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Impact of chain layer oxygen disorder on charge density wave order in $YBa_2Cu_3O_{6+\delta}$ ANDREW ACHKAR, XIAOPAN MAO, CHRISTOPHER MCMAHON, Department of Physics and Astronomy, University of Waterloo, RONNY SUTARTO, FEIZHOU HE, Canadian Light Source, University of Saskatchewan, RUIXING LIANG, DOUG BONN, WALTER HARDY, Department of Physics and Astronomy, University of British Columbia, DAVID HAWTHORN, Department of Physics and Astronomy, University of Waterloo — Charge density wave (CDW) order in the CuO_2 planes of underdoped $YBa_2Cu_3O_{6+\delta}$ (YBCO) has been reported to coexist and compete with superconductivity. Here we investigate the sensitivity of the CDW order to oxygen disorder in the chain layer of YBCO using resonant soft x-ray scattering. We find that disordering the chains in o-V and o-VIII ordered $YBCO_{6.67}$ decreases the intensity of the CDW superlattice peak by a factor of ~ 2, but unexpectedly has little effect on the incommensurability, correlation length or temperature dependence of the CDW peak. The same is true for o-III ordered $YBCO_{6.75}$, although the disordering has a smaller effect on the CDW peak intensity. The observed insensitivity of the incommensurability, correlation length and temperature dependence to chain layer oxygen disorder indicates that chain layer defects have a limited role in pinning the CDW order in the CuO_2 planes. We will discuss scenarios for the disorder effect, including a possible influence on CDW domain formation (CDW volume fraction) and the CDW order parameter.

Andrew Achkar
Department of Physics and Astronomy, University of Waterloo

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