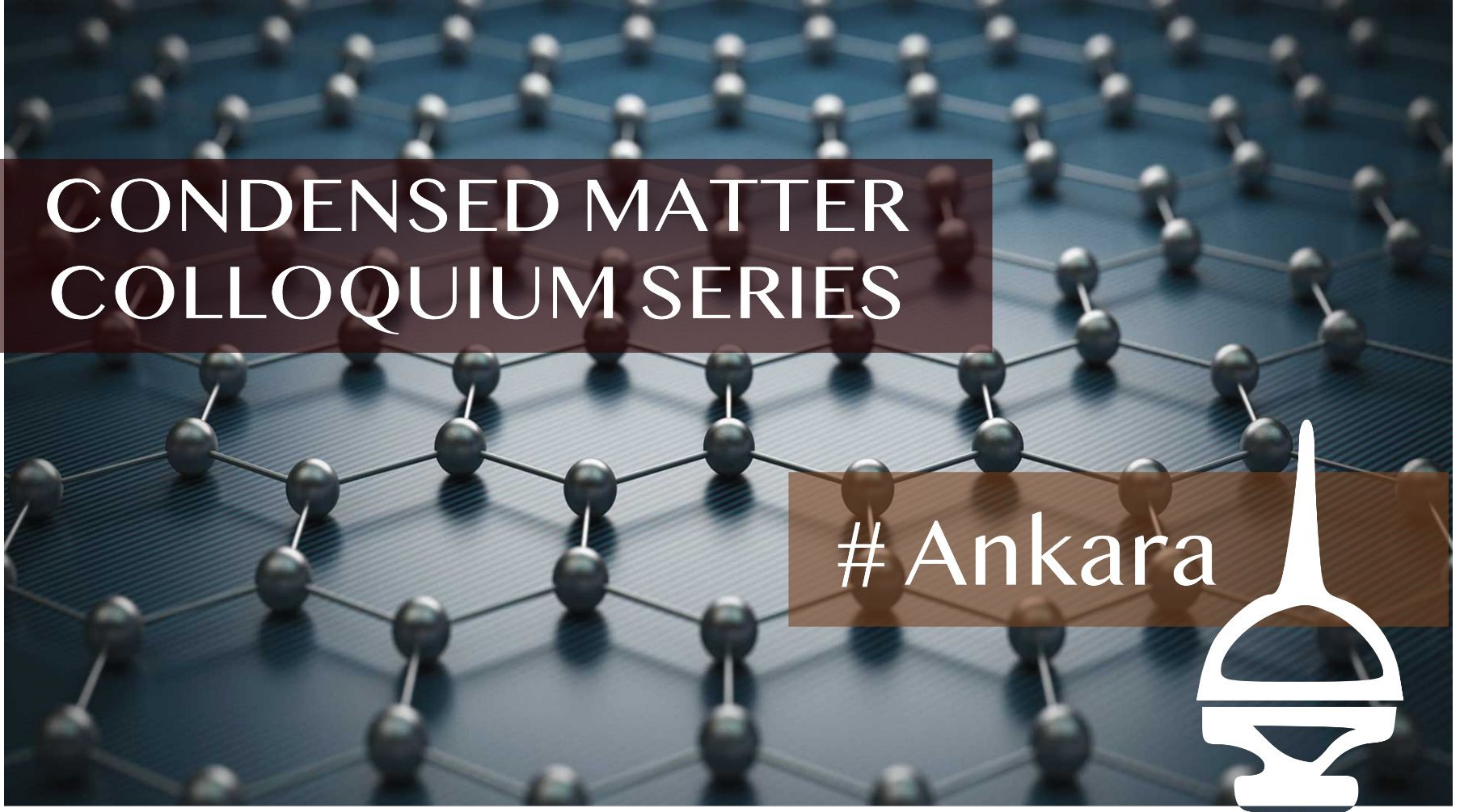

Martin Zwierlein

Massachusetts Institute of Technology

Quantum Many-Body Physics under the Microscope

Experiments with ultracold atomic gases can realize paradigmatic states of matter, from Bose-Einstein condensates to superfluid Fermi gases, in pristine fashion. Particularly intriguing are systems where particles interact so strongly that no simple algorithm exists to predict e.g. equations of state, transport properties or dynamical phenomena. I will discuss three recent examples. In fermionic superfluids, we were able to directly observe second sound, the wave-like propagation of heat, using a novel thermography scheme that directly visualizes heat flow. With Fermi gases in optical lattices, we realized the attractive Hubbard model, relevant for our understanding of high-temperature superconductivity, and could directly observe non-local fermion pairing under a quantum gas microscope. Finally, we studied rotating quantum gases to make contact with the physics of charged particles in high magnetic fields and found a new way to enter the ground state of cyclotron motion, the lowest Landau level. There, we observed an intriguing hydrodynamic instability, a quantum analogue of the Kelvin-Helmholtz instability, driven by interatomic interactions. With these sets of experiments, we hope to improve our understanding of quantum many-body physics in general, with relevance to condensed matter and nuclear physics.

November, 19
Tuesday

19:00, (Ankara Time)

Click here for zoom link
Meeting ID: 432 931 6595
Password: 326852

Martin Zwierlein is Thomas A. Frank Professor of Physics at MIT. He studied physics in Bonn and at the ENS Paris. His PhD at MIT focused on the observation of superfluidity in ultracold Fermi gases, a novel form of quantum matter. After a postdoc in Mainz he joined the MIT faculty in 2007. Zwierlein studies quantum gases of atoms and molecules as model matter for superconductors, quantum magnets and topological materials. His awards include the I.I. Rabi Prize from the APS, the Vannevar Bush Faculty Fellowship, and the Humboldt Research Prize.

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