Takanobu Amano
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Department of Earth and Planetary Science,
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PERSONAL DETAILS

Affiliation	Department of Earth and Planetary Science, Graduate School of Science, The University of Tokyo
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RESEARCH INTERESTS

Takanobu Amano is interested in theoretical aspects of space and astrophysical plasma phenomena. His major research interests include physics of collisionless shocks (both non-relativistic and relativistic regimes), high-energy particle acceleration and transport, linear and nonlinear theory for kinetic plasma instabilities, and numerical techniques for advanced kinetic/fluid plasma simulations.

APPOINTMENTS

Aug. 1, 2016 - present	**Associate Professor** Department of Earth and Planetary Science, School of Science, The University of Tokyo
Mar. 16, 2012 - Jul. 31, 2016	**Assistant Professor** Department of Earth and Planetary Science, School of Science, The University of Tokyo
Apr. 1, 2009 - Mar. 15, 2012	**Designated Assistant Professor** Division of Particle and Astrophysical Science, Nagoya University
Apr. 1, 2008 - Mar. 31, 2009	**Postdoctoral Researcher** Solar-Terrestrial Environment Laboratory, Nagoya University

EDUCATION

Apr. 1, 2005 - Mar. 31, 2008	**Ph.D degree** Department of Earth and Planetary Science, Graduate School of Science, The University of Tokyo
Apr. 1, 2003 - Mar. 31, 2005	**MS degree** Department of Earth and Planetary Science, Graduate School of Science, The University of Tokyo
Apr. 1, 1999 - Mar. 31, 2003	**BS degree** Department of Earth and Planetary Physics, School of Science, The University of Tokyo

AWARDS

- 2022 Tanakadate Award from from Society of Geomagnetism and Earth, Planetary and Space Sciences (SGEPSS)
- 2018 Young Researcher Award (under 40 yrs. old) from Association of Asia Pacific Physical Societies, Division of Plasma Physics (AAPPS-DPP)
- 2015 Obayashi Early Career Scientist Award from Society of Geomagnetism and Earth, Planetary and Space Sciences (SGEPSS)
- 2005 JSPS (Japan Society for the Promotion of Science) Research Fellowship for Young Scientists (DC1)

PUBLICATIONS

See also, Google Scholar, or Publons profile pages for the up-to-date list of publications and citation statistics.

Refereed Articles

[1] Boula, S. S., J. Niemiec, **T. Amano**, and O. Kobzar (2024). Quasi-perpendicular shocks of galaxy clusters in hybrid kinetic simulations: The structure of the shocks. *Astronomy & Astrophysics*, (in press.)

[2] Lindberg, M., A. Vaivads, **T. Amano**, S. Raptis, and S. Joshi (2024). Electron Acceleration at Earth's Bow Shock Due to Stochastic Shock Drift Acceleration. *Geophysical Research Letters 51*(5), e2023GL106612. https://doi.org/10.1029/2023GL106612

[3] Jikei, T., **T. Amano**, and Y. Matsumoto (2024). Enhanced Magnetic Field Amplification by Ion-Beam Weibel Instability in Weakly Magnetized Astrophysical Shocks. *The Astrophysical Journal 961*(2), 157. https://doi.org/10.3847/1538-4357/ad1594

[4] Iwamoto, M., Y. Matsumoto, **T. Amano**, S. Matsukiyo, and M. Hoshino (2024). Linearly Polarized Coherent Emission from Relativistic Magnetized Ion-Electron Shocks. *Physical Review Letters 132*(3), 035201. https://doi.org/10.1103/PhysRevLett.132.035201

[5] Yamakawa, T., K. Seki, **T. Amano**, Y. Miyoshi, N. Takahashi, A. Nakamizo, and K. Yamamoto (2023). Effects of Cold Plasma on the Excitation of Internally Driven ULF Waves by Ring Current Ions Based On the Magnetosphere-Ionosphere Coupled Model. *Journal of Geophysical Research: Space Physics 128*(9). https://doi.org/10.1029/2023JA031638

[6] Raymond, J. C., P. Ghavamian, A. Bohdan, D. Ryu, J. Niemiec, L. Sironi, A. Tran, E. Amato, M. Hoshino, M. Pohl, **T. Amano**, and F. Fiuza (2023). Electron–Ion Temperature Ratio in Astrophysical Shocks. *The Astrophysical Journal 949*(2), 50. https://doi.org/10.3847/1538-4357/acc528

[7] Kuramitsu, Y., Y. Matsumoto, and **T. Amano** (2023). Nonlinear Evolution of the Weibel Instability with Relativistic Laser Pulses. *Physics of Plasmas 30*(3), 032109. https://doi.org/10.1063/5.0138855

