# Yuichiro Tada

*Curriculum Vitae*

*466-0833 Nagoya, Japan*
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## Employment & Fellowship

Apr. 2021– Present **Designated Assistant Professor**, *Nagoya University*, Nagoya, Japan.
Institute for Advanced Research & Department of Physics, Cosmology group

Apr. 2019– Mar. 2021 **Part-time Lecturer**, *Daido University*, Nagoya, Japan.
Classical mechanics 1, 2

Apr. 2018– Mar. 2021 **JSPS Fellow PD**, *Nagoya University*, Nagoya, Japan.
Department of Physics, Cosmology group

Apr. 2017– Mar. 2018 **Post-Doctoral Researcher**, *Institut d'Astrophysique de Paris*, Paris, France.
Dr. Sébastien Renaux-Petel's Group

Apr. 2015– Mar. 2017 **JSPS Fellow DC2**, *The University of Tokyo*, Chiba, Japan.
Kavli IPMU & ICRR

Oct. 2012– Mar. 2017 **ALPS Fellow**, *The University of Tokyo*, Chiba, Japan.
Kavli IPMU & ICRR

## Education

23rd Mar. 2017 **Ph.D. in physics**, *The University of Tokyo*, Chiba, Japan.
Department of Physics. Advisor: Masahiro Kawasaki, Hitoshi Murayama

24th Mar. 2014 **Master of Science in physics**, *The University of Tokyo*, Tokyo, Japan.
Department of Physics. Advisor: Masahiro Kawasaki, Hitoshi Murayama

23rd Mar. 2012 **Bachelor of Science in physics**, *The University of Tokyo*, Tokyo, Japan.
Department of Physics

## Research Interest

### Inflation

- stochastic effect, $\delta N$ formalism, non-Gaussianity
- supergravity, grand unified theory, modified gravity
- curved target space

### Primordial Black Hole

- gravitational waves, bias/cluster effect
- precise abundance prediction

### Modified Gravity

- Palatini geometry

### Helical Particle Production

- inflationary magnetogenesis, helical gravitational waves, lepto/baryogenesis

## Publications

24. **Primordial black holes in peak theory with a non-Gaussian tail**, N. Kitajima, Y. Tada, S. Yokoyama and C. M. Yoo, arXiv:2109.00791 [astro-ph.CO].
23. **Minimal *k*-inflation in light of the conformal metric-affine geometry**, Y. Mikura, Y. Tada and S. Yokoyama, Phys. Rev. D **103**, no.10, L101303 (2021) [arXiv:2103.13045 [hep-th]].
22. **Revisiting non-Gaussianity in non-attractor inflation models in the light of the cosmological soft theorem**, T. Suyama, Y. Tada and M. Yamaguchi, PTEP **2021**, no.7, 073E02 (2021) [arXiv:2101.10682 [hep-th]].
21. **Induced gravitational waves as a cosmological probe of the sound speed during the QCD phase transition**, K. T. Abe, Y. Tada and I. Ueda, JCAP **06**, 048 (2021) [arXiv:2010.06193 [astro-ph.CO]].
20. **Local observer effect on the cosmological soft theorem**, T. Suyama, Y. Tada and M. Yamaguchi, PTEP **2020**, no.11, 113E01 (2020) [arXiv:2008.13364 [astro-ph.CO]].
19. **A manifestly covariant theory of multifield stochastic inflation in phase space: solving the discretisation ambiguity in stochastic inflation**, L. Pinol, S. Renaux-Petel and Y. Tada, JCAP **04**, 048 (2021) [arXiv:2008.07497 [astro-ph.CO]].
18. **Conformal inflation in the metric-affine geometry**, Y. Mikura, Y. Tada and S. Yokoyama, EPL **132**, no.3, 39001 (2020) [arXiv:2008.00628 [hep-th]].
    **2020 Highlights of EPL**
17. **Escape from the swampland with a spectator field**, K. Kogai and Y. Tada, Phys. Rev. D **101**, no.10, 103514 (2020) [arXiv:2003.06753 [astro-ph.CO]].
16. **Stochastic inflation with an extremely large number of *e*-folds**, N. Kitajima, Y. Tada and F. Takahashi, Phys. Lett. B **800**, 135097 (2020) [arXiv:1908.08694 [hep-ph]].
15. **Primordial black hole tower: Dark matter, earth-mass, and LIGO black holes**, Y. Tada and S. Yokoyama, Phys. Rev. D **100**, no. 2, 023537 (2019) [arXiv:1904.10298 [astro-ph.CO]].

