

# Anomalous And Topological Hall Effects In Itinerant Magnets

## Anomalous Hall Effect above Magnetic Ordering Temperature



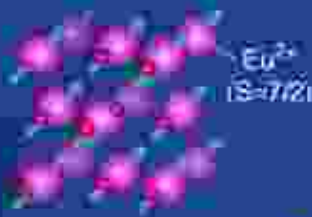
Anomalous Hall effect (AHE) can be observed in magnetic materials with long-range magnetic order



Hall voltage

Is large AHE possible without magnetic ordering? 

## Large AHE In novel magnetic semiconductor EuAs



EuO (conventional magnetic semiconductor)



EuAs  
Forms a distorted triangular lattice

Resistance ( $\bar{R}$ )



Colossal magnetoresistance and Hall resistivity peak above transition temperature

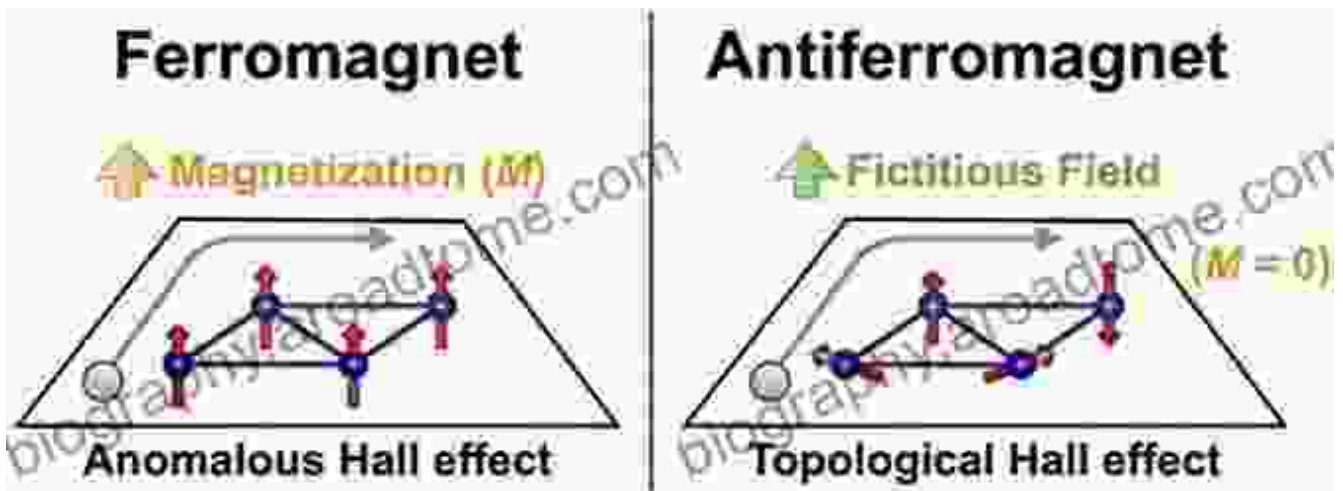
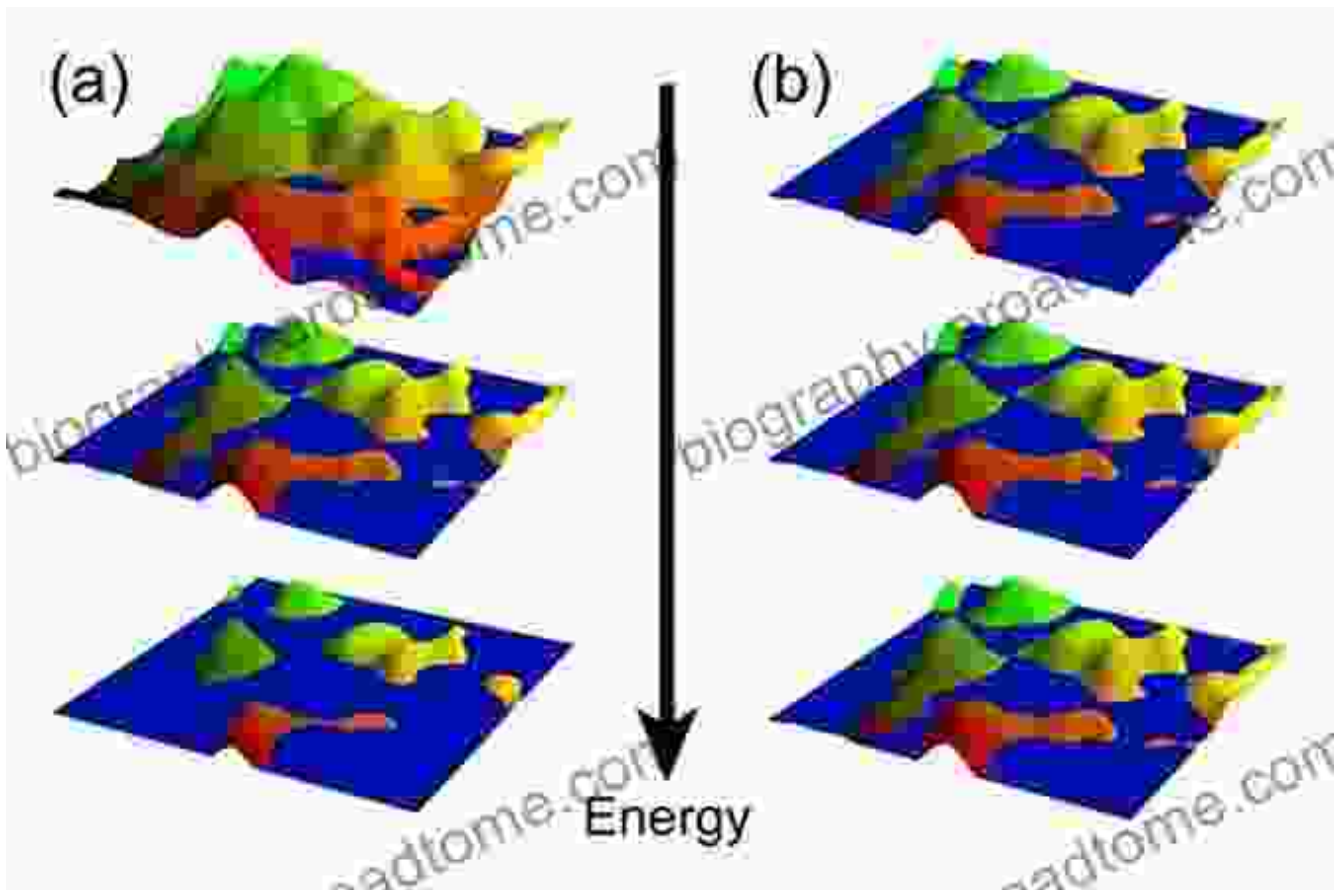


