New Evidences for the observation of the Higgs boson in the Superconductor 2H-NbSe$_2$ 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$_2$. We report quantitatively comparative electronic Raman measurements on the dichalcogenides 2H-NbSe$_2$, whose superconductivity (SC) coexists with a charge density wave order (CDW), and 2H-NbS$_2$, which exhibits only the SC. A SC pair breaking peak develops below T$_c$ in 2H-NbS$_2$ whose intensity is much smaller than the peak associated with the SC in 2H-NbSe$_2$. Thus, the peak observed in 2H-NbSe$_2$ 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$_2$, versus decreasing temperature. The total spectral weight for both peaks is constant within ± 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.

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