

Abstract Submitted  
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**Dynamical electron compressibility in the 3D topological insulator  $\text{Bi}_2\text{Se}_3$**  ANDREAS INHOFER, Laboratoire Pierre Aigrain, ENS Paris, BADIH ASSAF, Departement de Physique, ENS Paris, QUENTIN WILMART, Laboratoire Pierre Aigrain, ENS Paris, LOUIS VEYRAT, CHRISTIAN NOWKA, JOSEPH DUFOULEUR, ROMAIN GIRAUD, SILKE HAMPEL, BERND BUECHNER, IFW-Dresden, Institute for Solid State Research, GWENDAL FVE, JEAN-MARC BERROIR, BERNARD PLACAIS, Laboratoire Pierre Aigrain, ENS Paris — Measurements of the quantum capacitance  $c_q$ , related to the electron compressibility  $\chi = c_q/e^2$  is a sensitive tool to probe the density of states. In a topological insulator (TI) the situation is enriched by the coexistence and the interplay of topologically protected surface states and massive bulk carriers. We investigate top-gate metal-oxyde-TI capacitors using  $\text{Bi}_2\text{Se}_3$  thin crystals at GHz frequencies. These measurements provide insight into the compressibility of such a two electron-fluid system. Furthermore, the dynamical response yields information about electron scattering properties in TIs. More specifically, in our measurements we track simultaneously the conductivity  $\sigma$  and the compressibility as a function of a DC-gate voltage. Using the Einstein relation  $\sigma = c_q D$ , we have access to the gate dependence of the electron diffusion constant  $D(V_g)$ , a signature of the peculiar scattering mechanisms in TIs.

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