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Scattering Studies of the High T_c Superconductor $La_{2-x}Ba_xCuO_4$ Y. ZHAO, S. R. DUNSIGER, B. D. GAULIN¹, H. A. DABKOWSKA, Dept. of Physics and Astronomy, McMaster University, Hamilton, Ontario, Canada., Z. YA-MANI, W. J. L. BUYERS, Canadian Neutron Beam Centre, NRC, Chalk River Laboratories, Chalk River, Ontario, Canada — The interplay between superconductivity, magnetism and crystal structure is a central issue in the study of the high T_c cuprates. The first to be discovered, the Bednorz-Müller materials have been much less extensively studied due to the difficulty of growing large single crystals. Using floating zone image furnace techniques, we have recently successfully grown $La_{2-x}Ba_xCuO_4$ (x~0.095 and 0.08) single crystals on the underdoped side of the well known 1/8 anomaly. X-ray studies show a sequence of crystal structures with temperature, while incommensurate elastic peaks associated with the low temperature tetragonal phase are observed using neutron diffraction. This signature of static spin stripe order persists into the superconducting state. We discuss the relationship between the low temperature spin and lattice degrees of freedom, as well as their sensitivity to doping level.

¹Canadian Institute for Advanced Research

Yang Zhao

Dept. of Physics and Astronomy, McMaster University, Hamilton, Ontario, Canada.

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