# Moiré is Different: Metal-Insulator Transitions, Kondo Lattice Physics and Chiral Spin Liquids in TMD Bilayers

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The greatest open questions in quantum matter physics revolve around strongly correlated electronic phases, traditionally observed in heavy fermions, cuprates and organics. In recent years, a new class of materials emerged where the strength of correlations can be engineered: "moiré materials". I will briefly introduce moiré materials such as twisted bilayer graphene and transition-metal dichalcogenide (TMD) bilayers. I will then focus on three recent results: a universal theory for continuous metal-insulator transitions [1], valley-charge-transfer and Kondo lattice physics under pressure in TMD homobilayers [2] and our prediction of a chiral spin liquid phase in TMD [3,4]. These results show that the wealth of phenomena observed in moiré materials allow for new insights in old correlated problems.

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[2] Marta Brzezinska, Sergii Grytsiuk, Malte Rösner, Marco Gibertini, and Louk Rademaker, Tuning interactions using pressure-induced Γ-K valleytronics in moire bilayer WSe2, arXiv: 2404.07165.
[3] Dario Rossi, Johannes Motruk, Louk Rademaker, Dmitry A. Abanin, Schwinger boson study of the J1- J2-J3 kagome Heisenberg antiferromagnet with Dzyaloshinskii-Moriya interactions, Phys. Rev. B 108, 144406 (2023); arXiv:2305.15824.
[4] Johannes Motruk, Dario Rossi, Dmitry A. Abanin, Louk Rademaker, Kagome Chiral Spin Liquid in Transition Metal Dichalcogenide Moire Bilayers, Phys. Rev. Research 5, L022049 (2023); arXiv:2211.15696.