[8] Kitamura, N., **T. Amano**, Y. Omura, S. A. Boardsen, D. J. Gershman, Y. Miyoshi, M. Kitahara, Y. Katoh, H. Kojima, S. Nakamura, M. Shoji, Y. Saito, S. Yokota, B. L. Giles, W. R. Paterson, C. J. Pollock, A. C. Barrie, D. G. Skeberdis, S. Kreisler, O. Le Contel, C. T. Russell, R. J. Strangeway, P.-A. Lindqvist, R. E. Ergun, R. B. Torbert, and J. L. Burch (2022). Direct Observations of Energy Transfer from Resonant Electrons to Whistler-Mode Waves in Magnetosheath of Earth. *Nature Communications 13*(1), 6259. https://doi.org/10.1038/s41467-022-33604-2

[9] **Amano, T.** and M. Hoshino (2022). Theory of Electron Injection at Oblique Shock of Finite Thickness. *The Astrophysical Journal 927*(1), 132. https://doi.org/10.3847/1538-4357/ac4f49

[10] Yamakawa, T., K. Seki, **T. Amano**, Y. Miyoshi, N. Takahashi, A. Nakamizo, and K. Yamamoto (2022). Excitation of Two Types of Storm-Time Pc5 ULF Waves by Ring Current Ions Based on the Magnetosphere-Ionosphere Coupled Model.

Journal of Geophysical Research: Space Physics 127(8). https://doi.org/10.1029/2022JA030486

[11] Walia, N. K., K. Seki, and **T. Amano** (2022). Study of Slow-mode Shock Formation and Particle Acceleration in the Symmetric Magnetic Reconnection Based on Hybrid Simulations. *Journal of Geophysical Research: Space Physics 127*(5), e2021JA030066. https://doi.org/10.1029/2021JA030066

[12] Jikei, T. and **T. Amano** (2022). Critical Comparison of Collisionless Fluid Models: Nonlinear Simulations of Parallel Firehose Instability. *Physics of Plasmas 29*(2), 022102. https://doi.org/10.1063/5.0077064

[13] **Amano, T.**, Y. Matsumoto, A. Bohdan, O. Kobzar, S. Matsukiyo, M. Oka, J. Niemiec, M. Pohl, and M. Hoshino (2022). Nonthermal Electron Acceleration at Collisionless Quasi-Perpendicular Shocks. *Reviews of Modern Plasma Physics 6*(1), 29. https://doi.org/10.1007/s41614-022-00093-1

[14] Iwamoto, M., **T. Amano**, Y. Matsumoto, S. Matsukiyo, and M. Hoshino (2022). Particle Acceleration by Pickup Process Upstream of Relativistic Shocks. *The Astrophysical Journal 924*(2), 108. https://doi.org/10.3847/1538-4357/ac38aa

[15] Keika, K., S. Kasahara, S. Yokota, M. Hoshino, K. Seki, **T. Amano**, L. M. Kistler, M. Nosé, Y. Miyoshi, T. Hori, and I. Shinohara (2022). Preferential Energization of Lower-Charge-State Heavier Ions in the near-Earth Magnetotail. *Journal of Geophysical Research: Space Physics 127*(1), e2021JA029786. https://doi.org/10.1029/2021JA029786

[16] Kobzar, O., J. Niemiec, **T. Amano**, M. Hoshino, S. Matsukiyo, Y. Matsumoto, and M. Pohl (2021). Electron Acceleration at Rippled Low-Mach-number Shocks in High-Beta Collisionless Cosmic Plasmas. *The Astrophysical Journal 919*(2), 97. https://doi.org/10.3847/1538-4357/ac1107

[17] Nishigai, T. and **T. Amano** (2021). Mach Number Dependence of Ion-Scale Kinetic Instability at Collisionless Perpendicular Shock: Condition for Weibel-dominated Shock. *Physics of Plasmas 28*(7), 072903. https://doi.org/10.1063/5.0051269 **(Corresponding Author)**

[18] Kitamura, N., M. Shoji, S. Nakamura, M. Kitahara, **T. Amano**, Y. Omura, H. Hasegawa, S. A. Boardsen, Y. Miyoshi, Y. Katoh, M. Teramoto, Y. Saito, S. Yokota, M. Hirahara, D. J. Gershman, B. L. Giles, C. T. Russell, R. J. Strangeway, N. Ahmadi, P.-A. Lindqvist, R. E. Ergun, S. A. Fuselier, and J. L. Burch (2021). Energy Transfer between Hot Protons and Electromagnetic Ion Cyclotron Waves in Compressional Pc5 Ultra-Low Frequency Waves. *Journal of Geophysical Research: Space Physics 126*(5), e2020JA028912. https://doi.org/10.1029/2020ja028912

