Abstract Submitted
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Smearing of the quantum anomalous Hall effect due to statistical fluctuations of magnetic dopants[1] MIKHAIL RAIKH, ZHANG YUE, University of Utah — Quantum anomalous Hall effect (QAH) is induced by substitution of a certain portion, x, of Bi atoms in a BiTe-based insulating parent compound by magnetic ions (Cr or V). We find the density of in-gap states, $N(E)$, emerging as a result of statistical fluctuations of the composition, x, in the vicinity of the transition point, where the *average* gap, $\overline{E}_g$, passes through zero. Local gap follows the fluctuations of x. Using the instanton approach, we show that, near the gap edges, the tails are exponential, $\ln N(E) \propto -(\overline{E}_g - |E|)$, and the tail states are due to small local gap reduction. Our main finding is that, even when the smearing magnitude exceeds the gap-width, there exists a semi-hard gap around zero energy, where $\ln N(E) \propto -\frac{\overline{E}_g}{|E|} \ln\left(\frac{\overline{E}_g}{|E|}\right)$. The states responsible for $N(E)$ originate from local gap reversals within narrow rings. The consequence of semi-hard gap is the Arrhenius, rather than variable-range hopping, temperature dependence of the diagonal conductivity at low temperatures.

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