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Intra unit cell electronic structure of the d-symmetry form factor density wave in the underdoped cuprates – Part I KAZUHIRO FUJITA, MOHAMMAD HAMIDIAN, STEPHEN EDKINS, Cornell University, CHUNG KOO KIM, Brookhaven National Laboratory, ANDY MACKENZIE, University of St. Andrews, HIROSHI EISAKI, National institute of advanced industrial science and technology, SHIN-ICHI UCHIDA, University of Tokyo, MICHAEL LAWLER, Binghamton University, EUN-AH KIM, Cornell University, SUBIR SACHDEV, Harvard University, J.C. DAVIS, Cornell University — A central issue of cuprate superconductivity research is to understand the nature of the unknown phase called the *pseudogap* and its relationship to the *d*-wave superconductivity. To approach this we use spectroscopic imaging STM to study the electronic structure of $Bi_2Sr_2CaCu_2O_{8+\delta}$. Using our recently developed technique of sub-lattice phase-resolved electronic structure visualization within each CuO_2 unit-cell, we discovered a *d*-symmetry form factor density wave within the cuprate pseudogap state. In this talk, part I, we demonstrate that *d*-symmetry is the predominant form factor in the density wave within pseudogap states and show how this situation evolves upon doping.

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