomas Olsen
SYES 1.5	Fri	11:45–12:15	H1	**Spin-phonon and magnon-phonon interactions from first principles** — •Marco Bernardi

Sessions

SYES 1.1–1.5	Fri	9:30–12:15	H1	**Electronic Structure Theory for Quantum Technology**