

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**New Evidences for the observation of the Higgs boson in the Superconductor 2H-NbSe<sub>2</sub>** MARIE-AUDE MEASSON, BERTRAND CLAIR, YANN GALLAIS, MAXIMILIEN CAZAYOUS, Laboratory Quantum Matter and Penomena- University Paris Diderot-CNRS, PIERRE RODIÈRE, Institute Neel, CNRS-UJF, LAURENT CARIO, Institut des Materiaux Jean Rouxel (IMN), Universite de Nantes - CNRS, ALAIN SACUTO, Laboratory Quantum Matter and Penomena- University Paris Diderot-CNRS, SQUAP TEAM, SYSTÈMES À FORTES CORRÉLATIONS ÉLECTRONIQUES COLLABORATION, IMN COLLABORATION — We provide here new evidences for the observation of the amplitude mode of the superconducting order parameter, the so-called Higgs Boson, in 2H-NbSe<sub>2</sub>. We report quantitatively comparative electronic Raman measurements on the dichalcogenides 2H-NbSe<sub>2</sub>, whose superconductivity (SC) coexists with a charge density wave order (CDW), and 2H-NbS<sub>2</sub>, which exhibits only the SC. A SC pair breaking peak develops below  $T_c$  in 2H-NbS<sub>2</sub> whose intensity is much smaller than the peak associated with the SC in 2H-NbSe<sub>2</sub>. Thus, the peak observed in 2H-NbSe<sub>2</sub> below  $T_c$  certainly doesn't get its intensity only from the superconducting condensate. Moreover, we measure precisely a spectral weight transfer from the amplitude mode of the CDW to the SC peak in 2H-NbSe<sub>2</sub>, versus decreasing temperature. The total spectral weight for both peaks is constant within  $\pm 3\%$ . This result is consistent with the theory of the observation of a Higgs mode thanks to its coupling with an amplitudon developed by Littlewood and Varma. This result complements what was firstly observed by Sooryakumar et Klein under magnetic field.

Marie-aude Méasson  
Laboratory Quantum Matter and Penomena- University Paris Diderot-CNRS

Date submitted: 04 Dec 2012

Electronic form version 1.4