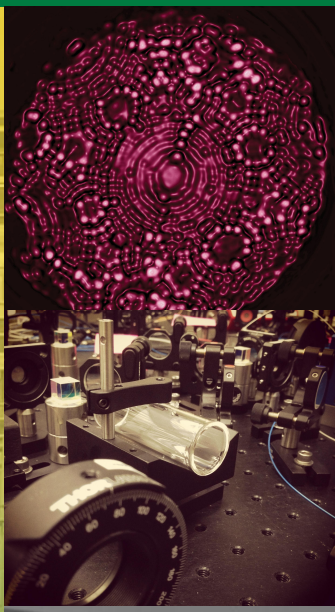
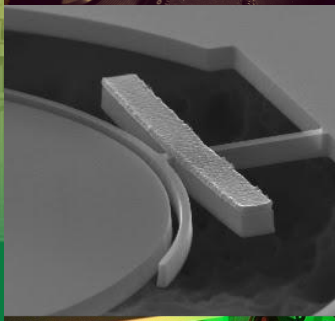
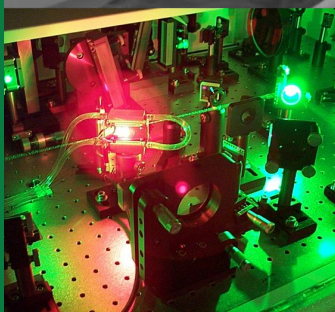
CONDENSED MATTER PHYSICS
ATOMIC, MOLECULAR & OPTICAL PHYSICS







UALBERTA
PHYSICS

uncovering the nature of matter from the macroscale to the nanoscale

Researchers in Condensed Matter Physics and Atomic, Molecular & Optical Physics at the University of Alberta use advanced computational resources, state-of-the-art experimental facilities in CCIS and the nanoFAB explore a wide range of topics, including: magnetism, photonics, optomechanics, quantum technologies, scanning probe microscopy, strongly correlated electrons, superconductivity, superfluidity, topological phases of matter, ultracold quantum gases, ultrafast laser spectroscopy.

Igor Boettcher, Assistant Professor,
Condensed Matter Theory

The Boettcher group studies quantum many-body systems on a wide range of platforms, including topological semimetals, ultracold quantum gases, circuit quantum electrodynamics, and novel superconductors. This is achieved by applying techniques from quantum field theory and the renormalization group.

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John P. Davis, Associate Professor
Cavity Optomechanics & Confined Superfluids

Combining state-of-the-art nanofabrication, cavity optomechanics, and ultra-low temperatures, the Davis lab explores the interface between the classical world and the quantum one, while developing next-generation quantum technology. His lab has also developed Canada's only cryogenic system capable of cooling below 1 mK, in order to study exotic states of superfluid 3He.

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Mark Freeman, Professor
Experimental Hybrid Nanosystems

Facilitated by the UofA's outstanding nanofabrication infrastructure, Dr. Freeman's lab studies the physics of nanosystems incorporating magnetic, mechanical, and optical degrees of freedom - such as gaining new insights into magnetism through the use of nanomechanical signatures of spin resonance.

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Frank Hegmann, Professor
Experimental Condensed Matter Physics

Dr. Hegmann explores ultrafast phenomena in materials on the nanoscale using time-resolved terahertz spectroscopy and terahertz scanning tunneling microscopy (THz-STM). His state-of-the-art Ultrafast Nanotools Lab and Ultrafast Spectroscopy Lab use amplified femtosecond laser sources and picosecond-duration terahertz pulses to probe ultrafast excitation dynamics and carrier transport in nanomaterials.

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Lindsay LeBlanc, Associate Professor
Experimental Atomic and Optical Physics

Dr. LeBlanc uses atomic systems, including warm vapours, laser-cooled ensembles, and ultracold quantum gases (Bose-Einstein condensates) to study and exploit the quantum nature of matter. Applications include quantum memory, quantum computing, and sensing. This research has applications in quantum information and involves developing cutting-edge quantum technologies in her state-of-the-art lab.

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Joseph Maciejko, Associate Professor
Condensed Matter Theory

Dr. Maciejko researches emergent phenomena in quantum many-body systems. Areas of current interest include the topology and geometry of quantum matter, strongly correlated electrons, and quantum criticality.

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Frank Marsiglio, Professor
Condensed Matter Theory

The Marsiglio lab studies various aspects of many-body electron systems, including superconductivity, polaronic effects, spin-orbit coupling in trapped ions, and impacts of external fields and stimuli.

Al Meldrum, Professor
Optics and Photonics

Dr. Meldrum's work focuses on optical materials development, applications-driven optical sensing technologies, and optical devices. His lab offers the opportunity for multidisciplinary training, with students interacting closely with chemists and engineers, as well as physicists and potentially industry as well.

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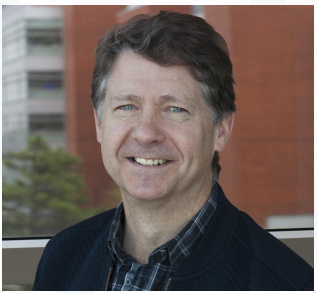

Robert Wolkow, Professor
Atom-Defined Quantum Circuitry

Dr. Wolkow's research offers the opportunity to build, explore, and commercially deploy their lab's newly discovered atom scale circuitry. Smaller, dramatically less energy consuming and enormously faster than CMOS, these atomic electric machines open the door to a near term classical computing revolution while pointing to a scalable approach to quantum circuitry.

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Additional researchers in CMP/AMOP include:

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