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Synchrotron X-ray diffraction study of the CDW correlations in Cu_xTiSe_2[1] S. ROSENKRANZ, J.P. CASTELLAN, F. WEBER, G. KARAPETROV, R. OSBORN, Materials Science Division, Argonne National Laboratory
— Charge density wave order in layered chalcogenides has been studied for several decades, but the nature of the instability driving the transition is still a subject of debate. For Cu_xTiSe_2, it was reported that the suppression of CDW with Cu doping results in superconductivity, with a phase diagram strongly reminiscent of copper oxide and heavy fermion superconductors. It is however not understood whether or how the order parameters are coupled in this or any other chalcogenide compounds where CDW and superconductivity can coexist. Here, we present our synchrotron X-ray diffraction measurements of the CDW order parameter and the diffuse scattering associated with CDW fluctuations on either side of the alleged quantum phase transition of Cu_xTiSe_2. We will discus the behavior of the critical exponents and the lengths of the CDW correlations as a function of temperature and doping. Our results indicate that CDW order exists at high doping levels, above the optimal doping for superconductivity, where bulk probes reported absence of CDW formation.

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Stephan Rosenkranz
Argonne National Laboratory

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