[19] Jikei, T. and **T. Amano** (2021). A Non-Local Fluid Closure for Modeling Cyclotron Resonance in Collisionless Magnetized Plasmas. *Physics of Plasmas 28*(4), 042105. https://doi.org/10.1063/5.0045335

[20] Ligorini, A., J. Niemiec, O. Kobzar, M. Iwamoto, A. Bohdan, M. Pohl, Y. Matsumoto, **T. Amano**, S. Matsukiyo, and M. Hoshino (2021). Mildly Relativistic Magnetized Shocks in Electron-Ion Plasmas - II. Particle Acceleration and Heating. *Monthly Notices of the Royal Astronomical Society 502*(4), 5065–5074. https://doi.org/10.1093/mnras/stab220

[21] Bohdan, A., M. Pohl, J. Niemiec, P. J. Morris, Y. Matsumoto, **T. Amano**, M. Hoshino, and A. Sulaiman (2021). Magnetic Field Amplification by the Weibel Instability at Planetary and Astrophysical Shocks with High Mach Number. *Physical Review Letters 126*(9), 095101. https://doi.org/10.1103/PhysRevLett.126.095101

[22] Ligorini, A., J. Niemiec, O. Kobzar, M. Iwamoto, A. Bohdan, M. Pohl, Y. Matsumoto, **T. Amano**, S. Matsukiyo, Y. Esaki, and M. Hoshino (2021). Mildly Relativistic Magnetized Shocks in Electron-Ion Plasmas - I. Electromagnetic Shock Structure. *Monthly Notices of the Royal Astronomical Society 501*(4), 4837–4849. https://doi.org/10.1093/mnras/staa3901

[23] Bohdan, A., M. Pohl, J. Niemiec, P. J. Morris, Y. Matsumoto, **T. Amano**, and M. Hoshino (2020). Kinetic Simulation of Nonrelativistic Perpendicular Shocks of Young Supernova Remnants. IV. Electron Heating. *The Astrophysical Journal 904*(1), 12. https://doi.org/10.3847/1538-4357/abbc19

[24] Yamakawa, T., K. Seki, **T. Amano**, N. Takahashi, and Y. Miyoshi (2020). Excitation of Internally Driven ULF Waves by the Drift-Bounce Resonance with Ring Current Ions Based on the Drift-Kinetic Simulation. *Journal of Geophysical Research: Space Physics 125*(11), e2020JA028231. https://doi.org/10.1029/2020ja028231

[25] Kitamura, N., Y. Omura, S. Nakamura, **T. Amano**, S. A. Boardsen, N. Ahmadi, O. Le Contel, P. A. Lindqvist, R. E. Ergun, Y. Saito, S. Yokota, D. J. Gershman, W. R. Paterson, C. J. Pollock, B. L. Giles, C. T. Russell, R. J. Strangeway, and J. L. Burch (2020). Observations of the Source Region of Whistler Mode Waves in Magnetosheath Mirror Structures. *Journal of Geophysical Research: Space Physics 125*(5). https://doi.org/10.1029/2019JA027488

[26] Bohdan, A., M. Pohl, J. Niemiec, S. Vafin, Y. Matsumoto, **T. Amano**, and M. Hoshino (2020). Kinetic Simulations of Nonrelativistic Perpendicular Shocks of Young Supernova Remnants. III. Magnetic Reconnection. *The Astrophysical Journal 893*(1), 6. https://doi.org/10.3847/1538-4357/ab7cd6

[27] **Amano, T.**, T. Katou, N. Kitamura, M. Oka, Y. Matsumoto, M. Hoshino, Y. Saito, S. Yokota, B. L. Giles, W. R. Paterson, C. T. Russell, O. Le Contel, R. E. Ergun, P.-A. Lindqvist, D. L. Turner, J. F. Fennell, and J. B. Blake (2020). Observational Evidence for Stochastic Shock Drift Acceleration of Electrons at the Earth's Bow Shock. *Physical Review Letters 124*(6), 065101. https://doi.org/10.1103/PhysRevLett.124.065101