14. **Inflationary stochastic anomalies**, L. Pinol, S. Renaux-Petel and Y. Tada, Class. Quant. Grav. **36**, no. 7, 07LT01 (2019) [arXiv:1806.10126 [gr-qc]].
**2019–20 Highlights of Classical and Quantum Gravity**

13. $\mathcal{O}(10)M_\odot$ **primordial black holes and string axion dark matter**, K. Inomata, M. Kawasaki, K. Mukaida, Y. Tada and T. T. Yanagida, Phys. Rev. D **96**, no. 12, 123527 (2017) [arXiv:1709.07865 [astro-ph.CO]].

12. **Does the detection of primordial gravitational waves exclude low energy inflation?**, T. Fujita, R. Namba and Y. Tada, Phys. Lett. B **778**, 17 (2018) [arXiv:1705.01533 [astro-ph.CO]].

11. **Inflationary Primordial Black Holes as All Dark Matter**, K. Inomata, M. Kawasaki, K. Mukaida, Y. Tada and T. T. Yanagida, Phys. Rev. D **96**, no. 4, 043504 (2017) [arXiv:1701.02544 [astro-ph.CO]].

10. **Inflationary primordial black holes for the LIGO gravitational wave events and pulsar timing array experiments**, K. Inomata, M. Kawasaki, K. Mukaida, Y. Tada and T. T. Yanagida, Phys. Rev. D **95**, no. 12, 123510 (2017) [arXiv:1611.06130 [astro-ph.CO]].

9. **Squeezed Bispectrum in the $\delta N$ Formalism: Local Observer Effect in Field Space**, Y. Tada and V. Vennin, JCAP **1702**, no. 02, 021 (2017) [arXiv:1609.08876 [astro-ph.CO]].

8. **Primordial black holes as dark matter in supergravity inflation models**, M. Kawasaki, A. Kusenko, Y. Tada and T. T. Yanagida, Phys. Rev. D **94**, no. 8, 083523 (2016) [arXiv:1606.07631 [astro-ph.CO]].

7. **Revisiting constraints on small scale perturbations from big-bang nucleosynthesis**, K. Inomata, M. Kawasaki and Y. Tada, Phys. Rev. D **94**, no. 4, 043527 (2016) [arXiv:1605.04646 [astro-ph.CO]].

6. **Can massive primordial black holes be produced in mild waterfall hybrid inflation?**, M. Kawasaki and Y. Tada, JCAP **1608**, no. 08, 041 (2016) [arXiv:1512.03515 [astro-ph.CO]].

5. **Consistent generation of magnetic fields in axion inflation models**, T. Fujita, R. Namba, Y. Tada, N. Takeda and H. Tashiro, JCAP **1505**, no. 05, 054 (2015) [arXiv:1503.05802 [astro-ph.CO]].

4. **Primordial black holes as biased tracers**, Y. Tada and S. Yokoyama, Phys. Rev. D **91**, no. 12, 123534 (2015) [arXiv:1502.01124 [astro-ph.CO]].

3. **Anisotropic CMB distortions from non-Gaussian isocurvature perturbations**, A. Ota, T. Sekiguchi, Y. Tada and S. Yokoyama, JCAP **1503**, no. 03, 013 (2015) [arXiv:1412.4517 [astro-ph.CO]].

2. **Non-perturbative approach for curvature perturbations in stochastic $\delta N$ formalism**, T. Fujita, M. Kawasaki and Y. Tada, JCAP **1410**, no. 10, 030 (2014) [arXiv:1405.2187 [astro-ph.CO]].

1. **A new algorithm for calculating the curvature perturbations in stochastic inflation**, T. Fujita, M. Kawasaki, Y. Tada and T. Takesako, JCAP **1312**, 036 (2013) [arXiv:1308.4754 [astro-ph.CO]].