Large AHE explained by spin-cluster scattering in a hopping regime

**Large AHE resulting from spin-cluster scattering in a hopping regime is observed in EuAs without magnetic ordering**

Above ordering temperature large anomalous Hall effect in a triangular lattice magnetic semiconductor

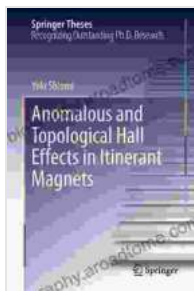
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### Unveiling the Hidden World of Magnetism and Topology

Enter a captivating world where magnetism and topology intertwine, giving rise to extraordinary electronic phenomena known as anomalous and topological Hall effects. This book, a comprehensive treatise on these

captivating topics, unfolds the mysteries behind these phenomena, offering a profound understanding of their fundamental physics, experimental observations, and theoretical underpinnings. Delve into the exciting realm of itinerant magnets, where the interplay of magnetism and electron dynamics unlocks a treasure trove of intriguing behaviors.



## Anomalous and Topological Hall Effects in Itinerant Magnets (Springer Theses)

★★★★★ 5 out of 5

Language : English  
File size : 10416 KB  
Text-to-Speech : Enabled  
Screen Reader : Supported  
Enhanced typesetting : Enabled  
Print length : 176 pages



### **Chapter 1: Unveiling the Hall Effect: Fundamentals and Historical Roots**

Begin your journey with a thorough exploration of the Hall effect, a pivotal discovery that laid the foundation for our understanding of magnetism and charge transport. Trace the historical evolution of this phenomenon, from its humble beginnings to its present-day significance in cutting-edge research. Grasp the fundamental principles that govern the Hall effect, unraveling the intricate relationship between magnetic fields, electric currents, and material properties.

### **Chapter 2: Unraveling the Enigma of the Anomalous Hall Effect**

Venture into the realm of anomalous Hall effects, where magnetism and spin-dependent scattering conspire to create a fascinating departure from the ordinary. Discover the underlying mechanisms that drive this effect, exploring the interplay between intrinsic magnetism, disFree Download, and spin-orbit interactions. Delve into experimental observations that showcase the anomalous Hall effect in diverse materials, unraveling the intricate connection between material properties and emergent electronic behaviors.

### **Chapter 3: Unveiling the Topological Landscape of the Topological Hall Effect**

Embark on a journey into the captivating realm of topological Hall effects, where the interplay of topology and magnetism gives rise to remarkable electronic phenomena. Explore the fundamental concepts of topology, delving into the intricate world of topological insulators and Weyl semi-metals. Discover the defining characteristics of topological Hall effects, unraveling the underlying mechanisms that drive their emergence. Witness the experimental breakthroughs that have brought these effects to the forefront of condensed matter physics.

### **Chapter 4: Unveiling the Interplay of Anomalous and Topological Hall Effects in Itinerant Magnets**

In this pivotal chapter, delve into the realm of itinerant magnets, where magnetism and electron dynamics dance in perfect harmony. Explore the unique characteristics of these materials, where the interplay of magnetism, charge transport, and spin-orbit interactions gives rise to a kaleidoscope of fascinating phenomena. Uncover the intricate connection between anomalous and topological Hall effects in itinerant magnets, unraveling the delicate balance between different physical mechanisms.

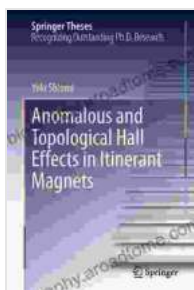
## Chapter 5: Unveiling the Practical Potential of Anomalous and Topological Hall Effects

As we approach the culmination of our journey, uncover the immense potential of anomalous and topological Hall effects in a multitude of cutting-edge applications. Explore their promising role in the development of next-generation spintronics devices, where the manipulation of electron spins holds the key to revolutionary technologies. Discover the exciting possibilities for quantum computing and ultra-low-power electronics, where these effects could pave the way for unprecedented advancements.

### : A Voyage into the Future of Magnetism and Topology

As we conclude our exploration, reflect upon the profound implications of anomalous and topological Hall effects in itinerant magnets. These remarkable phenomena not only deepen our understanding of magnetism and topology but also ignite new avenues for technological innovation. The future holds boundless possibilities as we continue to unravel the mysteries of these captivating effects, pushing the boundaries of scientific discovery and shaping the next chapter in the evolution of electronics and spintronics.

Embark on this intellectual voyage today and delve into the captivating world of anomalous and topological Hall effects in itinerant magnets. Free Download your copy of this comprehensive guide and unlock the secrets of these enigmatic phenomena.



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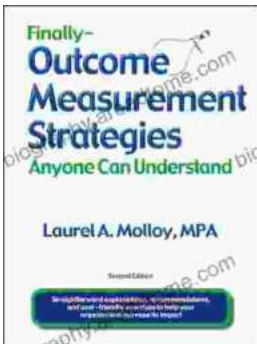
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