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The anomalous Hall effect (AHE) is a key transport signature revealing the topological properties of magnetic compounds. In quantum materials, the classical linear dependence of the AHE on magnetization often breaks down, which is typically ascribed to the presence of topological magnetic or electronic textures. However, the complex electronic ...

The quantum anomalous Hall effect has been observed in several materials, including those with a two-dimensional moiré structure. Han et al. observed this effect in a simpler two-dimensional material without a moiré potential: a five-layer rhombohedral graphene. The graphene was placed under a layer of tungsten disulfide, which induced spin-orbital coupling ...

One of the most exciting fields in modern condensed matter physics is the quantum Hall effect (QHE). In 1980, Klaus von Klitzing and coworkers discovered that in strong magnetic field, the two-dimensional electron gas (2DEG) exhibits quantized Hall resistivity r_{yx} plateaus at h/e^2 , where i is an integer, and meanwhile the four-terminal longitudinal resistivity ...

10 · An example is the fractional quantum anomalous Hall effect 166,167,168,169,170,171 in fractional Chern insulators 172,173,174,175,176 recently observed in moiré materials. The rapid pace of ...

In recent research, the discovery of a quantum anomalous Hall effect (QAHE) in bilayer graphene has opened up a new path to quantize this bandgap and control the superconductivity more effectively. Interview: Modeling Energy Storage and Charging Rates in Quantum Batteries

The QAH effect may be considered as the quantum Hall effect under zero magnetic field and can be realized in a time-reversal symmetry-breaking system with the inverted electronic band structure 1 ...

The quantum anomalous Hall (QAH) effect--a macroscopic manifestation of chiral band topology at zero magnetic field--has been experimentally realized only by the magnetic doping of topological ...

The quantum anomalous Hall (QAH) effect 1,2,3, a zero magnetic field manifestation of the integer quantum Hall effect, originates from the exchange interaction between electron spin and magnetism ...

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Download scientific diagram | Schematic representation of quantum anomalous Hall effect. (a) Schematic of our device, where the red circles represent the electron and the red arrows show the spin ...

The quantum anomalous Hall effect (QAHE), first discovered in Cr/V-doped (Bi,Sb)₂Te₃, has opened new avenues for academic studies into solid state manifestations of axion electrodynamics ...

The superconducting proximity effect has not been experimentally demonstrated in a quantum anomalous Hall insulator. Now this effect is observed in the chiral edge state of a ferromagnetic ...

In terms of energy harvesting with spin information, perhaps the most revolutionary concept in the last years has been the advent of the spin Seebeck effect and anomalous Nernst effect with ...

Figure 1. Illustration of our mechanism for topological Hubbard band inversion. In the top panels, we start with a charge transfer insulator with 120° x y AFM order on the A (red) sublattice. The A quasiparticle band is split into a filled lower Hubbard band and an upper Hubbard band separated by energy U . The spin-degenerate B band lies in the Hubbard gap, ...

QAHE in topological materials: key to low-energy electronics Topological insulators, recognized by the Nobel Prize in Physics in 2016, are based on a quantum effect known as the quantum anomalous

The quantum Hall (QH) effect refers to quantization of the Hall conductance of a material at integer multiples of e^2/h , a value that is dependent only on two fundamental physical constants, the electron charge e and the Planck constant h . Precision QH effect measurements currently achieve deviations from exact quantization of 1 part in 10¹⁰ ...

The instability of the quantum anomalous Hall (QAH) effect has been studied as a function of the electric current and temperature in ferromagnetic topological insulator thin films. We find that a characteristic current for the breakdown of the QAH effect is roughly proportional to the Hall-bar width, indicating that the Hall electric field is relevant to the breakdown. We also ...

The observation of this effect is supported by theoretical calculations, and can be attributed to an unconventional anomalous Hall effect owing to an out-of-plane Berry curvature induced by an in ...

Quantum anomalous Hall effect--the appearance of quantized Hall conductance at zero magnetic field--has been observed in thin films of the topological insulator Bi₂Se₃ doped with magnetic atoms. The doping, however, introduces inhomogeneity, reducing the temperature at which the effect occurs. ... which reflects the energy scale of the ...

More than 40 years after the discovery of the quantum Hall effect, the investigation of new variants of this

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phenomenon and of the exotic physics they represent is still a lively research topic ...

Two-dimensional (2D) materials with inherent magnetism have attracted considerable attention in the fields of spintronics and condensed matter physics. The anomalous Hall effect (AHE) offers a theoretical foundation for understanding the origins of 2D ferromagnetism (2D-FM) and offers a valuable opportunity for applications in topological ...

is needed for the 3D QH effect, which was first proposed to come from a fixed spatial period charge density wave (CDW) along the magnetic field [4-7]. Similarly, the 3D quantum anomalous Hall effect which needs no magnetic field relies on the underlying 3D periodic lattice [8-12]. Recently, quasi-quantized plateaus of Hall resistivity

Bringing the mathematical concept of topology to condensed matter physics leads to fascinating concepts and exotic phenomena in both momentum (K) space and real (R) space. The quantum anomalous Hall effect (QAHE) characterized by the nonzero Chern number (C) and quantized conductance is a convective example of the nontrivial topology in K space ...

The two-dimensional Quantum Hall effect with no external magnetic field is called the Quantum anomalous Hall (QAH) effect. So far, experimentally realized QAH insulators all exhibit ferromagnetic ...

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