

# CURRICULUM VITAE

## PERSONAL DATA

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NAME IN FULL: Katsuya Abe  
GENDER: Male  
BIRTHDATE: January 31, 1996  
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CITIZENSHIP: Japan

## EMPLOYMENT

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Apr. 2023 | Postdoctoral Researcher,  
- present | Center for Frontier Science, Chiba University, Chiba

Apr. 2024 | Part-time Teacher,  
- July 2024 | Shumei University, Chiba

Apr. 2024 | Part-time Teacher,  
- July 2024 | Tokyo City University, Tokyo

## EDUCATION

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Mar. 2023 | PHD, PHYSICS  
(expected) | Department of Physics,  
Graduate School of Science, Nagoya University.  
Thesis: Probing primordial scalar perturbations on small scales

Mar. 2020 | M.S., PHYSICS  
Division of Particle and Astrophysical Science,  
Graduate School of Science, Nagoya University.  
Thesis: Primordial black holes and cosmic microwave background  
anisotropy

Mar. 2018 | B.S., PHYSICS  
Department of Physics,  
School of Science, Nagoya University.

## FELLOWSHIP

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Apr. 2020 - Mar. 2023 (expected)	Japan Society for the Promotion of Science, Young scientist (DC1), Nagoya University, Aichi. Science, Cosmology group. Research budget (3,100,000yen) Stipend (2,400,000yen per annum)
Oct. 2018 - Mar. 2023 (expected)	PhD Professional Toryumon Nagoya University, Program for Leading Graduate School. Research budget (700,000yen) Stipend (2,400,000yen per annum)

## RESEARCH INTEREST

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### SMALL-SCALE STRUCTURES

- Dark matter halos
- Ultracompact minihalos

### PRIMORDIAL BLACK HOLES

- Dark matter, gravitational wave
- Abundance of primordial black holes

## PUBLICATIONS

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Accepted

1. [K. T. Abe](#) and H. Tashiro, “CMB lensing from early-formed dark matter halos,” *Phys. Rev. D* **109**, no.10, 103524 (2024) [doi:10.1103/PhysRevD.109.103524](#) [[arXiv:2401.00407](#)] [[astro-ph.CO](#)].
2. [K. T. Abe](#), H. Kawai and M. Oguri, “Analytic approach to astrometric perturbations of critical curves by substructures,” *Phys. Rev. D* **109**, no.8, 083517 (2024) [doi:10.1103/PhysRevD.109.083517](#) [[arXiv:2311.18211](#)] [[astro-ph.CO](#)].
3. [K. T. Abe](#) and Y. Tada, “Translating nano-Hertz gravitational wave background into primordial perturbations taking account of the cosmological QCD phase transition,” *Phys. Rev. D* **108**, no.10, L101304 (2023) [doi:10.1103/PhysRevD.108.L101304](#) [[arXiv:2307.01653](#)] [[astro-ph.CO](#)].
4. [K. T. Abe](#), R. Inui, Y. Tada and S. Yokoyama, “Primordial black holes and gravitational waves induced by exponential-tailed perturbations,” *JCAP* **05**, 044 (2023) [doi:10.1088/1475-7516/2023/05/044](#) [[arXiv:2209.13891](#)] [[astro-ph.CO](#)].
5. [K. T. Abe](#), “Cosmological contribution from population III stars in ultracompact minihalos,” *Phys. Rev. D* **106**, no.8, 083521 (2022) [doi:10.1103/PhysRevD.106.083521](#) [[arXiv: 2208.00375](#)] [[astro-ph.CO](#)].
6. [K. T. Abe](#) and H. Tashiro, “Cosmological free-free emission from dark matter halos in the  $\Lambda$ CDM model,” *Phys. Rev. D* **106**, no.6, 063523 (2022) [doi:10.1103/PhysRevD.106.063523](#) [[arXiv: 2206.11261](#)] [[astro-ph.CO](#)].
7. [K. T. Abe](#), T. Minoda and H. Tashiro, “Constraint on the early-formed dark matter halos using the free-free emission in the Planck foreground analysis,” *Phys. Rev. D* **105**, no.6, 063531 (2022) [doi:10.1103/PhysRevD.105.063531](#) [[arXiv: 2108.00621](#)] [[astro-ph.CO](#)].

