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Doping-dependent effect of competing orders (CO) on low-energy quasiparticle (QP) excitations in cuprate superconductivity (SC)[1] ANDREW BEYER, CHING-TZU CHEN, NAI-CHANG YEH, Physics Dept., Caltech, Pasadena, CA — There is general consensus from experimental and theoretical studies of cuprate superconductors that CO with energies close to the SC gap exist in the cuprates and that at times they can coexist with SC in the ground state. Clarifying the exact role of CO requires both theoretical insight into the microscopic physics and sensitive experimental tools to determine the QP properties. We present an experimental and theoretical investigation of the low-energy QP excitations from coexisting CO and SC in hole-type $Bi_2Sr_2CaCu_2O_x$ and $YBa_2Cu_3O_x$and in electron-type $La_{0.1}Sr_{0.9}CuO_2$. Our studies involve numerical simulations using a microscopic model of coexisting SC/CO and realistic bandstructures to fit experimental QP tunneling spectra to extract doping dependent CO and SC parameters. We suggest that the low-energy pseudogap is associated with CO being either charge-density waves or disorder-pinned spin-density waves but not d-density waves.

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