Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Intertwined Order in a Frustrated 4-leg t-J Cylinder JOHN DODARO, Stanford University, HONG-CHEN JIANG, Stanford Institute for Materials and Energy Sciences, SLAC, STEVEN KIVELSON, Stanford University, STANFORD PHYSICS TEAM — We report a density-matrix renormalization group study of the t-J model with nearest (t_1 J_1) and next-nearest (t_2 J_2) interactions on a 4-leg cylinder with concentration $\delta = 1/8$ of doped holes. We observe an astonishingly complex interplay between uniform d-wave superconductivity (SC) and strong spin and charge density wave ordering tendencies (SDW and CDW). Depending on parameters, the CDWs can be commensurate with period 4 or 8. By comparing the charge ordering vectors with $2k_F$, we rule out Fermi surface nesting-induced density wave order in our model. Magnetic frustration (i.e. $J_2/J_1 \sim 1/2$) significantly quenches SDW correlations with little effect on the CDW. Typically, the SC order is strongly modulated at the CDW ordering vector and exhibits d-wave symmetry around the cylinder. There is no evidence of a near-degenerate tendency to pair-density wave (PDW) ordering, charge 4e SC, or orbital current order.

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Date submitted: 09 Nov 2016 Electronic form version 1.4