Ph.D. thesis **Curvature Perturbations and Primordial Black Hole Formation in the Inflationary Universe**.
Department of Physics, The University of Tokyo, Bunkyo-ku, Tokyo 113-0033, Japan
Kavli Institute for the Physics and Mathematics of the Universe (WPI), UTIAS, The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8583, Japan
Institute for Cosmic Ray Research, The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8582, Japan

Master thesis **The stochastic approach to the inflationary universe (in Japanese)**.
Department of Physics, The University of Tokyo, Bunkyo-ku, Tokyo 113-0033, Japan
Kavli Institute for the Physics and Mathematics of the Universe (WPI), UTIAS, The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8583, Japan

## Conferences

2–6th Aug. 2021 **Probability density functions of coarse-grained curvature and density perturbations in stochastic inflation**, *COSMO'21*, The University of Illinois (Online), Y. Tada and V. Vennin.
poster, refereed

21st Jul. 2021 **Primordial black holes in peak theory with a non-Gaussian tail**, *2021 NRF-JSPS Workshop in particle physics, cosmology, and gravitation*, Online, N. Kitajima, Y. Tada, S. Yokoyama, and C-M. Yoo.
oral, invited

25th Nov. 2020 **Manifestly covariant theory of stochastic inflation**, *Online JGRG Workshop 2020*, Online, L. Pinol, S. Renaux-Petel, Y. Tada.
**Outstanding Presentation Award Gold Prize**. poster, refereed

10th Nov. 2020 **StocDeltaN: numerical approach to inflation in combination of the stochastic and delta N formalism**, *PBH & Stochastic inflation workshop*, Online, S. Renaux-Petel, Y. Tada, and V. Vennin.
oral, invited

20th Aug. 2020 **Manifestly covariant theory of stochastic inflation**, *The 14th International Conference on Gravitation, Astrophysics and Cosmology (ICGAC14)*, National Central University, Taiwan (Online), L. Pinol, S. Renaux-Petel, Y. Tada, V. Vennin.
oral, refereed

6th Dec. 2019 **Primordial black hole tower: Dark matter, earth-mass, and LIGO black holes**, *Focus Week on Primordial Black Holes*, Kavli IPMU, Y. Tada and S. Yokoyama.
oral, refereed

27th Nov. 2019 **Stochastic inflation with an extremely large number of e-folds**, *The 29th Workshop on General Relativity and Gravitation in Japan (JGRG29)*, Kobe University, N. Kitajima, Y. Tada, and F. Takahashi.
oral, refereed

19th Nov. 2019 **Stochastic approach to non-Gaussianity**, *Theoretical aspects of non-Gaussianity from modern perspectives*, YITP, Y. Tada and V. Vennin.
oral, refereed

16th Oct. 2019 **Primordial black hole tower: Dark matter, earth-mass, and LIGO black holes**, *Gravitational Wave Physics and Astronomy Workshop (GWPAW 2019)*, The University of Tokyo, Y. Tada and S. Yokoyama.
oral, refereed

4th Sep. 2019 **Primordial black hole tower: Dark matter, earth-mass, and LIGO black holes**, *COSMO19*, Aachen University, Y. Tada and S. Yokoyama.
poster, refereed

16th Aug. 2019 **Primordial black hole tower: Dark matter, earth-mass, and LIGO black holes**, *15th Rencontres du Vietnam "COSMOLOGY"*, ICISE, Y. Tada and S. Yokoyama.
oral, invited

13th Jun. 2019 **Stochastic formalism and curvature perturbation**, *3-day workshop: INFLATION AND GEOMETRY*, IAP, T. Fujita, L. Pinol, S. Renaux-Petel, Y. Tada, J. Tokuda, and V. Vennin.
oral, invited

15th May 2019 **PBH tower in multi-phase inflation**, *2-day mini-workshop: Axion Cosmology*, YITP, Y. Tada and S. Yokoyama.
oral, refereed

3rd Apr. 2019 **PBH tower in multi-phase inflation**, *Future Perspective in Cosmology and Gravity*, Nagoya University, Y. Tada and S. Yokoyama.
oral, refereed

7th Mar. 2019 **PBH tower in multi-phase inflation**, *Accelerating Universe in the Dark*, Kyoto University, Y. Tada and S. Yokoyama.
oral, refereed

19th Feb. 2019 **Aspects of primordial black hole as dark matter**, *FAPESP-JSPS Workshop on dark energy, dark matter, and galaxies*, University of Sao Paulo, K. Inomata, M. Kawasaki, A. Kusenko, K. Mukaida, Y. Tada, T. T. Yanagida, and S. Yokoyama.
**Young Representative Speaker**. oral, refereed

8th Nov. 2018 **Stochastic formalism and curvature perturbations**, *The 28th Workshop on General Relativity and Gravitation in Japan (JGRG28)*, Rikkyo University, T. Fujita, L. Pinol, S. Renaux-Petel, Y. Tada, and J. Tokuda.
oral, refereed

