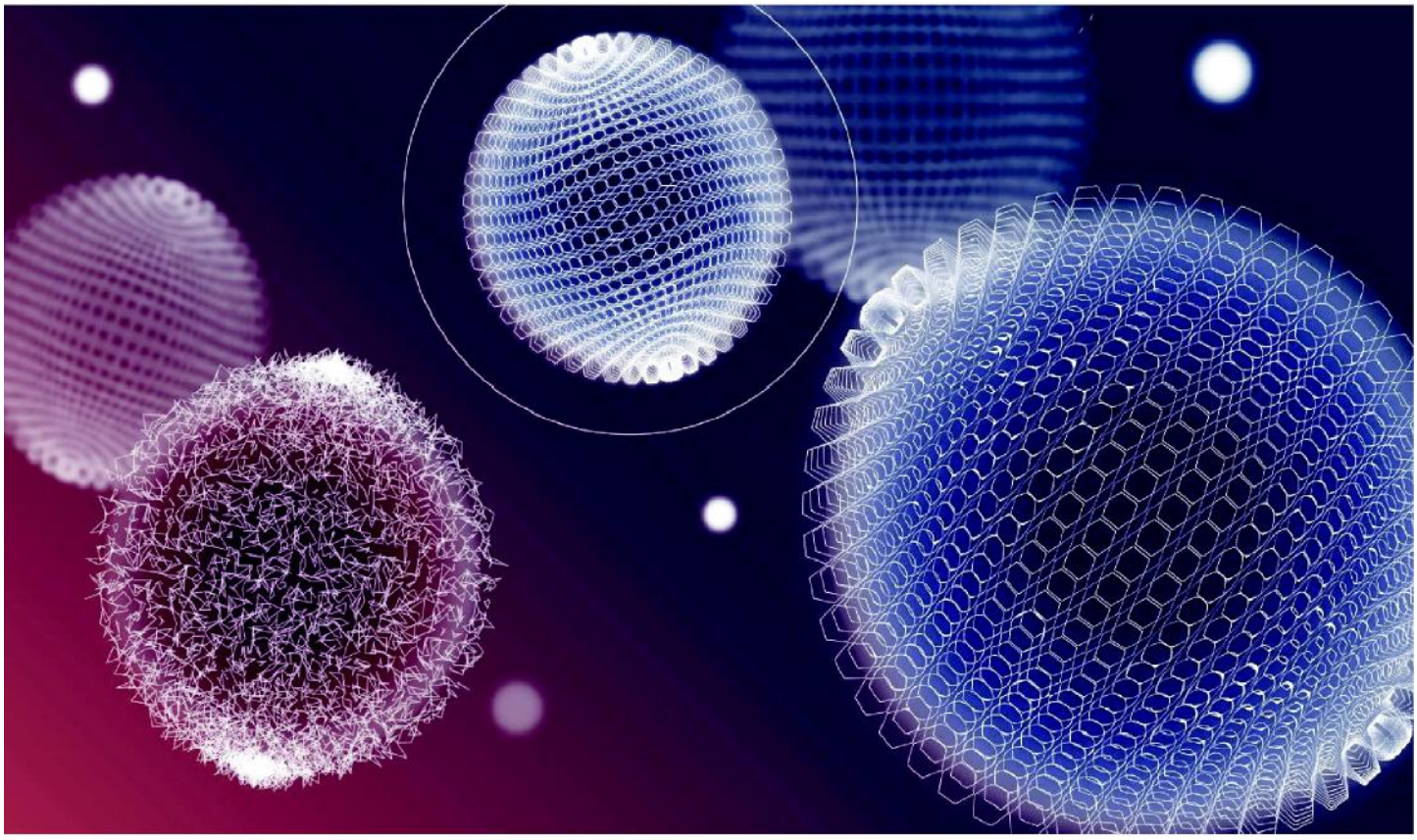
QUANTUM MATERIALS

2019 A University of Waterloo Workshop



TQT Transformative Quantum Technologies

TQT's support is thanks in part to funding from the Canada First Research Excellence Fund

UNIVERSITY OF WATERLOO

Welcome!

Michel Gingras (UW Physics & Astronomy)

David Hawthorn (UW Physics & Astronomy)

We would like to welcome you to our first pan-faculty
Waterloo Quantum Materials Workshop, Summer 2019 Edition.

Research in quantum materials has evolved over the past few years as a significant endeavour of interest to physicists, chemists and engineers. We recognize that there exists in Waterloo a broad interest in this field that transcends the traditional physics, chemistry and engineering disciplines. This not surprising given the naturally broad and intrinsically multidisciplinary nature of the problems at stake in this area of research.

This workshop was put together to promote an awareness of what Waterloo researchers in quantum materials are interested in. We hope our workshop may provide seeds for new ideas, research projects, collaborations and research funding opportunities.

Sincerely,

Michel Gingras
David Hawthorn

SPEAKERS

Na Young Kim

IQC Faculty, Associate Professor

Na Young Kim leads Quantum Innovation (QuIN) laboratory, aiming to build large-scale quantum processors based on novel materials and advanced technologies.

Prior to joining IQC in 2016, Kim was at Apple Inc., working on the development of small display products, where she got to experience delivering beloved products to world-wide consumers. She received a BS in Physics from Seoul National University and pursued her graduate studies exploring mesoscopic transport properties in low-dimensional nanostructures in the Department of Applied Physics at Stanford University.

Roger Melko

Professor; Canada Research Chair in Computational Many-Body Physics

Dr. Melko's research interests involve strongly-correlated many-body systems, with a focus on emergent phenomena, ground state phases, phase transitions, quantum criticality, and entanglement. He emphasizes computational methods as a theoretical technique, in particular the development of state-of-the-art algorithms for the study of strongly-interacting systems. Dr. Melko's work has employed Monte Carlo simulations and Density Matrix Renormalization Group methods to explore the low-temperature physics of classical and quantum magnetic materials, cold atoms in optical lattices, bosonic fluids and low-dimensional systems. He is particularly involved in studying microscopic models that display interesting quantum behavior in the bulk, such as superconducting, spin liquid, topological, superfluid or supersolid phases. He is also interested in broader ideas in computational physics, the development of efficient algorithms for simulating quantum mechanical systems on classical computers, and the relationship of these methods to the field of quantum information science.

Adam Wei Tsen

Assistant Professor

Adam Wei Tsen's research focuses on the study of low-dimensional materials that exhibit exotic quantum phenomena, and their integration into novel electronic devices.

Pierre Nicholas Roy

Professor & Canada Research Chair in Quantum Molecular Dynamics & Computational Science
Undergraduate Advisor

Pierre-Nicholas Roy carries out research in theoretical chemistry. His research involves the development of new computational methods to simulate the dynamics of complex molecular systems. His interests encompass various levels of theory from classical molecular dynamics to extreme quantum mechanical situations.

Pierre-Nicholas holds the Canada Research Chair in Quantum Molecular Dynamics.

SPEAKERS

Hamed Majedi

Professor, Department of Electrical & Computer Engineering
Institute for Nanotechnology Faculty

Hamed was born in Tehran, Iran and did his BSc. in Electrical Engineering (Major in Telecommunications) at K. N. Toosi University of Technology, Tehran, Iran. He received his MSc. in Electrical Engineering (Major in Electromagnetic Fields & Waves) from AmirKabir University of Technology with honors. In 1998, he joined the Department of Electrical & Computer (E&CE) at the University of Waterloo and obtained his PhD with distinction on December 2001.

Hamed's research interests and activities span engineering and physics of solid state quantum electrodynamics with an emphasis on superconducting optoelectronics, photonic and mm-wave/THz devices and systems for emerging applications in quantum information processing, nanophotonics and nanoelectronics.

Anton Burkov

Professor, Associate Graduate Officer

Dr. Burkov is a theoretical condensed matter physicist, currently focusing on the effects of nontrivial electronic structure topology and electron-electron interactions on experimentally observable properties of quantum materials. His recent work includes pioneering studies of topological Weyl, Dirac and nodal line semimetals, topological insulators and superconductors, and quantum spin liquids. Dr. Burkov's work has strong connections to other fields of physics, in particular to elementary particle physics and quantum computing.

Robert Hill

Associate Professor, Teaching Fellow
University of Waterloo

Dr.Hill's research is focused on the experimental study of materials whose exotic properties are dominated by the collective quantum mechanical nature of their electrons and defy explanation using current theoretical paradigms.

The difficult challenge of predicting emergent collective electronic properties means that such search and discovery is lead by experiment.

Dr. Hill's research provides the precise low temperature measurements of fundamental properties which form the benchmarks against which theoretical understanding is tested.

