Sonderforschungsbereich 1277

Emergent Relativistic Effects in Condensed Matter -
From Fundamental Aspects to Electronic Functionality

SFB – Colloquium

Speaker: **Prof. Dr. Andrew Higginbotham**
Insititute of Science and Technology Austria

Date: Tuesday, 10 May 2022, 14:15,
H34 and via Zoom

Topic: Probing quantum materials with quantum microwave circuits

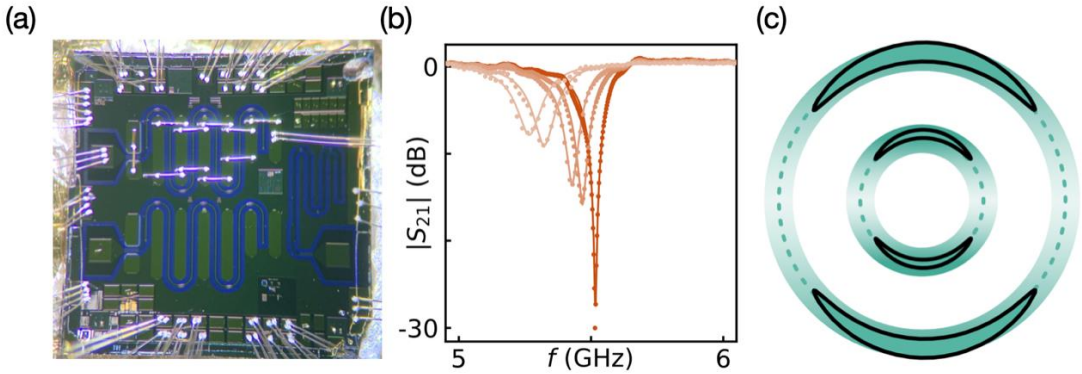
Abstract:

Coherently coupling target systems to microwave cavities is a celebrated strategy in quantum science, having been pioneered in atomic systems and later applied to superconducting and spin qubits. Is it possible to adapt these techniques to the domain of quantum materials?

I will discuss two recent examples of using quantum microwave circuits to probe quantum materials within my group. The first example is the detection of Bogoliubov-Fermi surfaces and inference of *p±ip* induced pairing at the Al/InAs interface using a superconducting resonator.

The second example is the study of the superconductor-insulator transition in Josephson arrays. Combining CQED and transport techniques, we show how thermally activated superconductivity can survive deep into the nominally insulating phase. In addition to clarifying some long-standing puzzles related to the superconductor-insulator transition, this suggests that some circuit elements used for quantum computing actually have their performance improved by thermal decoherence.

Host: Prof. Dr. Christoph Strunk



(a) Example quantum microwave circuit. (b) Transmission S_{21} measured vs frequency f, showing dips due to circuit resonance. (c) Momentum-space image of Bogoliubov-Fermi surfaces.