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Unusual form factor of the novel pseudogap excitations in $HgBa_2CuO_{4+\delta}$ MUN CHAN, C. DOROW, Y. TANG, G. YU, M. GREVEN, University of Minnesota, N. BARISIC, CEA,Saclay, Y. LI, Peking University, K. HRADIL, R. MOLE, Forschungsneutronenquelle Heinz Maier-Leibnitz, Germany, P. STEFFENS, Institut Laue Langevin, France, X. ZHAO, Jilin University, Y. SIDIS, P. BOURGES, Laboratoire Léon Brillouin, France — Following the discovery of a universal novel magnetic order in the pseudogap phase of the cuprates [B. Fauqué et al. PRL 96, 197001 (2006); Y. Li et al., Nature 455, 372 (2008)], our inelastic neutron scattering measurements of HgBa2CuO4+δ (Hg1201) revealed two weakly-dispersive excitation branches associated with this ordered state [Y. Li et al., Nature 468, 283 (2010); Y. Li et al., Nature Phys. 8, 404 (2012).]. The dependences of the mode intensities on the momentum transfer Q = (HKL) (r.l.u.) are inconsistent with traditional magnetic or structural form factors. The intensity of the high-energy mode is zero when Q is parallel to the copper-oxygen planes (i.e., for L=0), peaks at L = 8 (r.l.u.), and decreases again at large L. We observe the opposite behaviour for the low- energy mode, which is strongest when L=0. In combination with polarized inelastic neutron scattering results, this indicates possible dual magnetic and structural characteristics of the novel excitations. Work supported by DOE-BES.

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