8. [K. T. Abe](#), Y. Tada and I. Ueda, “Induced gravitational waves as a cosmological probe of the sound speed during the QCD phase transition,” JCAP **06**, 048 (2021) [doi:10.1088/1475-7516/2021/06/048](#) [[arXiv: 2010.06193](#) [[astro-ph.CO](#)]].
9. [K. T. Abe](#) and H. Tashiro, “Population III star explosions and Planck 2018 data,” Phys. Rev. D **103**, no.12, 123543 (2021) [doi:10.1103/PhysRevD.103.123543](#) [[arXiv:2103.01643](#) [[astro-ph.CO](#)]].
10. K. Furugori, [K. T. Abe](#), T. Tanaka, D. Hashimoto, H. Tashiro and K. Hasegawa, “The 21-cm signals from ultracompact minihaloes as a probe of primordial small-scale fluctuations,” Mon. Not. Roy. Astron. Soc. **494**, no.3, 4334-4342 (2020) [doi:10.1093/mnras/staa1033](#) [[arXiv: 2002.04817](#) [[astro-ph.CO](#)]].
11. [K. T. Abe](#), H. Tashiro and T. Tanaka, “Thermal Sunyaev-Zel’dovich anisotropy due to primordial black holes,” Phys. Rev. D **99**, no.10, 103519 (2019) [doi:10.1103/PhysRevD.99.103519](#) [[arXiv: 1901.06809](#) [[astro-ph.CO](#)]].

#### Submitted

1. T. Broadhurst, S. K. Li, A. Alfred, J. M. Diego, P. Morilla, P. L. Kelly, F. Sun, M. Oguri, H. Williams and R. Windhorst, *et al.* [[arXiv:2405.19422](#) [[astro-ph.CO](#)]].
2. Y. Fudamoto, F. Sun, J. M. Diego, L. Dai, M. Oguri, A. Zitrin, E. Zackrisson, M. Jauzac, D. J. Lagattuta and E. Egami, *et al.* [[arXiv:2404.08045](#) [[astro-ph.GA](#)]].
3. H. Tashiro, [K. T. Abe](#) and T. Minoda, “Free-free background radiation from accreting primordial black holes,” [[arXiv:2108.01916](#) [[astro-ph.CO](#)]].

## PRESENTATIONS

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- 27th Nov. 2023 | **Translating nano-Hertz gravitational wave background into primordial perturbations taking account of the cosmological QCD phase transition**, *JGRG 2023*, Nagoya U. , [K. T. Abe](#), and Y. Tada (oral)
- 6th July 2021 | **Constraint on the dark matter halo formation in the early universe by the free-free emission**, *Sixteenth Marcel Grossmann Meeting*, online, [K. T. Abe](#), T. Minoda and H. Tashiro (oral, refereed)
- 24th Nov. 2020 | **Induced gravitational wave as a cosmological probe of the sound speed during the QCD phase transition**, *Online JGRG 2020*, online, [K. T. Abe](#), Y. Tada, I. Ueda (oral)
- 26th Aug. 2020 | **Induced gravitational wave as a cosmological probe of the sound speed during the QCD phase transition**, *IBS & KMI Joint Workshop 2020*, online, [K. T. Abe](#), Y. Tada, I. Ueda (oral)
- 25th Nov. 2019 | **Small-scale CMB anisotropy due to PBH**, *JGRG29*, Kobe University, [K. T. Abe](#), H. Tashiro (oral refereed)
- 4th Sep. 2019 | **Kinetic Sunyaev-Zel'dovich anisotropy induced from PBH**, *COSMO19*, RWTH Aachen University, [K. T. Abe](#), H. Tashiro (poster)
- 15th May 2019 | **Thermal Sunyaev-Zel'dovich anisotropy due to Primordial black holes**, *Axion Cosmology*, Kyoto University, [K. T. Abe](#), H. Tashiro (oral)
- 11th Dec. 2018 | **Constraint on the abundance of primordial black holes with Sunyaev-Zel'dovich effects**, *XII Tonale Winter School in Cosmology*, Tonale Italy, [K. T. Abe](#), H. Tashiro (poster)

## AWARDS AND HONORS

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- 6th Sep. 2022 | **Outstanding Student Presentation Award**, The Physical Society of Japan, autumn meeting 2022.
- 13th Dec. 2019 | **Best award in master thesis presentation**, Nagoya University, Graduate School of Science, Physics.
- 22th July 2018 | **Oral award**, 48th Summer school for young scientists in gravity and cosmology session.

## TECHNICAL SKILLS

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SOFTWARE AND COMPUTING – C, C++, MATHEMATICA, Python and parallel processing  
LANGUAGES (PROFICIENT IN) – Japanese and English(IELTS overall score 6.0)