Takanobu Amano
天野 孝伸 (あまの たかのぶ)

Associate Professor
Department of Earth and Planetary Science,
Graduate School of Science, The University of Tokyo

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] 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*, e2021JA030066. https://doi.org/10.1029/2021JA030066

[2] **Amano, T.** and M. Hoshino (2022). Theory of electron injection at oblique shock of finite thickness. *Astrophys. J. 927*(1), 132. https://doi.org/10.3847/1538-4357/ac4f49

[3] Jikei, T. and **T. Amano** (2022). Critical comparison of collisionless fluid models: Nonlinear simulations of parallel firehose instability. *Phys. Plasmas 29*(2), 022102. https://doi.org/10.1063/5.0077064

[4] 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. *J. Geophys. Res. 127*(1), e2021JA029786. https://doi.org/10.1029/2021JA029786

[5] Iwamoto, M., **T. Amano**, Y. Matsumoto, S. Matsukiyo, and M. Hoshino (2022). Particle acceleration by pickup process upstream of relativistic shocks. *Astrophys. J. 924*(2), 108. https://doi.org/10.3847/1538-4357/ac38aa

[6] 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. *Astrophys. J. 919*(2), 97. https://doi.org/10.3847/1538-4357/ac1107

[7] Nishigai, T. and **T. Amano** (2021). Mach number dependence of ion-scale kinetic instability at collisionless perpendicular shock: Condition for Weibel-dominated shock. *Phys. Plasmas 28*(7), 072903. https://doi.org/10.1063/5.0051269 **(Corresponding Author)**

[8] 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. 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. *J. Geophys. Res. 126*(5), e2020JA028912. https://doi.org/10.1029/2020ja028912

[9] Jikei, T. and **T. Amano** (2021). A non-local fluid closure for modeling cyclotron resonance in collisionless magnetized plasmas. *Phys. Plasmas 28*(4), 042105. https://doi.org/10.1063/5.0045335

[10] 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. *Phys. Rev. Lett. 126*(9), 095101. https://doi.org/10.1103/PhysRevLett.126.095101

[11] 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. *Mon. Not. R. Astron. Soc. 502*(4), 5065–5074. https://doi.org/10.1093/mnras/stab220

[12] 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. *Mon. Not. R. Astron. Soc. 501*(4), 4837–4849. https://doi.org/10.1093/mnras/staa3901

[13] 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. *Astrophys. J. 904*(1), 12. https://doi.org/10.3847/1538-4357/abbc19

[14] 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. *J. Geophys. Res. 125*(11), e2020JA028231. https://doi.org/10.1029/2020ja028231

[15] 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. *J. Geophys. Res. 125*(5). https://doi.org/10.1029/2019JA027488

[16] 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. *Astrophys. J. 893*(1), 6. https://doi.org/10.3847/1538-4357/ab7cd6

[17] **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. *Phys. Rev. Lett. 124*(6), 065101. https://doi.org/10.1103/PhysRevLett.124.065101

[18] Oka, M., F. Otsuka, S. Matsukiyo, L. B. 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. *Astrophys. J. 886*(1), 53. https://doi.org/10.3847/1538-4357/ab4a81

[19] 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. *Astrophys. J. 885*(1), 10. https://doi.org/10.3847/1538-4357/ab43cf

[20] 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. *Astrophys. J. 883*(2), L35. https://doi.org/10.3847/2041-8213/ab4265

[21] 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. *Astrophys. J. 878*(1), 5. https://doi.org/10.3847/1538-4357/ab1b6d

[22] Katou, T. and **T. Amano** (2019). Theory of stochastic shock drift acceleration for electrons in the shock transition region. *Astrophys. J. 874*(2), 119. https://doi.org/10.3847/1538-4357/ab0d8a

[23] 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. *Geophys. Res. Lett. 46*(4), 1911–1918. https://doi.org/10.1029/2018GL081573

[24] **Amano, T.**, M. Iwamoto, Y. Matsumoto, and M. Hoshino (2019). The efficiency of coherent radiation from relativistic shocks. In *Prog. Phot. Sci.*, Volume 119, pp. 371–383. Springer, Cham