10th Aug. 2018 **Stochastic inflation in a general field space**, *International Conference on Modified Gravity 2018 (MOGRA 2018)*, Nagoya University, T. Fujita, L. Pinol, S. Renaux-Petel, Y. Tada, and J. Tokuda.
oral, refereed

5th Jul. 2018 **Stochastic inflation in a general field space**, *Fifteenth Marcel Grosmann Meeting*, University of Rome "La Sapienza", T. Fujita, L. Pinol, S. Renaux-Petel, Y. Tada, and J. Tokuda.
oral, refereed

20th–21st Jan. 2018 **Subtleties in stochastic formalism — Ito vs. Stratonovich**, *Infrared physics of gauge theories and quantum dynamics of inflation*, Shiga, L. Pinol, S. Renaux-Petel, and Y. Tada.
oral, refereed

28th Aug.–1st Sep. 2017 **Stochastic Formalism in Curved Field Space**, *The 21st annual International Conference on Particle Physics and Cosmology (COSMO-17)*, The Universite Paris Diderot site, Amphitheatre Buffon, L. Pinol, S. Renaux-Petel, and Y. Tada.
oral, refereed

27th May–2nd Jun. 2017 **Primordial Black Hole, Dark Matter, and Gravitational Wave**, *Gordon Research Conference & Seminars "String Theory & Cosmology"*, Renaissance Tuscany Il Ciocco, Lucca (Barga), Italy, K. Inomata, M. Kawasaki, A. Kusenko, K. Mukaida, Y. Tada, and T. T. Yanagida.
poster, refereed

24th–28th Oct. 2016 **Squeezed Bispectrum in the delta N Formalism without Gauge Artifact**, *The 26th Workshop on General Relativity and Gravitation in Japan (JGRG26)*, Osaka City University, Y. Tada and V. Vennin.
oral, refereed

24th–28th Aug. 2016 **PBH Dark Matter in Supergravity Inflation Models**, *RESCEU Summer School*, Gifu, M. Kawasaki, A. Kusenko, Y. Tada, and T. T. Yanagida.
oral, not refereed

14th–18th Dec. 2015 **Can massive primordial black holes be produced in mild waterfall hybrid inflation?**, *Second LeCosPA International Symposium "Everything About Gravity"*, National Taiwan University, M. Kawasaki and Y. Tada.
oral, refereed

7th–11th Sep. 2015 **PRIMORDIAL BLACK HOLES AS BIASED TRACERS**, *International Conference on Particle Physics and Cosmology (COSMO-15)*, The University of Warsaw, Y. Tada and S. Yokoyama.
oral, refereed

25th–29th Aug. 2014 **Non-perturbative approach for curvature perturbations in stochastic-delta N formalism**, *International Conference on Particle Physics and Cosmology (COSMO 2014)*, The Kavli Institute for Cosmological Physics (KICP), The University of Chicago, T. Fujita, M. Kawasaki, and Y. Tada.
poster, refereed

30th Sep.–3rd Oct. 2013 **A new algorithm for calculating the curvature perturbations in stochastic inflation**, *KEK Theory Meeting on Particle Physics Phenomenology (KEK-PH2013 FALL)*, KEK, T. Fujita, M. Kawasaki, Y. Tada, and T. Takesako.
oral, refereed

## Seminars

25th May 2021 **Self-introduction, or a biased view of what theoretical cosmologists are recently interested in**, *Nagoya University (Online)*, Aichi, Y. Tada.
invited

11th Nov. 2020 **Manifestly covariant theory of stochastic inflation**, *The University of Padua (Online)*, Padua, L. Pinol, S. Renaux-Petel, Y. Tada, and V. Vennin.

22nd Oct. 2020 **A manifestly covariant theory of multifield stochastic inflation in phase space**, *JGRG Webinar Series*, Online, L. Pinol, S. Renaux-Petel, and Y. Tada.
invited

20th Oct. 2020 **Manifestly covariant theory of stochastic inflation**, *KEK (Online)*, Ibaraki, L. Pinol, S. Renaux-Petel, Y. Tada, and V. Vennin.

7th Oct. 2020 **Manifestly covariant theory of stochastic inflation**, *IBS (Online)*, Daejeon, L. Pinol, S. Renaux-Petel, Y. Tada, and V. Vennin.
invited

7th Jun. 2019 **Aspects of primordial black holes and implication to multi-phase inflation**, *IRAP*, Toulouse, K. Inomata, M. Kawasaki, A. Kusenko, K. Mukaida, Y. Tada, T. T. Yanagida, and S. Yokoyama.

