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Nanoscale phase separation in deep underdoped $Bi_2Sr_2CuO_{6+\delta}$ and $Ca_2CuO_2Cl_2$[1] PETER MISTARK, ROBERT MARKIEWICZ, ARUN BANSIL, Northeastern University — We demonstrate that the tunneling spectra from deeply underdoped $Bi_2Sr_2CuO_{6+\delta}$ (Bi2201) and $Ca_2CuO_2Cl_2$ (CCOC) provide clear evidence for a nanoscale phase separation (NPS), which causes the gap to fill rather than close with doping. The phase separation extends from half-filling to a doping of $x \sim 0.09$. Assuming that the NPS is in the form of stripes, the nodal gap, which we model as a Coulomb gap, arises from impurity pinning of the charged stripes, and ultimately drives a metal-insulator transition.

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