[25] 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 Sp. 70*(1), 17. https://doi.org/10.1186/s40623-018-0785-9

[26] 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. *Geophys. Res. Lett. 45*(22), 12,153–12,162. https://doi.org/10.1029/2018GL080047

[27] **Amano, T.** (2018). A generalized quasi-neutral fluid-particle hybrid plasma model and its application to energetic-particle-magnetohydrodynamics hybrid simulation. *J. Comput. Phys. 366*, 366–385. https://doi.org/10.1016/j.jcp.2018.04.020

[28] Walia, N. K., K. Seki, M. Hoshino, **T. Amano**, N. Kitamura, Y. Saito, S. Yokota, C. J. Pollock, B. L. Giles, T. E. Moore, R. B. Torbert, C. T. Russell, and J. L. Burch (2018). A statistical study of slow-mode shocks observed by MMS in the dayside magnetopause. *Geophys. Res. Lett. 45*(10), 4675–4684. https://doi.org/10.1029/2018GL077580

[29] Iwamoto, M., **T. Amano**, M. Hoshino, and Y. Matsumoto (2018). Precursor wave emission enhanced by Weibel instability in relativistic shocks. *Astrophys. J. 858*(2), 93. https://doi.org/10.3847/1538-4357/aaba7a

[30] 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. *J. Geophys. Res. 123*(6), 4679–4691. https://doi.org/10.1002/2017JA024764

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

[32] Oka, M., Wilson, L. B. III, 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. *Astrophys. J. 842*(2), L11. https://doi.org/10.3847/2041-8213/aa7759

[33] Iwamoto, M., **T. Amano**, M. Hoshino, and Y. Matsumoto (2017). Persistence of precursor waves in two-dimensional relativistic shocks. *Astrophys. J. 840*(1), 52. https://doi.org/10.3847/1538-4357/aa6d6f

[34] Hirabayashi, K., M. Hoshino, and **T. Amano** (2016). A new framework for magnetohydrodynamic simulations with anisotropic pressure. *J. Comput. Phys. 327*, 851–872. https://doi.org/10.1016/j.jcp.2016.09.064

[35] **Amano, T.** (2016). A second-order divergence-constrained multidimensional numerical scheme for relativistic two-fluid electrodynamics. *Astrophys. J. 831*(1), 100. https://doi.org/10.3847/0004-637X/831/1/100

[36] 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. *J. Comput. Phys. 318*, 169–200. https://doi.org/10.1016/j.jcp.2016.05.006

[37] **Amano, T.** (2015). Divergence-free approximate Riemann solver for the quasi-neutral two-fluid plasma model. *J. Comput. Phys. 299*, 863–886. https://doi.org/10.1016/j.jcp.2015.07.035

[38] Matsumoto, Y., **T. Amano**, T. N. Kato, and M. Hoshino (2015). Stochastic electron acceleration during spontaneous turbulent reconnection in a strong shock wave. *Science 347*(6225), 974–978. https://doi.org/10.1126/science.1260168

[39] Minoshima, T., Y. Matsumoto, and **T. Amano** (2015). A finite volume formulation of the multi-moment advection scheme for Vlasov simulations of magnetized plasma. *Comput. Phys. Commun. 187*, 137–151. https://doi.org/10.1016/j.cpc.2014.10.023

[40] Itou, H., **T. Amano**, and M. Hoshino (2014). First-principles simulations of electrostatic interactions between dust grains. *Phys. Plasmas 21*(12), 123707. https://doi.org/10.1063/1.4904373

[41] **Amano, T.**, K. Higashimori, and K. Shirakawa (2014). A robust method for handling low density regions in hybrid simulations for collisionless plasmas. *J. Comput. Phys. 275*, 197–212. https://doi.org/10.1016/j.jcp.2014.06.048

[42] Matsumoto, Y., **T. Amano**, and M. Hoshino (2013). Electron acceleration in a nonrelativistic shock with very high Alfvén Mach number. *Phys. Rev. Lett. 111*(21), 215003. https://doi.org/10.1103/PhysRevLett.111.215003

[43] Saito, T., M. Hoshino, and **T. Amano** (2013). Stability of cosmic-ray modified shocks: two-fluid approach. *Astrophys. J. 775*(2), 130. https://doi.org/10.1088/0004-637X/775/2/130

