

**Testing topological protection of edge states in bismuthene on SiC:
New room-temperature quantum spin-Hall system**

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Due to its large bulk bandgap, bismuthene on SiC offers intriguing new opportunities for new room-temperature quantum spin-Hall (QSH) applications. Although edge states have been observed in the local density of states (LDOS), to date there has been no experimental evidence that they are spin-polarized and topologically protected. We predict experimentally-testable fingerprints of these properties originating from magnetic fields, such as changes in the LDOS and in ballistic magnetotransport. In particular, for armchair edges we find a distinct difference of behavior under out-of-plane (gap opening of a few meV between the QSH states) and in-plane (no or tiny gap) fields. While we focus here on bismuthene on SiC, our main findings should also be applicable to other honeycomb-lattice-based QSH systems.