**Orthorhombic Distortion and Pressure-Induced Electronic Transition in an Antiferromagnetic Dirac Semimetal YbMnSb2**

**Dilip Bhoi1,Yoshiya Uwatoko1,2,3**

1 The Institute for Solid State Physics, University of Tokyo, 1-5-1 Kashiwanoha, Kashiwa, Japan

2 Comprehensive Research Organization for Science and Society, 162-1 Shirakata, Naka-gun, Japan

3 Faculty of Science and Engineering, Tokyo City University, 1-28-1 Tamazutsumi, Setagaya-ku, Tokyo, Japan

Dirac semi-metal with magnetic atoms as constituents delivers an interesting platform to investigate the interplay of Fermi surface (FS) topology, electron correlation, and magnetism. One such family of semimetals is YbMn*Pn*2 (Pn = Sb, Bi), which is being actively studied due to the intertwined spin and charge degrees of freedom. These materials display antiferromagnetic ordering near room temperature with collinear C-type arrangements of Mn spins. In this talk, I will present our recent efforts to investigate the relationship between the magnetic/crystal structures and FS topology of YbMnSb2 at ambient and under pressure utilizing single-crystal X-ray and neutron scattering, magnetic susceptibility, magneto-transport measurement and complimentary density functional theory calculation. Contrary to previous reports, the x-ray and neutron diffraction reveal that YbMnSb2 crystallizes in an orthorhombic *Pnma* structure with notable anti-phase displacement of the magnetic Mn ions that increases in magnitude upon cooling. First principles DFT calculation reveals a reduced Brillouin zone and more anisotropic FS of YbMnSb2 compared to YbMnBi2 because of the orthorhombicity. Furthermore, when pressure is applied, the AFM transition temperature increases, and the Fermi surface undergoes a Lifshitz transition accompanied by an order of magnitude increase in thermoelectric power factor over a wide temperature range. Our results imply that YbMnSb2 is an ideal tunable platform to investigate the interplay of subtle lattice distortion, magnetic order, and topological transport arising from relativistic quasiparticles.

References:

1. Dilip Bhoi, et al., arXiv:2306.12732v1 (Accepted in PRB)
2. Dilip Bhoi, et al. (to be submitted)