Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Polar Kerr effect from chiral-nematic charge order YUXUAN WANG, Univ of Wisconsin, Madison, ANDREY CHUBUKOV, University of Minnesota, RAHUL NANDKISHORE, Princeton University — We analyze the polar Kerr effect in an itinerant electron system on a square lattice in the presence of a composite charge order proposed for the pseudogap state in underdoped cuprates. This composite charge order preserves translational symmetries, and is "chiral-nematic" in the sense that it breaks time-reversal symmetry, mirror symmetries in x and y directions, and C_4 lattice rotation symmetry. The Kerr angle θ_K in C_4-symmetric system is proportional to the antisymmetric component of the anomalous Hall conductivity $\sigma_{xy} - \sigma_{yx}$. We show that this result holds when C_4 symmetry is broken. We show that chiral-nematic charge order satisfies all symmetry requirements by a polar Kerr effect. We further show that to get a non-zero θ_K in a one-band spin-fluctuation scenario, in the absence of disorder, one has to extend the spin-mediated interaction to momenta away from (π, π) and has to include particle-hole asymmetry. Alternatively, in the presence of disorder one can get a non-zero θ_K from impurity scattering: either due to skew scattering (with non-Gaussian disorder) or due to particle-hole asymmetry in case of Gaussian disorder. We finally discuss the effect of an external magnetic field on the Kerr signal.

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Date submitted: 13 Nov 2014 Electronic form version 1.4