Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Sorting Category: 09.5 (E)

Pressure effect on the electronic transport properties of $Fe_{1+y}Te_{1-x}Se_x$ STEVAN ARSENIJEVIĆ, RICHARD GAÁL, HENRIK RØNNOW, Institute of Condensed Matter Physics, Swiss Federal Institute of Technology, EPFL, CH-1015 Lausanne, Switzerland, ROMAIN VIENNOIS, ENRICO GIANNINI, DIRK VAN DER MAREL, DPMC, University of Geneva, 24 Quai E.-Ansermet, 1211 Geneva, Switzerland, LÁSZLÓ FORRÓ, Institute of Condensed Matter Physics, Swiss Federal Institute of Technology, EPFL, CH-1015 Lausanne, Switzerland — We present a systematic study of electronic transport as function of pressure up to 25 kbar of $Fe_{+y}Te_{1-x}Se_x$ single crystalline samples (with $y = 0.02$, 0.05, and $x = 0$, 0.2, and 0.3). Pressure is demonstrated to be a clean control parameter to drive the system with high Fe-excess through the metal-insulator (MIT) transition, in analogy with increasing the Se-doping or reducing the Fe-excess. The scaling of resistivity $\rho(T, p)$ below 50 K identified a critical pressure of $p_c = 8$ kbar which separates non-metallic and metallic temperature dependences. At the p_c the low-temperature sheet resistance is in the 6.5 kΩ/square range. The Seebeck coefficient (S) at p_c changes sign from negative to positive indicating a change in the electronic structure and in the balance between the electron and hole carriers. The S at the highest pressure exhibits low positive values similar to the metallic, superconducting cuprates. The critical MIT behavior, related to a quantum phase transition, indicates a universality of the Fe- and Cu-based high-T_c superconductors.

Stevan Arsenijević
stevan.arsenijevic@epfl.ch
Institute of Condensed Matter Physics,
Swiss Federal Institute of Technology, EPFL,
CH-1015 Lausanne, Switzerland

[X] Prefer Oral Session
[ ] Prefer Poster Session

Date submitted: 16 Dec 2011 Electronic form version 1.4