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Monte Carlo simulations of an O(6) theory for the pseudogap regime of the cuprate superconductors LAUREN HAYWARD, DAVID HAWTHORN, University of Waterloo, ROGER MELKO, University of Waterloo / Perimeter Institute for Theoretical Physics, SUBIR SACHDEV, Harvard University — We present a theory that describes the pseudogap regime of the hole-doped cuprate superconductors by incorporating the competing effects of superconducting and charge density wave orders into 6-dimensional degrees of freedom on a 2-dimensional lattice [arXiv:1309.6639]. Using Monte Carlo simulations, we calculate the charge order correlations associated with this O(6) theory, and show that the results compare well with recent X-ray scattering experiments on hole-doped $YBa_2Cu_3O_{6.67}$. We compare our simulation data to large-N calculations for the theory, and also demonstrate that the charge order continues to increase with increasing temperature for a small temperature range above the superconducting transition. For temperatures above this transition, we study our theory's diamagnetic response to a magnetic field applied perpendicular to the plane.

Lauren Hayward
University of Waterloo

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