[44] **Amano, T.** and J. G. Kirk (2013). The role of superluminal electromagnetic waves in pulsar wind termination shocks. *Astrophys. J. 770*(1), 18. https://doi.org/10.1088/0004-637X/770/1/18

[45] Minoshima, T., Y. Matsumoto, and **T. Amano** (2013). Multi-moment advection scheme in three dimension for Vlasov simulations of magnetized plasma. *J. Comput. Phys. 236*, 81–95. https://doi.org/10.1016/j.jcp.2012.11.024

[46] 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. *Astrophys. J. 755*(2), 109. https://doi.org/10.1088/0004-637X/755/2/109

[47] Umeda, T., S. Matsukiyo, **T. Amano**, and Y. Miyoshi (2012). A numerical electromagnetic linear dispersion relation for Maxwellian ring-beam velocity d istributions. *Phys. Plasmas 19*(7), 072107. https://doi.org/10.1063/1.4736848

[48] 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. *Publ. Astron. Soc. Japan 64*(1), 8. https://doi.org/10.1093/pasj/64.1.8

[49] Minoshima, T., Y. Matsumoto, and **T. Amano** (2012). Multi-moment advection scheme for Vlasov simulations. *ASP Conf. Ser. 459*(17), 277–282

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[51] **Amano, T.**, K. Torii, T. Hayakawa, and Y. Fukui (2011). Stochastic acceleration of cosmic rays in the central molecular zone of the Galaxy. *Publ. Astron. Soc. Japan 63*(6), L63–L66. https://doi.org/10.1093/pasj/63.6.L63

[52] Minoshima, T., Y. Matsumoto, and **T. Amano** (2011). Multi-moment advection scheme for Vlasov simulations. *J. Comput. Phys. 230*(17), 6800–6823. https://doi.org/10.1016/j.jcp.2011.05.010

[53] **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. *J. Geophys. Res. 116*, A02216. https://doi.org/10.1029/2010JA015682

[54] **Amano, T.** and M. Hoshino (2010). A critical mach number for electron injection in collisionless shocks. *Phys. Rev. Lett. 104*(18), 181102. https://doi.org/10.1103/PhysRevLett.104.181102

[55] Shimada, N., M. Hoshino, and **T. Amano** (2010). Structure of a strong supernova shock wave and rapid electron acceleration confined in its transition region. *Phys. Plasmas 17*(3), 032902. https://doi.org/10.1063/1.3322828

[56] **Amano, T.** and M. Hoshino (2009). Effect of shock angle on fast and direct acceleration of electrons in high Mach number quasi-perpendicular shocks. In M. Hirahara, Y. Miyoshi, N. Terada, I. Shinohara, and T. Mukai (Eds.), *AIP Conf. Proc.*, Volume 1144, pp. 36–39. AIP

[57] **Amano, T.** and M. Hoshino (2009). Nonlinear evolution of Buneman instability and its implication for electron acceleration in high Mach number collisionless perpendicular shocks. *Phys. Plasmas 16*(10), 102901. https://doi.org/10.1063/1.3240336

[58] **Amano, T.** and M. Hoshino (2009). Electron shock surfing acceleration in multidimensions: two-dimensional particle-in-cell simulation of collisionless perpendicular shock. *Astrophys. J. 690*(1), 244–251. https://doi.org/10.1088/0004-637X/690/1/244

[59] **Amano, T.** and M. Hoshino (2007). Electron injection at high Mach number quasi-perpendicular shocks: surfing and drift acceleration. *Astrophys. J. 661*(1), 190–202. https://doi.org/10.1086/513599

Non-Refereed Articles

[1] **Amano, T.** (2016). Inside a plasma shock. *Physics (College. Park. Md). 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 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.

[2] 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)**

[3] 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.

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

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

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

[7] 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.

[8] 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.

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

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

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

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

[13] 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.

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

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

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

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

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

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

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

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

[22] 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.

[23] 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.

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

[25] 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.

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

[27] 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.

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

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

[30] 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] 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.

[2] 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.

[3] 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.

[4] 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.

[5] 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.

[6] 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.

[7] 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.

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[9] 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.

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