

## **Webinar**

### **Protection and Manipulation of Topological States and Development of Quantum Technology**

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In this presentation, I shall start with introducing different topological phases of matters flavoured with the excitement in this field of research and show how the unique ability of a scanning tunnelling microscope (STM) can be utilized to measure these exotic topological boundary states down to the atomic limit. Existence of topological “Fermi-arc” surface states is the hallmark of the Weyl semimetals. The spectroscopic visualization of the topological surface Fermi arcs in both the inversion and time reversal symmetry broken Weyl semimetals e.g. TaAs and  $\text{Co}_3\text{Sn}_2\text{S}_2$  respectively, will be discussed next. In inversion symmetry broken TaAs, we find high level of topological protection of the surface Fermi arcs against the surface potential through its structure of the plane-wave like Bloch wave function in the Brillouin zone (BZ). On the other hand, in time reversal symmetry broken  $\text{Co}_3\text{Sn}_2\text{S}_2$ , we find the topological Fermi arcs are highly susceptible to the surface potential that changes its connectivity in the BZ on different surface terminations and the dispersion of the arcs. These results will be complemented by showing our recent results on InAs(111)A surfaces where an interesting interplay between the confined bulk and the surface states will be shown in the sense of the protection and susceptibility respectively against the surface potential. These responses serve as crucial building blocks in the construction of a fault tolerant quantum computer that will require both protection and control of quantum bits.

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***4:00 PM***