Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Anisotropy in $BaFe_2Se_3$ single crystals with double chains of FeSe tetrahedra HECHANG LEI, HYEJIN RYU, Condensed Matter Physics and Materials Science Department, Brookhaven National Laboratory, ANATOLY FRENKEL, Physics Department, Yeshiva University, CEDOMIR PETROVIC, Condensed Matter Physics and Materials Science Department, Brookhaven National Laboratory — Since two-dimensional (2D) FePn or FeCh (Pn = pnictogens, Ch = chalcogens) tetrahedron layers are the common structural ingredient in all iron based superconductors, they are probably related to high temperature superconductivity. In order to fully understand the nature of iron-based superconductivity, study of materials containing similar FePn or FeCh tetrahedron as building blocks is of significant interest. $BaFe_2Se_3$ contains one-dimensional (1D) double chains of edge shared Fe-Se tetrahedra along the b-axis, in contrast to iron chalcogenide superconductors which feature two-dimensional (2D) Fe-Se planes. We report the anisotropic physical properties and local crystal structure of $Ba_{1.00(4)}Fe_{1.9(1)}Se_{3.1(1)}$ single crystals. It shows that $BaFe_2Se_3$ is a semiconductor with a short-range AFM correlation at the room temperature and a long-range AFM order below 255 K. Composition analysis indicates that all crystallographic sites are fully occupied. X-ray absorption near edge structure (XANES) result shows that the valence of Fe is about 1.87+.

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Date submitted: 13 Nov 2011 Electronic form version 1.4