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Talk: Nonthermal electronic orders in photo-doped Mott systems

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A main goal in the field of nonequilibrium condensed matter physics is the control of electronic orders and the induction of ordered states which do not exist in equilibrium. Striking examples of nonthermal phases have been discovered experimentally, e. g. in fullerides and dichalcogenides, and also in numerical studies of correlated electron systems. Relevant insights have been gained into the mechanisms which stabilize such hidden phases in photo-excited Mott insulators. I will discuss four examples from recent model studies based on nonequilibrium dynamical mean field theory: (i) nonthermal magnetic and orbital order in a quarter-filled two-orbital Hubbard model [1], (ii) hidden excitonic order in the vicinity of a spin-state transition in the half-filled two-orbital Hubbard model [2], (iii) nonthermal odd-frequency order in a model for Mott insulating fullerides [3], and (iv) photo-induced eta-pairing [4] and chiral superconductivity [5] in Mott systems.

[1] Jiajun Li, Hugo U. R. Strand, Philipp Werner and Martin Eckstein, Nature Comm. 9, 4581 (2018).
[2] Philipp Werner and Yuta Murakami, Phys. Rev. B 102, 241103 (2020).
[3] Philipp Werner and Yuta Murakami, Phys. Rev. B 104, L201101 (2021).
[4] Philipp Werner, Jianju Li, Denis Golez, and Martin Eckstein, Phys. Rev. B 100, 155130 (2019).
[5] Jiajun Li, Markus Müller, Aaram J. Kim, Andreas Läuchli, Philipp Werner, arXiv:2202.10176 (2022).

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