Contribution ID: **60** Type: **POSTER**

Hyperfine parameters of Fe atoms in superconducting FeSe as function of temperature, pressure and magnetic field.

A pressure, temperature and magnetic field effect was studied in the superconducting FeSe.

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Poster

Summary

A pressure and temperature effect was studied in the Fe partial phonon density of states by 57Fe nuclear resonant inelastic scattering (NIS) in the superconducting Fe1.01Se. We found i) no pronounced changes across the tetragonal –orthorhombic phase transition and ii) a hardening of the phonon spectrum as a function of pressure in the superconducting phase. We conclude that the strong increase of Tc in Fe1.01Se with pressure [1] cannot be described in the framework of classical electron-phonon coupling, for instance, in the McMillan formalism. This result suggests the importance of both lattice and spin fluctuations in the observed superconductivity [2].
Mössbauer spectroscopic studies were done at ambient and high pressure. Temperature dependence of the Mössbauer-Lamb factor in Fe1.01Se was measured across the tetragonal-orthorombic structural phase transition at ca. 95 K. It has been shown that the orthorhombic phase is slightly softer that the tetragonal one.
Among other factors which could be responsible for Tc enhancement in Fe1.01S under pressure is the behavior of electronic density of states at the Fermi level. Indirectly the information about the electronic density at the Fe sites bears the isomer shift on 57Fe nucleus. We observe a decrease in the isomer shift in the tetragonal phase of Fe1.01Se which corresponds to increase in s electron density at Fe nucleus under pressure. We discuss several mechanisms by which core electron contribution can be altered by pressure.
Mössbauer measurements in the external magnetic field below the transition to the superconducting state revealed zero electron spin density on Fe atoms in Fe1.01Se and FeSe0.5Te0.5. Interpretation of Mössbauer spectra of Fe1.01Se and FeSe0.5Te0.5 in the Shubnikov phase will be discussed [3].

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[2] V. Ksenofontov, G. Wortmann, A.I. Chumakov, T. Gasi, S. Medvedev, T.M. McQueen, R.J. Cava, and C. Felser, Phys. Rev. B (accepted).
[3] V. Ksenofontov, G. Wortmann, T. Gasi, J. Deisenhofer, V. Tsurkan and C. Felser (in preparation).

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Track Classification: Semiconductors, Metals and Insulators