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Condensation of collective charge ordering in Chromium A. SINGER, M. MARSH, S. DIETZE, Department of Physics, University of California-San Diego, V.V. UHLíŘ, Center for Magnetic Recording Research, University of California-San Diego, Y. LI, D.A. WALKO, E.M. DUFRESNE, G. SRAJER, Advanced Photon Source, Argonne National Laboratory, M.P. COSGRIFF, P.G. EVANS, Department of Materials Science and Engineering, University of Wisconsin Madison, E.E. FULLERTON, Center for Magnetic Recording Research, University of California-San Diego, O.G. SHPYRKO, Department of Physics, University of California-San Diego — Here we report on the dynamics of the structural order parameter in a chromium film using synchrotron radiation in response to photo-induced ultra-fast excitations. Following transient optical excitations the effective lattice temperature of the film rises close to the Néel temperature and the charge density wave (CDW) amplitude is reduced. Although we expect the electronic charge ordering to vanish shortly after the excitation we observe that the CDW is never completely disrupted, which is revealed by its unmodified period at elevated temperatures. We attribute the persistence of the CDW to the long-lived periodic lattice displacement in chromium. The long-term evolution shows that the CDW revives to its initial strength within 1 ns, which appears to behave in accordance with the temperature dependence in equilibrium. This study highlights the fundamental role of the lattice distortion in charge ordered systems and its impact on the re-condensation dynamics of the charge ordered state in strongly correlated materials.

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