

# CMP Seminar

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## Resolving emergent structure states in low-dimensional systems by high-energy x-ray diffraction

Materials exhibiting reduced dimensionality and strongly interacting charge and lattice degrees of freedom can appear in various atomic structure states that harbor fascinating quantum phenomena. The complexity of the states, however, often makes it challenging to understand the nature of the phenomena, impeding their exploration for practical applications. Typical examples are the emergence of charge density waves (CDWs) and Weyl semimetal phases in transition metal dichalcogenides and 2D magnetism in transition metal thiophosphates. We will show that the problem can be solved by using high-energy x-ray diffraction coupled to atomic pair distribution function analysis. Examples will include results of our recent studies on the genesis of commensurate CDWs in TaSe<sub>2</sub> [1], chemically distinct CDWs in TaTe<sub>2</sub> [2], local structure memory effects in Weyl semimetal MoTe<sub>2</sub> [3] and TMPS<sub>3</sub> 2D antiferromagnets (TM=Mn, Fe, Ni) [4].

1. V. Petkov et al. PRB 101, 121114(R), (2020).
2. V. Petkov et al. PRB 102, 024111 (2020)
3. V. Petkov and Y. Ren PRB 103, 094101 (2021).
4. V. Petkov et al. (work in progress)

<https://msu.zoom.us/j/97233063447>

Meeting ID: 972 3306 3447

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Monday, October 11<sup>th</sup>, 2021, at 4:10 p.m.  
Host: Xianglin Ke