

Is SmB6 a Topological Insulator?

Khawla Elfied

Department of Physics and Physical Oceanography
Memorial University

DATE: Friday, November 25, 2016

TIME: 1:00 PM

PLACE: C3024

ABSTRACT: We examined whether samarium hexaboride (SmB6) is a topological insulator, or not. Despite the fact that the SmB6 has long been known as a Kondo insulator, with strong correlations and band hybridization, it is still of great interest because of low-temperature transport anomalies which have recently been interpreted as evidence that SmB6 is a topological insulator. SmB6 behaves electronically at high temperature like an insulator, and at low temperature its resistance mysteriously saturates. We studied de Haas van-Alphen quantum oscillation results to resolve the Fermi surface topology in this material. Although dHvA measurement may be consistent with two-dimensional conducting electronic states, we find an elongated 3D ellipsoidal Fermi surface. Furthermore, resistance measurement also can give some evidence of SmB6 topological surface states, by study different geometries to determine whether the conduction is dominated by the surface or the bulk. After analyzing all of these experiments, our conclusion is that the main experimental results could be described as either bulk or surface conduction, but resistivity measurements strongly suggest surface conduction. Even if further studies prove conductivity that the surface is conducting, further studies will be required to show that SmB6 is a topological material.

ALL ARE WELCOME!