Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Quantum criticality in a dissipative (2+1)-dimensional XY model of circulating currents in high-T_c cuprates[1] IVER B. SPERSTAD, EINAR B. STIANSEN, ASLE SUDBO, Norwegian University of Science and Technology — We present large-scale Monte Carlo results for the dynamical critical exponent z and the spatio-temporal two-point correlation function of a (2+1)-dimensional quantum XY model with bond dissipation, proposed to describe a quantum critical point in high-T_c cuprates near optimal doping. The phase variables of the model, originating with a parametrization of circulating currents within the CuO_2 unit cells in cuprates, are compact, $\{\theta_{vvr,\tau}\} \in [-\pi, \pi\rangle$. The dynamical critical exponent is found to be $z \approx 1$, and the spatio-temporal correlation functions are explicitly demonstrated to be isotropic in space-imaginary time. The model thus has a fluctuation spectrum where momentum and frequency enter on equal footing, rather than having the essentially momentum-independent marginal Fermi liquid-like fluctuation spectrum previously reported for the same model.

[1]Supported by the NRC under Grant No. 167498/V30 (STORFORSK).

Egil V. Herland
Norwegian University of Science and Technology

Date submitted: 25 Nov 2011 Electronic form version 1.4