Charge stripes, nematicity and disorder in a cuprate superconductor DAMJAN PELC, MARIJA VUČKOVIĆ, University of Zagreb, Faculty of Science, Department of Physics, HANS-JOACHIM GRAFE, SEUNG-HO BAEK, IFW Dresden, Institute for Solid State Research, MIROSLAV POŽEK, University of Zagreb, Faculty of Science, Department of Physics — Charge stripe order is recognized as an important ingredient of the physics of cuprates, yet the thermodynamics of its formation and the influence of disorder are unclear. We present a study of the development of charge stripes in the cuprate La$_{1.85}$Eu$_{0.2}$Sr$_x$CuO$_4$, using three complementary experimental techniques: nuclear quadrupole resonance, nonlinear conductivity and specific heat$^1$. We find an intermediate phase between (pseudo-gapped) metal and charge stripes, existing in a dome-shaped region of the phase diagram and appearing through a sharp phase transition. A novel technique$^2$ is used for measurements of nonlinear response, which show that the new phase is consistent with a charge nematic. This is in agreement with recent predictions of charge stripe formation with quenched disorder$^3$. Our experiments thus resolve the intricate process of charge stripe formation and provide a link to other materials with electronic nematic order.

$^1$D. Pelc et al., Nature Comm. 7, 12775 (2016)