

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Interplay between uni-directional and bi-directional charge orders in underdoped cuprates YUXUAN WANG, Univeristy of Illinois at Urbana-Champaign, ANDREY CHUBUKOV, University of Minnesota — We analyze the interplay between charge-density-wave (CDW) orders with axial momenta $(Q, 0)$ and $(0, Q)$ (Δ_x and Δ_y respectively), detected in the underdoped cuprates. The CDW order in real space can be uni-directional (either Δ_x or Δ_y is non-zero) or bi-directional (both Δ_x and Δ_y are non-zero). To understand which of the two orders develop, we adopt the magnetic scenario, in which the CDW order appears due to spin-fluctuation exchange. We derive the Ginzburg-Landau action to the sixth order in Δ_x and Δ_y and argue that the CDW order is bi-directional at the onset but changes to uni-directional inside the CDW phase. This implies that, at a given temperature, CDW order is uni-directional at smaller dopings, but becomes bi-directional at larger dopings. These results are consistent with recent x-ray data on YBCO, which detected tendency towards bi-directional order at larger dopings. We also discuss for completeness the effect of yet unobserved intertwined pair-density-wave (PDW) order, which may appear along with CDW.

Yuxuan Wang
Univeristy of Illinois at Urbana-Champaign

Date submitted: 03 Nov 2015

Electronic form version 1.4