Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Higgs modes in a pair density wave superconducting state[1] RODRIGO SOTO GARRIDO, Universidad San Sebastian, YUXUAN WANG, EDUARDO FRADKIN, University of Illinois at Urbana-Champaign — The pair density wave (PDW) superconducting state has been proposed to explain the layer-decoupling effect observed in the $La_{2-x}Ba_xCuO_4$ compound at $x = 1/8$ (Phys. Rev. Lett. 99, 127003). In this state the superconducting order parameter is spatially modulated, in contrast with the usual superconducting (SC) state where the order parameter is uniform. In this work, we study the properties of the amplitude (Higgs) modes in a PDW state coupled to a Fermi surface. Despite that in the PDW state the Fermi surface largely remains gapless, we found that the damping of the Higgs mode is much weaker than that for a uniform SC, in which case the Fermi surface is *completely* gapped. We show that this suppression of damping in the PDW state is due to kinematics. In addition, motivated by the experimental phase diagram, we discuss of the mixing of Higgs modes in the coexistence regime of PDW and uniform SC. These results could be observed directly in a Raman spectrum experiment, providing evidence of the PDW states.

[1]This work was supported by Fondecyt (Chile) No.11160542 (RSG), NSF Grant DMR-1408713 (EF) and Gordon and Betty Moore Foundations EPiQS Initiative through Grant No. GBMF4305 (YW)

Rodrigo Soto Garrido
Universidad San Sebastian

Date submitted: 09 Nov 2016 Electronic form version 1.4