[28] Oka, M., F. Otsuka, S. Matsukiyo, L. B. I. Wilson, M. R. Argall, **T. Amano**, T. D. Phan, M. Hoshino, O. L. Contel, D. J. Gershman, J. L. Burch, R. B. Torbert, J. C. Dorelli, B. L. Giles, R. E. Ergun, C. T. Russell, and P. A. Lindqvist (2019). Electron Scattering by Low-Frequency Whistler Waves at Earth's Bow Shock. *The Astrophysical Journal 886*(1), 53. https://doi.org/10.3847/1538-4357/ab4a81

[29] Bohdan, A., J. Niemiec, M. Pohl, Y. Matsumoto, **T. Amano**, and M. Hoshino (2019). Kinetic Simulations of Nonrelativistic Perpendicular Shocks of Young Supernova Remnants. II. Influence of Shock-surfing Acceleration on Downstream Electron Spectra. *The Astrophysical Journal 885*(1), 10. https://doi.org/10.3847/1538-4357/ab43cf

[30] Iwamoto, M., **T. Amano**, M. Hoshino, Y. Matsumoto, J. Niemiec, A. Ligorini, O. Kobzar, and M. Pohl (2019). Precursor Wave Amplification by Ion–Electron Coupling

through Wakefield in Relativistic Shocks. *The Astrophysical Journal 883*(2), L35. https://doi.org/10.3847/2041-8213/ab4265

[31] Bohdan, A., J. Niemiec, M. Pohl, Y. Matsumoto, **T. Amano**, and M. Hoshino (2019). Kinetic Simulations of Nonrelativistic Perpendicular Shocks of Young Supernova Remnants. I. Electron Shock-surfing Acceleration. *The Astrophysical Journal 878*(1), 5. https://doi.org/10.3847/1538-4357/ab1b6d

[32] Katou, T. and **T. Amano** (2019). Theory of Stochastic Shock Drift Acceleration for Electrons in the Shock Transition Region. *The Astrophysical Journal 874*(2), 119. https://doi.org/10.3847/1538-4357/ab0d8a

[33] Yamakawa, T., K. Seki, **T. Amano**, N. Takahashi, and Y. Miyoshi (2019). Excitation of Storm Time Pc5 ULF Waves by Ring Current Ions Based on the Drift-Kinetic Simulation. *Geophysical Research Letters 46*(4), 1911–1918. https://doi.org/10.1029/2018GL081573

[34] **Amano, T.**, M. Iwamoto, Y. Matsumoto, and M. Hoshino (2019). The Efficiency of Coherent Radiation from Relativistic Shocks. Volume 119, pp. 371–383. Springer, Cham

[35] Seki, K., Y. Miyoshi, Y. Ebihara, Y. Katoh, **T. Amano**, S. Saito, M. Shoji, A. Nakamizo, K. Keika, T. Hori, S. Nakano, S. Watanabe, K. Kamiya, N. Takahashi, Y. Omura, M. Nose, M.-C. Fok, T. Tanaka, A. Ieda, and A. Yoshikawa (2018). Theory, Modeling, and Integrated Studies in the Arase (ERG) Project. *Earth, Planets and Space 70*(1), 17. https://doi.org/10.1186/s40623-018-0785-9

[36] Keika, K., S. Kasahara, S. Yokota, M. Hoshino, K. Seki, M. Nosé, **T. Amano**, Y. Miyoshi, and I. Shinohara (2018). Ion Energies Dominating Energy Density in the Inner Magnetosphere: Spatial Distributions and Composition, Observed by Arase/MEP-i. *Geophysical Research Letters 45*(22), 12,153–12,162. https://doi.org/10.1029/2018GL080047

[37] **Amano, T.** (2018). A Generalized Quasi-Neutral Fluid-Particle Hybrid Plasma Model and Its Application to Energetic-Particle-Magnetohydrodynamics Hybrid Simulation. *Journal of Computational Physics 366*, 366–385. https://doi.org/10.1016/j.jcp.2018.04.020

[38] Walia, N. K. K., K. Seki, M. Hoshino, **T. Amano**, N. Kitamura, Y. Saito, S. Yokota, C. J. J. Pollock, B. L. L. Giles, T. E. E. Moore, R. B. B. Torbert, C. T. T. Russell, and J. L. Burch (2018). A Statistical Study of Slow-Mode Shocks Observed by MMS in the Dayside Magnetopause. *Geophysical Research Letters 45*(10), 4675–4684. https://doi.org/10.1029/2018GL077580

[39] Iwamoto, M., **T. Amano**, M. Hoshino, and Y. Matsumoto (2018). Precursor Wave Emission Enhanced by Weibel Instability in Relativistic Shocks. *The Astrophysical Journal 858*(2), 93. https://doi.org/10.3847/1538-4357/aaba7a

