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Universality of pseudogap and emergent order in lightly doped Mott insulators IRENE BATTISTI, KOEN M. BASTIAANS, VITALY FEDOSEEV, Leiden University, ALBERTO DE LA TORRE, California Institute of Technology, NIKOS ILIOPOULOS, Leiden University, ANNA TAMAI, Univ of Geneva, EMILY C. HUNTER, Univ of Edinburgh, ROBIN S. PERRY, University College London, JAN ZAANEN, Leiden University, FELIX BAUMBERGER, Univ of Geneva, MILAN P. ALLAN, Leiden University — It is often assumed that high-T_c superconductivity in the cuprates emerges from doped Mott insulators. When doping these materials, the electrons become mobile but still feel the strong correlations from the Mott state, leading to electronic order, a pseudogap phase and superconductivity. How the insertion of dopant atoms drives this evolution is not known, nor whether these phenomena belong only to hole-doped cuprates. Using spectroscopic-imaging scanning tunneling microscopy, we visualize the electronic states of the iridate $(Sr_{1-x}La_x)_2IrO_4$, which is chemically radically different from the cuprates but also an effective Mott insulator [1]. We find that above a certain doping threshold a phase separated state emerges, with the nucleation of pseudogap puddles around clusters of dopant atoms. Within these puddles, we observe the same iconic electronic order that is seen in underdoped cuprates. Our results clarify the melting of the Mott state, and establish phase separation and electronic order as generic features of doped Mott insulators [2]. [1] B.J. Kim et al., PRL 101, 076402 (2008) [2] I. Battisti et al., Nat. Phys. AOP, DOI:10.1038/nphys3894 (2016)

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