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Orbital symmetry of charge density wave order in $\text{La}_{1.875}\text{Ba}_{0.125}\text{CuO}_4$ and $\text{YBa}_2\text{Cu}_3\text{O}_{6.67}$
DAVID HAWTHORN, ANDREW ACHKAR, University of Waterloo, FEIZHOU HE, RONNY SUTARTO, Canadian Light Source, CHRISTOPHER MCMAHON, University of Waterloo, MARTIN ZWIEBLER, Leibniz Institute for Solid State and Materials Research IFW Dresden, MARKUS HÜCKER, GENDA GU, Brookhaven National Laboratory, RUIXING LIANG, DOUG BONN, WALTER HARDY, University of British Columbia, JOCHEN GECK, Leibniz Institute for Solid State and Materials Research IFW Dresden — Recent theories of charge density wave (CDW) order in high temperature superconductors have predicted a primarily d CDW orbital symmetry. Here, we report on the orbital symmetry of CDW order in the canonical cuprate superconductors $\text{La}_{1.875}\text{Ba}_{0.125}\text{CuO}_4$ (LBCO) and $\text{YBa}_2\text{Cu}_3\text{O}_{6.67}$ (YBCO), using resonant soft x-ray scattering and a model mapped to the CDW orbital symmetry. From measurements sensitive to the O sublattice, we conclude that LBCO has predominantly s' CDW orbital symmetry, in contrast to the d orbital symmetry recently reported in other cuprates. Additionally, we find that the C_4 orbital symmetry of the Cu sublattice scattering is approximately preserved in LBCO and broken in YBCO. This work highlights orbital symmetry as an additional key property of CDW order that distinguishes the different cuprate families. We discuss how the CDW symmetry may be related to the “1/8-anomaly” and to static spin ordering.

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