[40] Kamiya, K., K. Seki, S. Saito, **T. Amano**, and Y. Miyoshi (2018). Formation of Butterfly Pitch Angle Distributions of Relativistic Electrons in the Outer Radiation Belt with a Monochromatic Pc5 Wave. *Journal of Geophysical Research 123*(6), 4679–4691. https://doi.org/10.1002/2017JA024764

[41] Matsumoto, Y., **T. Amano**, T. N. Kato, and M. Hoshino (2017). Electron Surfing and Drift Accelerations in a Weibel-Dominated High-Mach-Number Shock. *Physical Review Letters 119*(10), 105101. https://doi.org/10.1103/PhysRevLett.119.105101

[42] Oka, M., L. B. I. Wilson, T. D. Phan, A. J. Hull, **T. Amano**, M. Hoshino, M. R. Argall, O. L. Contel, O. Agapitov, D. J. Gershman, Y. V. Khotyaintsev, J. L. Burch, R. B. Torbert, C. Pollock, J. C. Dorelli, B. L. Giles, T. E. Moore, Y. Saito, L. A. Avanov, W. Paterson, R. E. Ergun, R. J. Strangeway, C. T. Russell, and P. A. Lindqvist (2017). Electron Scattering by High-Frequency Whistler Waves at Earth's Bow Shock. *The Astrophysical Journal 842*(2), L11. https://doi.org/10.3847/2041-8213/aa7759

[43] Iwamoto, M., **T. Amano**, M. Hoshino, and Y. Matsumoto (2017). Persistence of Precursor Waves in Two-Dimensional Relativistic Shocks. *The Astrophysical Journal 840*(1), 52. https://doi.org/10.3847/1538-4357/aa6d6f

[44] Hirabayashi, K., M. Hoshino, and **T. Amano** (2016). A New Framework for Magnetohydrodynamic Simulations with Anisotropic Pressure. *Journal of Computational Physics 327*, 851–872. https://doi.org/10.1016/j.jcp.2016.09.064

[45] **Amano, T.** (2016). A Second-Order Divergence-Constrained Multidimensional Numerical Scheme for Relativistic Two-Fluid Electrodynamics. *The Astrophysical Journal 831*(1), 100. https://doi.org/10.3847/0004-637X/831/1/100

[46] Balsara, D. S., **T. Amano**, S. Garain, and J. Kim (2016). A High-Order Relativistic Two-Fluid Electrodynamic Scheme with Consistent Reconstruction of Electromagnetic Fields and a Multidimensional Riemann Solver for Electromagnetism. *Journal of Computational Physics 318*, 169–200. https://doi.org/10.1016/j.jcp.2016.05.006

[47] **Amano, T.** (2015). Divergence-Free Approximate Riemann Solver for the Quasi-Neutral Two-Fluid Plasma Model. *Journal of Computational Physics 299*, 863–886. https://doi.org/10.1016/j.jcp.2015.07.035

[48] Matsumoto, Y., **T. Amano**, T. N. Kato, and M. Hoshino (2015). Stochastic Electron Acceleration during Spontaneous Turbulent Reconnection in a Strong Shock Wave. *Science (New York, N.Y.) 347*(6225), 974–978. https://doi.org/10.1126/science.1260168

[49] Minoshima, T., Y. Matsumoto, and **T. Amano** (2015). A Finite Volume Formulation of the Multi-Moment Advection Scheme for Vlasov Simulations of Magnetized Plasma. *Computer Physics Communications 187*, 137–151. https://doi.org/10.1016/j.cpc.2014.10.023

[50] Itou, H., **T. Amano**, and M. Hoshino (2014). First-Principles Simulations of Electrostatic Interactions between Dust Grains. *Physics of Plasmas 21*(12), 123707. https://doi.org/10.1063/1.4904373

[51] **Amano, T.**, K. Higashimori, and K. Shirakawa (2014). A Robust Method for Handling Low Density Regions in Hybrid Simulations for Collisionless Plasmas. *Journal of Computational Physics 275*, 197–212. https://doi.org/10.1016/j.jcp.2014.06.048

[52] Matsumoto, Y., **T. Amano**, and M. Hoshino (2013). Electron Acceleration in a Nonrelativistic Shock with Very High Alfvén Mach Number. *Physical Review Letters 111*(21), 215003. https://doi.org/10.1103/PhysRevLett.111.215003

[53] Saito, T., M. Hoshino, and **T. Amano** (2013). Stability of Cosmic-Ray Modified Shocks: Two-Fluid Approach. *The Astrophysical Journal 775*(2), 130. https://doi.org/10.1088/0004-637X/775/2/130

