Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Anomalous Resistance Increase on Topological Insulator Bi_2Te_3 Nanotubes with Superconductor Contacts RENZHONG DU, YUEWEI YIN, LUDI MIAO, AOKUI SUN, QI LI, Department of Physics, Pennsylvania State University — Topological superconductivity has gained much attention in recent years since it has been predicted to exhibit exotic behaviors and host the Majorana states. We report transport studies on topological insulator Bi_2Te_3 nanotube with Nb superconductor contacts. The Bi_2Te_3 nanotubes were synthesized by solution phase method and have previously been proved to possess robust surface states with long phase coherency against strong bulk disorders. Superconducting Nb contacts on the nanotubes were fabricated by electron beam lithography process. An anomalous resistance upturn of the resistance in the nanotube was observed when the contacts became superconducting. When applying a magnetic field, the resistance upturn is reduced gradually and disappears when the magnetic field exceeds the H_{c2} of Nb. From both the temperature and magnetic field dependence of the resistance upturn, we conclude that the resistance upturn is associated superconducting transition of the contact leads. Combination of Au and Nb leads have been fabricated with different channel length and the detailed experimental results will be discussed.

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Date submitted: 14 Nov 2014 Electronic form version 1.4