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Interfaces in $La_2NiO_4 - La_2CuO_4$ **superlattices** S. SMADICI, J. C. T. LEE, S. WANG, P. ABBAMONTE, University of Illinois at Urbana-Champaign, IL 61801, G. LOGVENOV, A. GOZAR, I. BOZOVIC, Brookhaven National Laboratory, Upton, NY 11973 — Ni substitution on Cu sites in underdoped $La_{2-x}Sr_xCuO_4$ quickly restores Neel order. This was attributed to strong interaction between the Ni and doped holes. An open question was whether the additional Ni empty orbital or the different spin on Ni sites was at the origin of this strong interaction. We have addressed this problem with resonant soft x-ray scattering on a $La_2NiO_4 - La_2CuO_4$ heterostructure. La_2NiO_4 and La_2CuO_4 have close lattice structures and electronic configurations. However, the x-ray scattering contrast between superlattice layers is greatly enhanced at soft x-ray resonant energies. Based on our measurements at the O K, La M, Cu L and Ni L edges a model of the charge, orbital and spin structures in these superlattices will be presented with a special emphasis on the interface region. This work was supported by Grants. DE-FG02- 06ER46285, DE-AC02-98CH10886, MA-509-MACA, DE-FG02-07ER46453 and DE-FG02-07ER46471.

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