

Abstract Submitted  
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**Interplay of low-energy bosonic collective modes with incipient charge order in Bi-2212 characterized by momentum-resolved electron energy loss spectroscopy**<sup>1</sup> SEAN VIG, ANSHUL KOGAR, Univ of Illinois - Urbana, VIVEK MISHRA, Argonne National Laboratory, MELINDA RAK, ALI HUSAIN, Univ of Illinois - Urbana, GENDA GU, Brookhaven National Laboratory, MIKE NORMAN, Argonne National Laboratory, PETER ABBAMONTE, Univ of Illinois - Urbana — Classifying the collective electronic dynamics of materials is critical to addressing the high temperature superconductivity problem and understanding related collective phenomena. Most current probes are unable to measure the full energy and momentum dependence of the dynamic charge susceptibility in these strongly correlated materials at the meV energy scale relevant to superconductivity. We use our momentum-resolved electron energy loss spectroscopy (M-EELS) technique to perform this measurement, characterizing both the static charge density and the bosonic electronic excitations in the cuprate superconductor  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$  (Bi-2212). I present our measurement of a low temperature diffuse charge ordered state at optimal doping which modulates the observed dispersionless low energy collective excitations. Performing a one-loop correction to the bare electron dispersion, we show these modes reproduce the self-energy anomaly, or “kink”, as measured by ARPES. I discuss the nature of the charge dynamics that we measured with our technique and its relation to the superconducting state.

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