

Abstract Submitted  
for the SES19 Meeting of  
The American Physical Society

**Effects of Supercurrent on the Higgs mode in Superconductors<sup>1</sup>**

ANKIT KUMAR, ALEXANDER KEMPER, Department of Physics, North Carolina State University — When a superconducting order is perturbed, one of the resulting excitations gives rise to the amplitude oscillation mode known as the Higgs mode. The existence of the Higgs mode in a perturbed broken-symmetry state is one of the fundamental phenomena in condensed matter systems. However, the Higgs mode is hard to measure experimentally due to its spin-less and charge-less nature. Recently, it was proposed that the Higgs mode in superconductors can be coupled to light in the linear regime if there is a non-zero supercurrent present in the system. Motivated by that, we study the dynamics of the Higgs mode in the presence of supercurrent. We find that the supercurrent creates an asymmetry of the electron distribution in the momentum space which leads to a momentum-dependent superconducting spectral gap. When we pump the system with an ultra-fast light pulse, the frequency of the Higgs mode gains momentum dependence. We analyze the dynamics of the Higgs mode through the electron spectral function which can be measured using angle-resolved photoemission spectroscopy (ARPES), and propose that the presence of supercurrent may help in the observation of the Higgs mode through time-resolved ARPES.

<sup>1</sup>This work was supported by NSF DMR-1752713.

Ankit Kumar  
Department of Physics, North Carolina State University

Date submitted: 29 Oct 2019

Electronic form version 1.4