[54] **Amano, T.** and J. G. Kirk (2013). The Role of Superluminal Electromagnetic Waves in Pulsar Wind Termination Shocks. *The Astrophysical Journal 770*(1), 18. https://doi.org/10.1088/0004-637X/770/1/18

[55] Minoshima, T., Y. Matsumoto, and **T. Amano** (2013). Multi-Moment Advection Scheme in Three Dimension for Vlasov Simulations of Magnetized Plasma. *Journal of Computational Physics 236*, 81–95. https://doi.org/10.1016/j.jcp.2012.11.024

[56] Matsumoto, Y., **T. Amano**, and M. Hoshino (2012). Electron Accelerations at High Mach Number Shocks: Two-Dimensional Particl-in-Cell Simulations in Various Parameter Regimes. *The Astrophysical Journal 755*(2), 109. https://doi.org/10.1088/0004-637X/755/2/109

[57] Umeda, T., S. Matsukiyo, **T. Amano**, and Y. Miyoshi (2012). A Numerical Electromagnetic Linear Dispersion Relation for Maxwellian Ring-Beam Velocity d Istributions. *Physics of Plasmas 19*(7), 072107. https://doi.org/10.1063/1.4736848

[58] Hayakawa, T., K. Torii, R. Enokiya, **T. Amano**, and Y. Fukui (2012). Molecular and Atomic Gas toward HESS J1745-303 in the Galactic Center: Further Support for the Hadronic Scenario. *Publications of the Astronomical Society of Japan 64*(1), 8. https://doi.org/10.1093/pasj/64.1.8

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[60] **Amano, T.** and M. Hoshino (2012). Recent Progress in the Theory of Electron Injection in Collisionless Shocks. Volume 33, pp. 143–152. Springer Berlin Heidelberg

[61] **Amano, T.**, K. Torii, T. Hayakawa, and Y. Fukui (2011). Stochastic Acceleration of Cosmic Rays in the Central Molecular Zone of the Galaxy. *Publications of the Astronomical Society of Japan 63*(6), L63–L66. https://doi.org/10.1093/pasj/63.6.L63

[62] Minoshima, T., Y. Matsumoto, and **T. Amano** (2011). Multi-Moment Advection Scheme for Vlasov Simulations. *Journal of Computational Physics 230*(17), 6800–6823. https://doi.org/10.1016/j.jcp.2011.05.010

[63] **Amano, T.**, K. Seki, Y. Miyoshi, T. Umeda, Y. Matsumoto, Y. Ebihara, and S. Saito (2011). Self-Consistent Kinetic Numerical Simulation Model for Ring Current Particles in the Earth's Inner Magnetosphere. *Journal of Geophysical Research 116*, A02216. https://doi.org/10.1029/2010JA015682

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[65] Shimada, N., M. Hoshino, and **T. Amano** (2010). Structure of a Strong Supernova Shock Wave and Rapid Electron Acceleration Confined in Its Transition Region. *Physics of Plasmas 17*(3), 032902. https://doi.org/10.1063/1.3322828

[66] **Amano, T.** and M. Hoshino (2009). Electron Shock Surfing Acceleration in Multidimensions: Two-Dimensional Particle-in-Cell Simulation of Collisionless Perpendicular Shock. *The Astrophysical Journal 690*(1), 244–251. https://doi.org/10.1088/0004-637X/690/1/244

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[69] **Amano, T.** and M. Hoshino (2007). Electron Injection at High Mach Number Quasi-Perpendicular Shocks: Surfing and Drift Acceleration. *The Astrophysical Journal 661*(1), 190–202. https://doi.org/10.1086/513599

Book Chapters

[1] **Amano, T.** (2023). Generalized Quasi-Neutral Hybrid-Kinetic Simulations. *Space and Astrophysical Plasma Simulation*, 313–336. https://doi.org/10.1007/978-3-031-11870-8_10

Non-Refereed Articles

[1] **Amano, T.** (2016). Inside a Plasma Shock. *Physics 9*, 117. https://doi.org/10.1103/Physics.9.117

Non-refereed Articles in Japanese

[1] 星野真弘, **天野孝伸** (2009), 宇宙における衝撃波粒子加速機構の新展開, 日本物理学会誌, 64(6), 421

[2] **天野孝伸** (2009), 超新星残骸衝撃波における電子注入, 天文月報, 102(1), 9

INVITED TALKS (INTERNATIONAL CONFERENCES)

[1] Electron injection via stochastic shock drift acceleration at quasi-perpendicular shocks, *Synergistic approaches to particle transport in magnetized turbulence: from the laboratory to astrophysics*, Apr. 16, 2024.

