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Magnetic Excitations of Stripes DAOXIN YAO, Depts. of Physics and Electrical and Computer Engineering, Boston University, ERICA CARLSON, Dept. of Physics, Purdue University, DAVID CAMPBELL, Depts. of Physics and Electrical and Computer Engineering, Boston University — Competing tendencies in electronic systems with strong correlations can lead to spontaneous nanoscale structure, pattern formation, and even long-range spatial order. There has been continued interest in various "stripe" phases of electrons, as well as more recent interest in possible "checkerboard" patterns. New experimental techniques allow for the extraction of detailed and reproducible neutron scattering spectra in copper oxide superconductors and related nickelate compounds. We discuss the magnetic excitations of well-ordered stripe phases, including the high energy magnetic excitations of recent interest and possible connections to the "resonance peak" in cuprate superconductors. Using a suitably parametrized Heisenberg model and spin wave theory, we study a variety of possible stripe configurations, including vertical, diagonal, staircase, and zigzag stripes. We calculate the expected neutron scattering intensities as a function of energy and momentum. Constant energy cuts at high energy often reveal a square-like scattering pattern, and occasionally a circular pattern. Bond-centered stripes have weight gathered near (pi,pi) at low energy, indicating that only part of the spin wave cone is expected to be resolvable experimentally. In addition, we present a litmus test for experimentally distinguishing bond-centered stripes from site-centered stripes using low energy data.

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