

Research Fellow / Senior Research Fellow in Transport Spectroscopy at milliKelvin Temperatures

The Weber group at Nanyang Technological University seeks a highly qualified Research Fellow to explore topological superconductivity in van-der-Waals materials, heterostructures, and devices. The Research Fellow will be part of a collaborative effort across NTU and A*Star for the scalable design of novel materials and heterostructures, and to explore their potential for applications in topological quantum devices.

The hire is part of a recent major grant award for the realization of topological quantum devices in van-der-Waals heterostructures, with funding available over the next five years. Materials and devices will be characterised in a unique combination of complementary local probe and transport spectroscopies, down to milliKelvin temperatures and in strong magnetic fields.

We are looking for a high-calibre Research Fellow with the following expertise

Required:

- Experience in running and maintaining dilution cryostats for transport spectroscopy of mesoscopic devices. Experience in modifying cryostat wiring and filtering, including GHz frequency wiring is strongly desired.
- Expertise in nanofabrication of mesoscopic quantum devices (including electron beam lithography).

Preferred

- Experience in the synthesis of 2D quantum materials (including van-der-Waals materials and heterostructures), by Molecular beam epitaxy (MBE), chemical vapour deposition (CVD), or mechanical exfoliation.
- Experience in the fabrication (stacking) of van-der-Waals heterostructures (including in inert environments).

Job Scope / Responsibilities

The successful candidate will aid the PI in one of the following areas:

- Operation, maintenance, and modification of a cryogen free dilution refrigerator, recently installed and commissioned in Weber's laboratory
- Nanofabrication of van-der-Waals heterostructures for topological quantum devices
- Electronic characterization of topological quantum devices by transport spectroscopy at milliKelvin temperatures and in strong vector magnetic fields
- Co-supervision of research students
- Preparation of scientific publications

The position comes with internationally competitive remuneration and benefit package, commensurate with experience. The duration of the contract is 1-2 years, based on experience, with option for renewal on a yearly basis, based on performance, until the project expires.

Expiry: position open until filled

Job Requirements:

- A Ph.D. degree in physics is mandatory
- Demonstrated strong experimental skill and track record of research achievements

- Demonstrated ability to publish high-tier research publications
- Excellent verbal and written communication skills (including scientific writing)
- Ability to work independently but also to work as part of a team

Candidates are expected to assume duty any time from their successful hire.

About the PI:

Weber has nearly 15 years of experience in scanning probe microscopy, local probe spectroscopy, and electron transport spectroscopies of material systems relevant to quantum technologies. He obtained his PhD from the Centre for Quantum Computation and Communication Technology at The University of New South Wales (UNSW) in Sydney, where he developed a scanning probe based fabrication scheme for atomically small silicon quantum bits. He later worked as an Australian Research Council (ARC) DECRA Fellow at the Centre for Atomically Thin Materials (MCATM), Monash University, and remains an Associate Investigator within the ARC Centre for Future Low Energy Electronics Technologies (FLEET).

Weber recently moved to Nanyang Technological University as a Nanyang Assistant Professor (NAP) and Singapore National Research Foundation (NRF) Fellow to establishing state-of-the-art local probe and transport spectroscopy facilities for the study of quantum materials for their application in future topological and quantum information devices. Weber's laboratories include capability for UHV low-temperature (4.5K) scanning probe microscopy, molecular beam epitaxy (MBE), angle-resolved photoemission spectroscopy (ARPES), as well as a dilution cryostat for transport spectroscopy at milliKelvin temperatures. A custom-designed vibration-isolation laboratory is currently being constructed that will host a commercial milliKelvin scanning tunnelling microscope (mK-STM) with vector magnetic field.

Weber's work has been published in several high-impact publications (Science, Nature Nanotechnology, Nature Communications, Physical Review Letters, Nano Letters, and more), as well as presented at invited and contributing conferences.

Asst Prof Bent WEBER

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