Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Colossal enhancement of the Seebeck coefficient in $FeSb_2$ driven by nearly ballistic phonons HIDEFUMI TAKAHASHI, RYUJI OKAZAKI, HIROKI TANIGUCHI, ICHIRO TERASAKI, Nagoya University — An unusually large S of -45 mV/K (at 10 K) was discovered in $FeSb_2$ single crystal, which prompted extensive investigations into its physical origin [A. Bentien *et al.*, EPL 80, 17008 (2007).] This compound has a small energy gap $\Delta \sim 5$ meV, which may be caused by strong correlations of Fe 3d-electrons, as observed with Kondo insulators, and the colossally large S may be attributed to this unique band structure near the Fermi energy. However, the exceptional value of S has not been clearly explained by electron correlations, suggesting an additional contribution such as the non-equilibrium phonon-drag effect [H. Takahashi *et al.*, JPSJ 80, 054708 (2011)., H. Takahashi *et al.*, PRB 84, 205215 (2011)., and H. Takahashi *et al.*, PRB 88, 165205 (2013).]. Here, we report on the direct investigation of this effect by measuring the transport properties of three samples with cross sections ranging from 250×245 μm^2 to 80×160 μm^2. S and κ show a significant size effect, indicating that nearly ballistic phonons, which have a long mean free path relative to the sample dimensions, are responsible for the colossal S.

Hidefumi Takahashi
Nagoya University

Date submitted: 06 Nov 2014 Electronic form version 1.4