Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Resonance-state-induced superconductivity at high Indium contents in In-doped SnTe NEEL HALDOLAARACHCHIGE, Saint Joseph's University, QUINN GOBSON, WEIWEI XIE, MORTEN NIELSEN, SATYA KUSHWAHA, ROBERT CAVA, Princeton University, CAVA'S GROUP TEAM — We report a reinvestigation of superconducting $Sn_{1-x}In_xTe$ at both low and high In doping levels. Analysis of the superconductivity reveals a fundamental change as a function of x: the system evolves from a weakly coupled to a strongly coupled superconductor with increasing indium content. Hall Effect measurements further show that the carrier density does not vary linearly with Indium content; indeed at high Indium content, the samples are overall n-type, which is contrary to expectations of the standard picture of In^{1+} replacing Sn^{2+} in this material. Density functional theory calculations probing the electronic state of In in SnTe show that it does not act as a trivial hole dopant, but instead forms a distinct, partly flled In 5s - Te 5p hybridized state centered around E_F, very different from what is seen for other nominal hole dopants such as Na, Ag, and vacant Sn sites. We conclude that superconducting In-doped SnTe therefore cannot be considered as a simple hole doped semiconductor.

Neel Haldolaarachchige
Saint Joseph's University

Date submitted: 07 Nov 2015 Electronic form version 1.4