23rd May 2019 **Aspects of primordial black holes and implication to multi-phase inflation**, *Tohoku University*, Miyagi, K. Inomata, M. Kawasaki, A. Kusenko, K. Mukaida, Y. Tada, T. T. Yanagida, and S. Yokoyama.
invited

26th Jun. 2018 **Stochastic inflation in a general field space**, *Laboratoire Astroparticule et Cosmologie*, Paris, T. Fujita, L. Pinol, S. Renaux-Petel, Y. Tada, and J. Tokuda.

20th Sep. 2017 **Stochastic Formalism in Curved Field Space**, *Nagoya University*, Aichi, L. Pinol, S. Renaux-Petel, and Y. Tada.

19th Sep. 2017 **Stochastic Formalism in Curved Field Space**, *Kobe University*, Hyogo, L. Pinol, S. Renaux-Petel, and Y. Tada.

4th Sep. 2017 **Stochastic Formalism in Curved Field Space**, *RESCEU*, Tokyo, L. Pinol, S. Renaux-Petel, and Y. Tada.

20th Apr. 2017 **Primordial Black Hole, Dark Matter, and LIGO's Gravitational Wave Event**, *Institut Astrophysique de Paris*, Paris, K. Inomata, M. Kawasaki, A. Kusenko, K. Mukaida, Y. Tada, and T. T. Yanagida.

16th Dec. 2016 **Primordial Black Hole, Dark Matter, and LIGO's Gravitational Wave Event**, *Waseda University*, Tokyo, K. Inomata, M. Kawasaki, A. Kusenko, K. Mukaida, Y. Tada, and T. T. Yanagida.
invited

22nd Jun. 2016 **Stochastic-delta N formalism and massive primordial black hole formation in hybrid inflation**, *Institute of Cosmology and Gravitation*, Portsmouth, M. Kawasaki and Y. Tada.

18th Apr. 2016 **Stochastic-delta N formalism and massive primordial black holes in hybrid inflation**, *The University of Toyko*, Tokyo, M. Kawasaki and Y. Tada.
invited

29th Mar. 2016 **Stochastic-delta N formalism and massive primordial black holes in hybrid inflation**, *Kyoto University*, Kyoto, M. Kawasaki and Y. Tada.

29th Feb. 2016 **Can massive primordial black holes be produced in mild waterfall hybrid inflation?**, *RESCEU*, Tokyo, M. Kawasaki and Y. Tada.
invited

27th Jun. 2016 **Stochastic-delta N formalism and massive primordial black holes in hybrid inflation**, *KEK*, Ibaraki, M. Kawasaki and Y. Tada.

14th–18th Sep. 2015 **Stochastic-deltaN formalism and primordial black holes in hybrid inflation**, *The University of Padua*, Padua, M. Kawasaki and Y. Tada.

21th Sep. 2015 **Stochastic-deltaN formalism and primordial black holes in hybrid inflation**, *Institut Astrophysique de Paris*, Paris, M. Kawasaki and Y. Tada.

16th Feb. 2015 **Primordial black holes as biased tracers**, *Joint seminar of gravity and cosmology @ IPMU*, Chiba, Y. Tada and S. Yokoyama.

19th Aug. 2014 **Stochastic-$\delta N$ formalism**, *Helsinki University*, Helsinki, T. Fujita, M. Kawasaki, Y. Tada, and T. Takesako.

## Activities

1st Oct.– 22 Dec. 2014 **Study abroad**, *Helsinki University*, Prof. Enqvist group.
coursework of ALPS fellowship

**Peer review**.
European Physical Journal C (EPJC), Journal of Cosmology and Astroparticle Physics (JCAP), Modern Physics Letters A (MPLA), Physical Review D (PRD), Progress of Theoretical and Experimental Physics (PTEP), Universe

**Science member**, *International Research Network Extragalactic astrophysics and Cosmology (NECO)*.

## Awards and Honors

2021 **2019–20 Highlights of Classical and Quantum Gravity**, *Inflationary stochastic anomalies*, L. Pinol, S. Renaux-Petel and Y. Tada, Class. Quant. Grav. **36**, no. 7, 07LT01 (2019) [arXiv:1806.10126 [gr-qc]].

2021 **2020 Highlights of EPL**, *Conformal inflation in the metric-affine geometry*, Y. