Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Soft phonon mode and superconducting properties of 2H-NbS2 compared to 2H-NbSe2 MAXIME LEROUX, CNRS / UJF, Institut NÉEL, 38042 Grenoble cedex 9, France, MATHIEU LE TACON, Max Planck Institut für Festkörperforschung, D-70569 Stuttgart, Germany, MATTEO CALANDRA, CNRS / IMPMC Université Paris 6, 75252, Paris cedex 05, France, THIERRY KLEIN, CNRS / UJF, Institut NÉEL, 38042 Grenoble cedex 9, France, LAURENT CARIO, CNRS / IMN Jean-Rouxel, Université de Nantes, 44322 Nantes, France, PIERRE RODIÈRE, CNRS / UJF, Institut NÉEL, 38042 Grenoble cedex 9, France — I will report on several recent results on 2H-NbS_2. This compound is the only superconducting 2H-dichalcogenide which does not develop a charge density wave (CDW). I will start with the temperature dependence of the phonon spectra of 2H-NbS_2 measured by Inelastic X-ray Scattering (IXS). Along ΓM, a huge softening of two phonon modes was observed on a wide part of the Brillouin zone. This is almost the same as the CDW precursor soft phonons modes that appear above $T_{CDW} \approx 33\,K$ in 2H-$NbSe_2$[Weber11]. It clearly indicates that 2H-NbS_2 is also at proximity of a CDW instability. In the second part I will show measurement of H_{c1} and magnetic penetration depth, which show signs of a small energy scale in the superconducting gap of 2H-NbS_2, very similar to 2H-$NbSe_2$ [Fletcher07], and also in good agreement with STS measurement[Guillamon08]. In view of these two facts and as an open question, we would like to discuss the hypothesis of a quantum critical point (QCP) lying between 2H-NbS_2 and 2H-$NbSe_2$, where the 2^{nd} order phase transition would be the CDW instability.

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Date submitted: 08 Dec 2011 Electronic form version 1.4