Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Polaronic high-temperature superconductivity in optimally doped bismuthate $\mathbf{Ba_{0.63}K_{0.37}BiO_3}$[1] NICHOLAS DERIMOW, JACOB LABRY, ARMOND KHODAGULYAN, Department of Physics & Astronomy, California State University, Los Angeles, JUN WANG, Department of Physics, Faculty of Science, Ningbo University, Ningbo, P. R. China, GUO-MENG ZHAO, Department of Physics & Astronomy, California State University, Los Angeles — Magnetic measurements have been carried out in the superconducting and normal states of the optimally doped nonmagnetic bismuthate superconductor $Ba_{0.63}$ $K_{0.37}$ BiO_3. The magnetic data along with previous μSR, resistivity, and tunneling data consistently show that there is a large polaronic enhancement in the density of states and effective electron-phonon coupling constant. The first-principle calculation within the density-functional theory indicates a small electron-phonon coupling constant of about 0.3-0.4, which can only lead to about 1 K superconductivity within the conventional phonon-mediated mechanism. Remarkably, the polaronic effect increases the electron-phonon coupling constant to about 1.4, which is large enough to lead to 32 K superconductivity. The present work thus uncovers the mystery of high-temperature superconductivity in bismuthate superconductors, which will also provide important insight into the pairing mechanism of other high-temperature superconductors.

[1]Derimow acknowledges NIH Grant R25 GM 061331-13.

Nicholas Derimow
Department of Physics & Astronomy, California State University, Los Angeles

Date submitted: 13 Nov 2014 Electronic form version 1.4