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Superconductivity and charge order in 1/8 doped LBCO probed by proton-induced disorder MAXIME LEROUX, VIVEK MISHRA, HELMUT CLAUS, ULRICH WELP, Materials Science Division, Argonne National Laboratory, ASGHAR KAYANI, Department of Physics, Western Michigan University, ZAHIRUL ISLAM, Advanced Photon Source, Argonne National Laboratory, GENDA GU, Department of Physics, Brookhaven National Laboratory, WAI-KWONG KWOK, Materials Science Division, Argonne National Laboratory — The question of how charge order coexists or competes with superconductivity is a subject of intense and active research, as its resolution could be key in explaining the origin of superconductivity in cuprates superconductors. Here we report that the T_c of $La_{1.875}Ba_{0.125}CuO_4$ (LBCO) increases by up to 50% after proton irradiation. At high enough energy, proton irradiation creates a uniform density of small nm-sized amorphous clusters and point defects, which results in a uniform and isotropic 3D distribution of defects [1]. However, it is well known that non-magnetic defects are pair-breaking for d-wave superconductivity, and should therefore reduce Tc. We speculate that proton-induced disorder directly affects the balance between competing density wave and superconducting ground states. [1] Jia, Y. et al. Appl. Phys. Lett. 103, 122601 (2013); M. A. Kirk, Cryogenics 33, 235 (1993), M. A. Kirk, Y. Yan, Micron 30, 507 (1999). This work is supported by the Center for Emergent Superconductivity, an Energy Frontier Research Center funded by the U.S. D.O.E., Office of Science, Office of Basic Energy Sciences and by the D.O.E, Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357.

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