



center for nanophysics
and advanced materials

Condensed Matter Colloquium

Thursday, April 24, 2014

2 pm, Room 1201



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Thermal gap destabilization and the fate of topologically protected surface states in the mixed valent insulator SmB_6

The paradigm mixed-valent insulator SmB_6 has experienced recent renewed interest coming from the prediction of the existence of topological surface states arising from the inversion of f and d -bands at the X-point, and from transport measurements giving evidence for surface conductivity at low temperatures. The existence of such surface states would provide an explanation for a 30 year puzzle as to the origin of “in-gap” states causing a metallic resistivity saturation below 4K. In this work angle-resolved photoemission on cleaved $\langle 100 \rangle$ surfaces provides the first experimental view of the X-point conduction band, the T-dependent destabilization of the many-body hybridization gap and the intimately connected fate of the topologically protected X-point surface states that reside in the gap^[1]. The T-dependent evolution of the bulk states compares very well with bulk transport properties and the qualitative implications of DFT+DMFT calculations. But presently there is no such theory for the surface states. Spatial variations of the surface state properties and the extent of their robustness on inhomogeneous cleaved surfaces arising from large charge polarity differences between Sm- and B-terminated regions is also presented^[2].

^[1] J.D. Denlinger, et al., /arXiv/:1336.6637;

^[2] J.D. Denlinger, et al. /arXiv/:1336:6636.

Refreshments at 1:30 pm in Room 1305F

HOST: Johnpierre Paglione & Nick Butch