[2] Theory, Simulation, and Observation for Electron Injection at Collisionless Shocks, *AOGS 19th Annual Meeting*, Online, Aug. 1, 2022.

[3] Electron injection at shocks: Transition from stochastic shock drift acceleration to diffusive shock acceleration, *XXVIII Cracow EPIPHANY Conference on Recent Advances in Astroparticle Physics*, Online, Jan. 12, 2022.

[4] Connecting Injection and Subsequent Acceleration of Nonthermal Electrons at Collisionless Oblique Shocks, *The 30th International Toki Conference on Plasma and Fusion Research (ITC30)*, Online, Nov. 16, 2021. **(Plenary Talk)**

[5] Stochastic Shock Drift Acceleration as the Mechanism for Electron Injection into Diffusive Shock Acceleration at Collisionless Shocks, *5th Asia-Pacific Conference on Plasma Physics (AAPPS-DPP2021)*, Online, Sep. 28, 2021.

[6] Particle Acceleration at Collisionless Shocks, *10th East-Asia Workshop on Laboratory, Space, Astrophysical Plasmas (EASW-10)*, Online, Aug. 16, 2021.

[7] Perspectives for Electron Heating and Acceleration at Collisionless Shocks, *MMS Spring 2021 Science Working Team Meeting*, Online, Apr. 8, 2021.

[8] Non-thermal Particle Acceleration at Collisionless Shocks, *Max Planck Princeton Center Workshop*, Göttingen, Germany, Jan. 22, 2020.

[9] Three-dimensional Particle-In-Cell Simulations for High Mach Number Collisionless Shocks, *The 2nd Asia-Pacific Conference on Plasma Physics*, Kanazawa, Japan, Nov. 15, 2018.

[10] Nonthermal Electron Acceleration at Earth's Bow Shock: Theory, Simulation and Observation, *The 13th International School/Symposium for Space Simulations (ISSS-13)*, Los Angeles, USA, Sep. 13, 2018.

[11] Stochastic Shock Drift Acceleration for Electrons, *8th East-Asia Workshop on Laboratory, Space, Astrophysical Plasmas*, Daejeon, Korea, Aug. 1, 2018.

[12] Cosmic-Ray Acceleration via Astrophysical Coherent Radiation, *20th International Symposium on Very High Energy Cosmic Ray Interactions (ISVHECRI)*, Nagoya, Japan, May 24, 2018.

[13] Particle Acceleration in Relativistic Plasmas, *Dawn of a New Era for Black Hole Jets in Active Galaxies*, Sendai, Japan, Jan. 26, 2018.

[14] Nonthermal Electrons at Quasi-perpendicular Collisionless Shocks, *7th East-Asia Workshop on Laboratory, Space, Astrophysical Plasmas*, Weihai, China, Jul. 25, 2017.

[15] Coherent and Stochastic Acceleration in Quasi-perpendicular Collisionless Shocks, *Workshop on Plasma Astrophysics from the Laboratory to the Non-thermal Universe*, Oxford, UK, Jul. 4, 2017.

[16] Kinetic Simulations of Particle Acceleration and Transport around Collisionless Shocks, *AOGS 13th Annual Meeting*, Beijing, China, Aug. 1, 2016.

[17] Particle Acceleration and Transport at Collisionless Shocks, *6th East-Asia Workshop on Laboratory, Space, Astrophysical Plasmas*, Tsukuba, Japan, Jul. 11, 2016.

[18] Key Issues in Particle Acceleration Theory at Collisionless Shocks, *18th International Congress on Plasma Physics*, Kaohsiung, Taiwan, Jun. 29, 2016.

[19] Energetic Particle Hybrid Code and Its Application, *11th International Conference on Numerical Modeling of Space Plasma Flows (ASTRONUM2016)*, Monterey, USA, Jun. 9, 2016.

[20] Superluminal Electromagnetic Waves in Highly Magnetized Relativistic Shocks, *5th East-Asia School and Workshop on Laboratory, Space, Astrophysical Plasmas*, Pohang, Korea, Aug. 21, 2015.

[21] Quasi-neutral Two-fluid Plasma Simulation Model, *10th International Conference on Numerical Modeling of Space Plasma Flows (ASTRONUM 2015)*, Avignon, France, Jun. 10, 2015.

[22] Physics of Very High Mach Number Collisionless Shocks, *The Many Facets of Supernova Remnants*, Rikkyo University, Japan, Nov. 10, 2014.

