



## Physical Sciences Seminar

# Quantum Colloquium (Title: Searching for topological superconductors using ultrasound)

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Host: Kim Modic

Superconductors come in many varieties: we typically classify them based on the symmetry of their superconducting gap, such as s, p, or d-wave. This classification, however, does not tell the entire story because the superconducting gap can also have topological structure. One route to topological superconductivity is to find a superconductor with a multi-component order parameter, such as the famed  $px + i py$  state in 3He. Multi-component order parameters can have "twists" in momentum space, forming a topological superconducting state. Finding such a superconductor, however, has proven challenging, in part due to the lack of experimental tools available. I will discuss how we use ultrasound to measure the strain susceptibility of the superconducting gap. By comparing the shear and compression susceptibilities, we can distinguish between one-component and multi-component superconductors. I will discuss our surprising discovery that Sr<sub>2</sub>RuO<sub>4</sub> may harbour a unique, multi-component state, despite  $px + i py$  being ruled out by NMR. I will then show new data on UTe<sub>2</sub>, which has been claimed to have a multi-component order parameter that gives rise to two superconducting transitions and time reversal symmetry breaking. By performing ultrasound on samples of UTe<sub>2</sub> with both one and two superconducting transitions, we clarify the nature of the superconducting state and are able to make crisp, symmetry-based statements about the potential multi-component gap.

**Tuesday, October 10, 2023 11:00am - 12:00pm**

Office Bldg West / Ground floor / Heinzl Seminar Room (I21.EG.101)



This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.

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<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.