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**Low energy electrodynamics of topological insulator thin films**

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Topological insulators are recently discovered states of matter with robust metallic surface states protected by the topological properties of their bulk wavefunctions. A quantum phase transition from a topological insulator to a conventional insulator and a change in topological class can occur only when the bulk bandgap closes. In this work, we have used time-domain terahertz spectroscopy to investigate the low-frequency conductance in $(Bi_{1-x}\ In_x)_2Se_3$ as we tune through this transition by In substitution. Above certain substitution levels we observe a collapse in the transport lifetime that indicates the destruction of the topological phase. We associate this effect with the threshold where states from opposite surfaces hybridize. The substitution level of the threshold is thickness dependent and only asymptotically approaches the bulk limit $x \sim 0.06$ where a maximum in the mid-infrared absorption is exhibited. This absorption can be identified with the bulk bandgap closing and change in topological class. The correlation ength associated with the quantum phase transition appears as the evanescent length of the surface states. The observation of the thickness- dependent collapse of the transport lifetime shows the unusual role that finite-size effects play in this topological quantum phase transition. In even more recent work on bulk insulating films, we have identified a cyclotron resonance feature. At high magnetic fields we identify a anomalous increase of the scattering rate. I will discuss the reasons for this increase and put it in the context of existing theories for charge transport in topological insulators.