Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Scanning tunneling microscopy studies of topological crystalline insulators ANDRAS GYENIS, JUNGPIL SEO, OLIVER JEONG, ILYA DROZDOV, STEVAN NADJ-PERGE, QUINN GIBSON, Princeton University, GENDA GU, Brookhaven National Laboratory, ROBERT CAVA, ALI YAZDANI, Princeton University — Recent theoretical studies and experimental findings suggest the existence of a new topological phase: topological crystalline insulators (TCI). In contrast to the Z_2 topological insulators, where the time-reversal symmetry warrants the topological protection of the gapless surface states, in the TCI phase the protection is based on the crystal symmetry. $Pb_{1-x}Sn_xSe$ and $Pb_{1-x}Sn_xTe$ alloys are promising candidates for the TCI state: both of them have the rock-salt crystal structure (at certain doping values) with spatial mirror symmetry, and as a function of doping level the band structure can be changed from normal to inverted bandgap state. We present scanning tunneling microscopy/spectroscopy measurements on these alloys as a function of doping. Similar to previous experiments on spin-orbit coupled topological insulators [1], spectroscopic mapping with the STM can be used to establish the presence of topological properties through examining allowed and disallowed scattering transitions.

[1] P. Roushan et al, Nature **460** 1106 (2009).

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Date submitted: 09 Nov 2012 Electronic form version 1.4