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Stripes near a Quantum Critical Point ERICA W. CARLSON, Department of Physics, Purdue University, DAOXIN YAO, DAVID K. CAMPBELL, Departments of Physics and Electrical and Computer Engineering, Boston University — Competing tendency in strongly correlated materials can cause spontaneous nanoscale structure, pattern formation, and even long-range spatial order. We explore the magnetic excitation spectrum in the stripe phase of high-Tc cuprates. Using a semiclassical spin wave treatment, we calculate the dynamical spin structure factor for weakly coupled stripes. We find a characteristic hourglass magnetic excitation spectrum with high-energy peaks rotated by 45 degrees compared to the incommensurate (IC) low-energy peaks in good agreement with the experimental data.The similarity at high energy between this semiclassical treatment and quantum fluctuations in spin ladders may be attributed to the proximity of a quantum critical point with a small critical exponent η. We also find that the low energy intensity is strongly peaked on the inner branches of the spin wave cones when coupling across the stripes is weak, so that the entire spin wave cone is not likely to be resolvable experimentally. (Phys. Rev. Lett. 97, 017003 (2006), Phys. Rev. B 73, 224525 (2006))

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