

論文が出版されました

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須藤特任研究員の論文が2026年1月5日に米国物理学会誌「Physical Review Letter (PRL)」から出版されました。

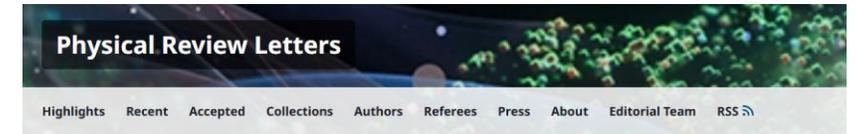
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対称性の破れた金属は、ダイオードに類似した「電気が一方向に流れやすい」性質を示します(非相反伝導)。本研究では、電子のスピンのジグザグに並んだ反強磁性体を用いて、スピンの反強磁性秩序することで自発的に非相反伝導を示すことを明らかにしました。

この論文は、PRLの編集部が選ぶ注目論文Editors' Suggestionに選出され、学会が運営するオンライン研究紹介サイトPhysics magazine (<https://physics.aps.org/articles/v19/1>)にて紹介されました。

また、本成果についてプレスリリースも行いました。

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Large Spontaneous Nonreciprocal Charge Transport in a Zero-Magnetization Antiferromagnet

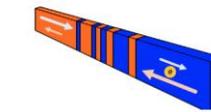
Kenta Sudo^{1,*}, Yuki Yanagi², Mitsuru Akaki¹, Hiroshi Tanida², and Motoi Kimata^{1,3,†}

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Physics FOCUS



Diode-Like Behavior Arising from Antiferromagnetism

Published 5 January, 2026

An antiferromagnet with a zigzag magnetic structure exhibits a diode effect that has potential applications in spintronics.

PHYSICAL REVIEW LETTERS **136**, 016503 (2026)

Editors' Suggestion

Featured in Physics

Large Spontaneous Nonreciprocal Charge Transport in a Zero-Magnetization Antiferromagnet

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Spontaneous breaking of time-reversal and spatial-inversion symmetries in solids triggers diverse intriguing phenomena. Although these phenomena have been extensively studied in insulators, similar investigations for metals remain limited. Herein, we report the observation and properties of spontaneous (i.e., zero-magnetic field) nonreciprocal charge transport in the zigzag intermetallic compound $\text{NdRu}_2\text{Al}_{10}$. This effect is attributed to the antiferromagnetic order, which can be interpreted as a magnetic toroidal dipole order. Our results reveal an excessively large nonreciprocal coefficient for this material, attributed to the strong effective magnetic field generated through $c-f$ exchange interactions. The results also suggest that the nonreciprocal response of this material depends on the spin configurations of the antiferromagnetic domains. Overall, our findings are distinct from those previously reported for field-induced nonreciprocal charge transport and contribute to a comprehensive understanding of cross-correlations in symmetry-broken metals.

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