

We are actively looking for students who have completed their MS degree in **Physics, Materials Science or Electrical Engineering** to begin their research in Condensed Matter Physics (Theory or Experiment) or Physics Education Research at the University of Cincinnati beginning in January, Summer or Fall of 2023! Express your interest in our program by sending your CV and a cover letter to CMPSearch2022@ucmail.uc.edu for more information. We use holistic criteria for admissions to our program. Test scores are optional, and we interview all candidates who are considered.

We **guarantee stipend support** of at least \$26,000/year in addition to Tuition and Fees and health subsidy worth up to an additional \$28,000 per year. We anticipate increased stipend support in the future subject to funding. The University of Cincinnati is an urban Carnegie R1 research institution which overlooks the Ohio river valley and the vibrant downtown of the city. Cincinnati has been ranked



by *US News and World Report* for the past five years as the best city in Ohio to live. In 2022, Cincinnati was ranked fourth in the nation for our extensive park system, and was ranked by *Food and Wine* as having one of the most vibrant new food scenes in the country. Our cultural environment is second to none for a city of our size, with the Cincinnati Symphony Orchestra, Cincinnati Ballet, College Conservatory of Music, Cincinnati Art Museum, Contemporary Arts Center, Taft Museum, and Cincinnati Playhouse in the Park, Cincinnati Shakespeare Company, Ensemble Theatre and nearly a dozen other community theatres in the three state area, and three Chamber Music Societies. We have professional teams in baseball, football and soccer with the Cincinnati Reds, Bengals and FC-Cincinnati.

Consider joining one of the following active research groups:

Carlos Bolech (CMP Theory): Strongly Correlated Quantum Systems (SCQS): many-body and quantum-field theories, quantum fluids, integrable systems, quantum information and tensor networks, non-equilibrium transport, mesoscopic systems, ultracold atomic gases and optical lattices, unconventional superconductivity, strongly correlated electrons (e.g., quantum impurities and heavy fermions).

Andrei Kogan (CMP Experiment): His group studies quantum effects in low-dimensional solid state structures due to collective behavior of carriers. Currently, the group focuses on effects that emerge in 2D conductors at low carrier densities when the Coulomb interactions of the carriers becomes a dominant factor. We are interested in unusual ground states induced by the carriers' interactions, the impact of the interactions on the current flow in such conductors, identifying and controlling hydrodynamic current modes, the energy relaxation between the interacting 2D carriers and the host lattice, and mesoscopic effects in such systems. In these studies, we employ millikelvin-temperature, low-noise transport measurements, microwave response measurements at frequencies up to tens of GHz, and advanced semiconductor fabrication techniques including nm-scale lithography.

Kathy Koenig (PER): The PER group focuses on research regarding the implementation and evaluation of teaching pedagogies and curriculum, both in-person and web-based, that support student success and retention in introductory college-level STEM courses. In addition, they engage in the development and evaluation of lab activities that promote students' abilities in scientific reasoning.

Yashar Komijani (CMP Theory): His research interests are (1) Quantum criticality, high-T_c superconductivity in heavy-fermions and spin-liquids. (2) Entanglement and quantum chaos (3) Quantum impurities and quantum transport in mesoscopic systems, and (4) Realizations of topological quantum computation.

Evgeny Mikheev (CMP Experiment): Low-temperature behavior of nanoscale devices fabricated from superconducting oxides such as SrTiO₃ and KTaO₃. His group aims to combine superconductivity with gate voltage tunability, reduced dimension geometries (quantum constrictions, wires, dots, rings), and microwave superconducting resonator structures. Two long-term goals are stabilization and detection of topological superconductivity in an oxide wire, and integration of oxide superconductor materials into superconducting qubits.

Leigh Smith (CMP Experiment): Electronic, Magnetic and Spin dynamics in nanostructures and topological materials, including 2D Ferromagnetic Semiconductors, Weyl and Dirac Semimetals, and Semiconductor Nanowires. We study the electronic topology using a combination of electronic and optical probes with high spatial, spectroscopic and temporal resolution.

Hans-Peter Wagner (CMP Experiment): Lasing from single nanowires and from photonic crystal nanowire arrays. Entanglement and strong coupling using open cavity semiconductor nanowire-metal nanoparticle or 2D semiconductor-metal nanotriangle systems in which excitons and plasmons can interact in regimes ranging from weak to strong coupling. Ultrafast optical spectroscopy and electron energy-loss spectroscopy are uniquely combined to study the energy transfer and many-emitter entanglement in these systems.

The Department of Physics at the University of Cincinnati is an equal opportunity, open access, and APS Bridge Partnership Institution.