

CEA - Saclay 91191 Gif-sur-yvette Cedex
Service de Physique de l'Etat Condensé
SÉMINAIRE

Mercredi 11 mai 11h15

Orme des Merisiers SPEC Salle Itzykson, Bât.774

**STM studies of impurities and macroscopic defect states on the
surface of topological insulators**

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Scanning tunneling spectroscopy studies on high-quality Bi₂Te₃ and Bi₂Se₃ crystals exhibit perfect correspondence to ARPES data, hence enabling identification of different regimes measured in the local density of states (LDOS). Oscillations of LDOS near a step are analyzed. Within the main part of the surface band oscillations are strongly damped, supporting the hypothesis of topological protection. At higher energies, as the surface band becomes concave, oscillations appear which disperse with a particular wave-vector that is shown to result from an unconventional hexagonal warping term.

Further analysis of the data, beyond the oscillations, reveal a one-dimensional bound state that runs parallel to the step-edge and is bound to it at some characteristic distance. This bound state is clearly observed in the bulk gap region, while it becomes entangled with the oscillations of the warped surface band at high energy, and with the valence band states near the Dirac point. We obtain excellent fits to theoretical predictions that properly incorporate the three-dimensional nature of the problem to the surface state. Fitting the data at different energies, we can recalculate the LDOS originating from the Dirac band without the contribution of the bulk bands or incoherent tunneling effects.

A coffee break will be served at 11h00. The seminar will be given in English.