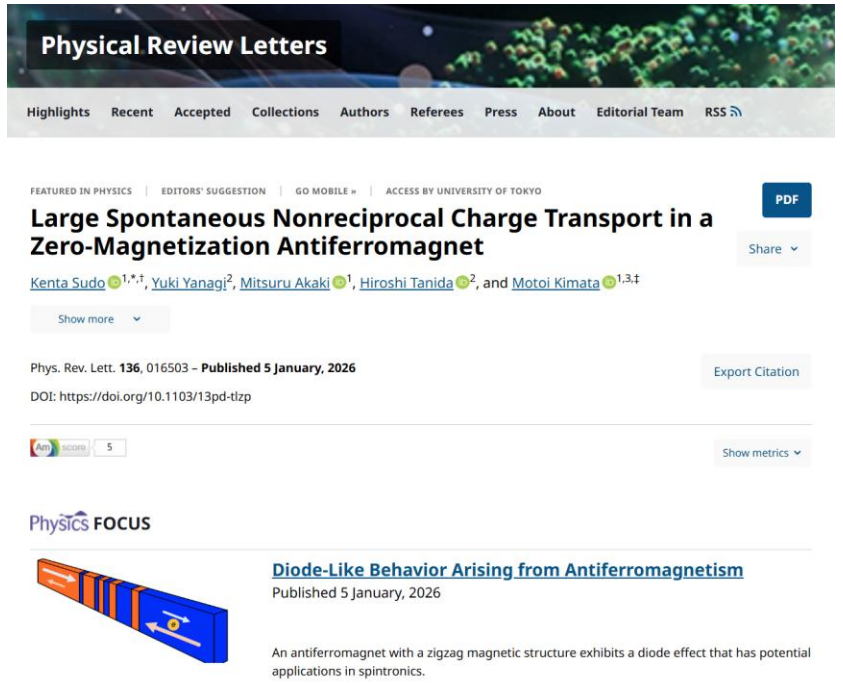
New publication

A paper by **Dr. Kenta Sudo** was published in PRL.
DOI: https://doi.org/10.1103/13pd-tlzp

Metals with broken symmetries can exhibit diode-like behavior, in which electric current flows more easily in one direction than the other, known as nonreciprocal charge transport. In this study, we demonstrate that an antiferromagnet with a zigzag structure shows spontaneous nonreciprocal charge transport as a direct consequence of antiferromagnetic spin ordering.

This paper was selected as an Editors' Suggestion and was also featured on *Physics Magazine.*
(https://physics.aps.org/articles/v19/1)

In addition, a press release describing this research outcome has been issued.
https://www.issp.u-tokyo.ac.jp/maincontents/research_result.html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Large Spontaneous Nonreciprocal Charge Transport in a Zero-Magnetization Antiferromagnet

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Kenta Sudo[1,*,†], Yuki Yanagi[2], Mitsuru Akaki[1], Hiroshi Tanida[2], and Motoi Kimata[1,3,‡]

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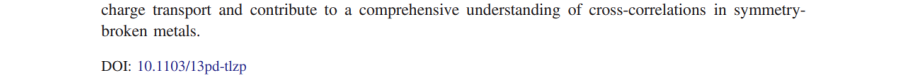
An antiferromagnet with a zigzag magnetic structure exhibits a diode effect that has potential applications in spintronics.


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

Editors' Suggestion | Featured in Physics

Large Spontaneous Nonreciprocal Charge Transport in a Zero-Magnetization Antiferromagnet

Kenta Sudo,[1,*,†] Yuki Yanagi,[2] Mitsuru Akaki,[1] Hiroshi Tanida,[2] and Motoi Kimata[1,3,‡]
[1]*Institute for Materials Research, Tohoku University, Sendai, Miyagi 980-8577, Japan*
[2]*Liberal Arts and Sciences, Toyama Prefectural University, Imizu, Toyama 939-0398, Japan*
[3]*Advanced Science Research Center, Japan Atomic Energy Agency, Tokai, Ibaraki 319-1195, Japan*

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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 $NdRu_2Al_{10}$. 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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