Chong Wang

Perimeter Institute Faculty, with research interests in Condensed Matter

Not Available

SPEAKERS

Holger Klienke

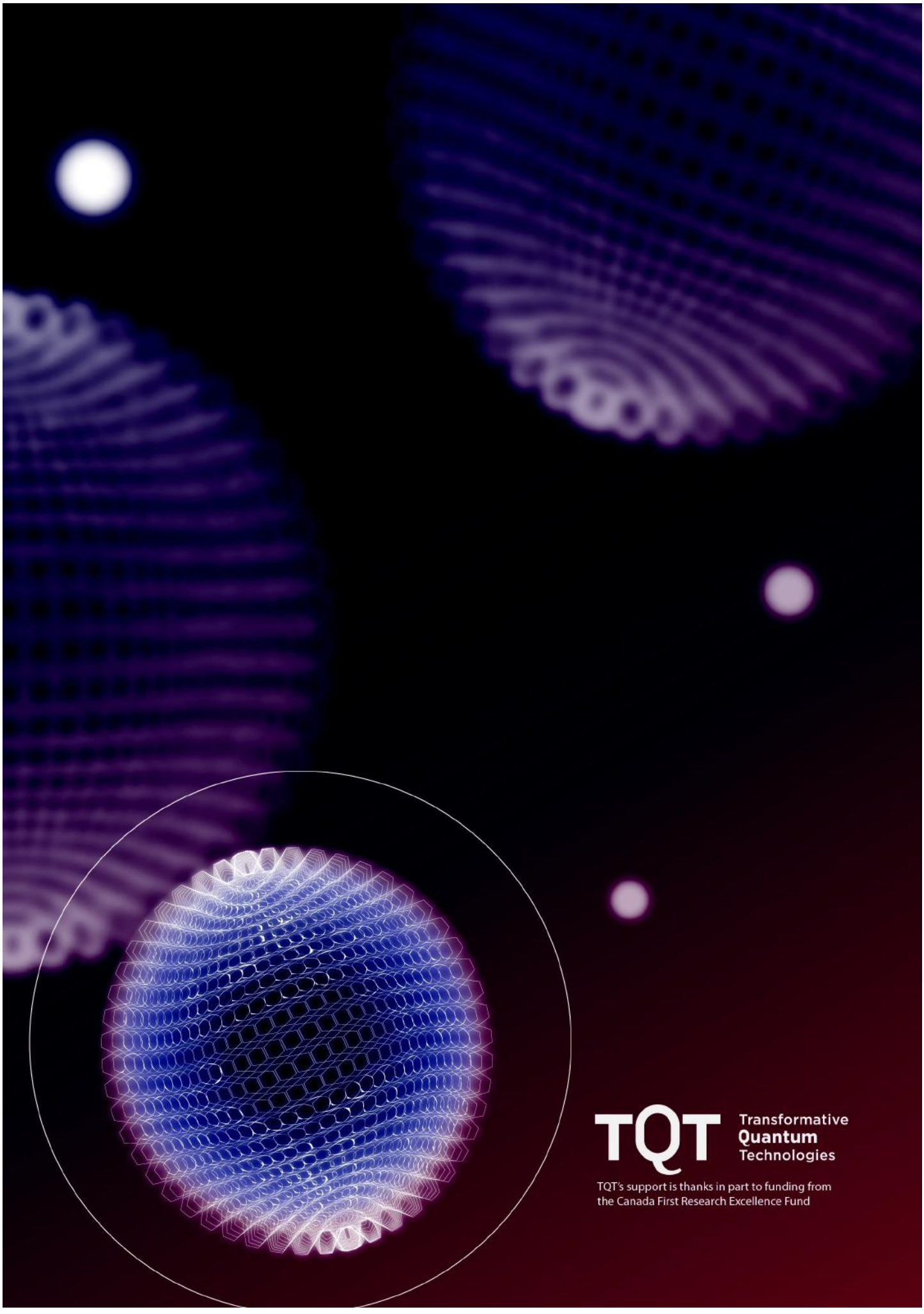
Professor & Program Director, Collaborative Graduate Nanotechnology Program

Holger Kleinke's research focuses on finding and optimizing new thermoelectric materials. Thermoelectrics are capable of converting heat into electrical energy and vice versa. This environmentally friendly energy conversion currently has several applications, but is limited by its low efficiency. His research group is attempting to increase the efficiency so that thermoelectrics may be used to recover electricity from the nowadays abundant waste heat, e.g. in the exhaust of automobiles.

Timothy Hsieh

Perimeter Institute Faculty, Condensed Matter & Quantum Information

Timothy Hsieh has held the position of Moore Postdoctoral Fellow, a Kavli Institute for Theoretical Physics, University of California, Santa Barbara before joining the Perimeter Institute. His research interests include quantum materials, topological phases of matter, and applications of synthetic quantum systems for quantum simulation.



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