

Boulder School for Condensed Matter and Materials Physics

Ultracold Matter

July 6-31, 2020

Experimental breakthroughs in trapping, cooling and manipulating degenerate atomic, ionic and molecular gases have enabled studies of strongly interacting, highly coherent, nonequilibrium quantum matter in previously unexplored regimes and phases. These explorations have synergized AMO, condensed matter, computational and quantum information sciences. The 2020 Boulder Summer School will pedagogically cover these frontier developments, including (1) Strongly interacting Feshbach resonant Bose and Fermi gases, and the associated BEC-BCS crossover and phase transitions, (2) Phenomena in optical lattices and low-dimensional systems, and realization of lattice models, (3) Synthetic dimensions, gauge fields, and spin-orbit coupling, (4) Long-ranged interactions in dipolar atoms, molecules, trapped ions and Rydberg states as a route to novel states of quantum matter, (5) Nonequilibrium dynamics, entanglement growth, thermalization, and its absence in many-body localized systems.

Monika Aidelsburger (Munich)
Ehud Altman (Berkeley)
Ana Asenjo-Garcia (Columbia)
Waseem Bakr (Princeton)
Immanuel Bloch (Munich)
Antoine Browaeys (Orsay)
Nigel Cooper (Cambridge)
Eric Cornell (Boulder)
Sebastian Diehl (Cologne)
Tilman Esslinger (ETH)
Thierry Giamarchi (Geneva)
Alexey Gorshkov (Maryland)
Randy Hulet (Rice)
David Huse (Princeton)
Wolfgang Ketterle (MIT)
Konrad Lehnert (Boulder)
Chris Monroe (Maryland)
Kang-Kuen Ni (Harvard)
Meera Parish (Monash)
Cindy Regal (Boulder)
Ana Maria Rey (Boulder)
James Thompson (Boulder)
Jun Ye (Boulder)

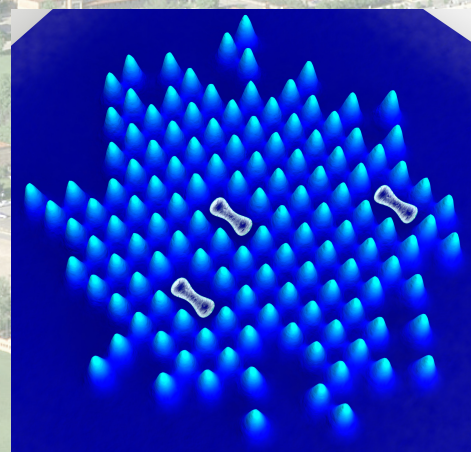
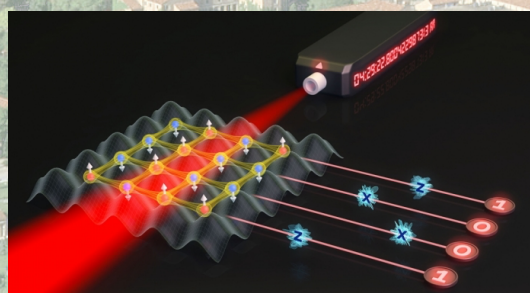
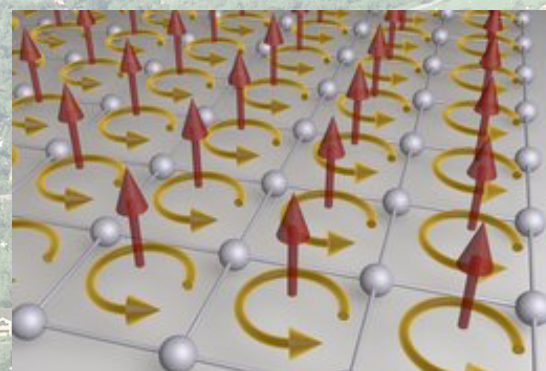
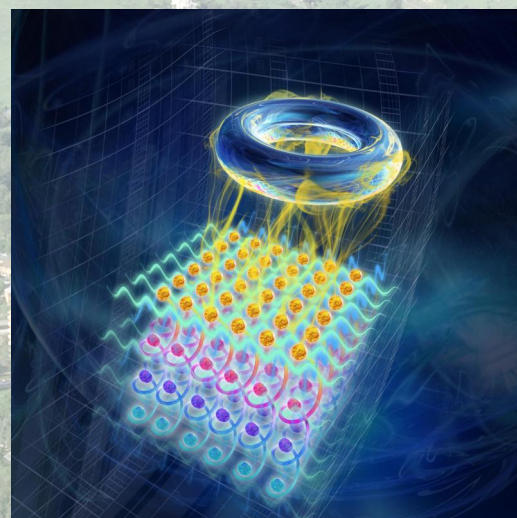
Scientific Organizers:

Kaden Hazzard (Rice)
Leo Radzihovsky (Boulder)
Ana Maria Rey (JILA/Boulder/NIST)
Ian Spielman (Maryland/NIST)
Director: Leo Radzihovsky (Boulder)

The school will pay for most local expenses, and there are travel grants available for participants from U.S. universities. Students and postdocs interested in participating should submit an electronic application by the January 15 deadline. The application form, and detailed information regarding housing, travel and financial support are available at

<http://boulderschool.yale.edu/>

The Boulder School in Condensed Matter and Materials Physics provides expert training, not usually available within the traditional system of graduate and post-graduate education, for advanced graduate students and postdoctoral researchers working in condensed matter physics, materials science and related fields. The School is supported by the National Science Foundation, with additional funding provided by the University of Colorado, JILA-PFC, and meets annually during July in Boulder, Colorado.



Upper left: Probing topology by shaking ultracold atoms in an optical lattice (Innsbruck Harald Ritsch)
Upper right: Cyclotron orbits of atoms in effective magnetic field of engineered light crystals. (LMU Bloch/Aidelsburger)
Lower left: Optical atomic clock in Ye's lab, for quantum computing application (JILA Rey/Burrows)
Lower right: Atomic Mott insulator distribution, with particle-hole pairs. (LMU, I. Bloch)