[23] Relativistic Electromagnetic Two-fluid Simulations of Pulsar Wind Termination Shocks, *The 6th East-Asian Numerical Astrophysics Meeting (EANAM6)*, Suwon, Korea, Sep. 18, 2014.

[24] Robust Handling of Low Density Regions in Hybrid Simulations, *9th International Conference on Numerical Modeling of Space Plasma Flows (ASTRONUM 2014)*, Long Beach, USA, Jun. 25, 2014.

[25] Relativistic Pulsar Wind Termination Shocks Modified by Superluminal Electromagnetic Waves, *8th International Conference on Numerical Modeling of Space Plasma Flows (ASTRONUM 2013)*, Biarritz, France, Jul. 1, 2013.

[26] Structure of Relativistic Shock Modified by Nonlinear Superluminal Waves, *Nonlinear Waves and Chaos Workshop 9*, La Jolla, USA, Mar. 7, 2013.

[27] Self-consistent Drift-kinetic Numerical Ring-current Modeling : Five-dimensional Vlasov-Maxwell Approach, *Inner Magnetosphere Coupling II (IMC II)*, Los Angeles, USA, Mar. 20, 2012.

[28] Nonthermal Electron Acceleration and Injection in Collisionless Shocks, *International Astrophysics Forum Alpbach (IAFA) 2011*, Alpbach, Austria, Jun. 24, 2011.

[29] Kinetic and Self-consistent Numerical Modeling of the Terrestrial Inner Magnetosphere, *6th International Conference on Numerical Modeling of Space Plasma Flows (ASTRONUM 2011)*, Valencia, Spain, Jun. 17, 2011.

[30] Electron Acceleration and Injection by Whistler Waves in Collisionless Shocks, *2010 International Space Plasma Symposium*, Tinan, Taiwan, Jun. 28, 2010.

[31] Surfing and Drift Acceleration of Electrons at High Mach Number Quasi-perpendicular Shocks, *Kinetic Modeling of Astrophysical Plasmas*, Crakow, Poland, Oct. 6, 2008.

[32] Nonthermal Electron Acceleration in High Mach Number Collisionless Shocks, *The 9th International Workshop on the Interrelationship between Plasma Experiments in Laboratory and Space (IPELS)*, Palm Cove, Australia, Aug. 10, 2007.

INVITED TALKS (DOMESTIC CONFERENCES)

[1] 宇宙プラズマにおける運動論的不安定性, *プラズマシミュレータシンポジウム*, オンライン, 2023 年 9 月 28 日.

[2] ミクロなプラズマ素過程に基づく衝撃波粒子加速機構, *高エネルギー現象で探る宇宙の多様性 I*, 東京大学宇宙線研究所, 2021 年 10 月 19 日.

[3] 衝撃波電子加速におけるホイッスラー波の役割, *第 37 回プラズマ・核融合学会年会シンポジウム*, オンライン, 2020 年 12 月 1 日.

[4] 内部磁気圏における ULF 波動励起機構, *実験室・宇宙プラズマ研究集会*, 東京大学本郷キャンパス, 2019 年 9 月 17 日.

[5] 宇宙空間衝撃波の遷移層, *日本物理学会 春季年会*, 東京理科大学野田キャンパス, 2018 年 3 月 24 日.

[6] 内部磁気圏 RC モデリングの新しい試み, *太陽地球圏環境予測のためのモデル研究の展望*, 名古屋大学東山キャンパス, 2017 年 1 月 27 日.

[7] MMS 衛星で見る無衝突衝撃波と電子加速, *高エネルギー宇宙物理学研究会*, 青山学院大学相模原キャンパス, 2016 年 12 月 2 日.

[8] 宇宙プラズマのハイブリッドシミュレーション, *日本物理学会 2016 秋季年会*, 金沢大学角間キャンパス, 2016 年 9 月 14 日.

[9] Theory and Simulations of Particle Acceleration in Collisionless Shocks, *高エネルギーガンマ線でみる極限宇宙 2015*, 2016 年 1 月 14 日.

[10] パルサー風衝撃波と電磁波の相互作用, *高エネルギー宇宙物理学研究会*, 九州大学西新プラザ, 2014 年 11 月 25 日.

[11] 相対論的電磁変性衝撃波の構造と電磁エネルギー散逸, *日本物理学会 2013 春季年会*, 広島大学, 2013 年 3 月 27 日.

[12] 無衝突衝撃波の数値シミュレーションと粒子加速, *宇宙流体力学のフロンティア*, 京都大学, 2009 年 11 月 16 日.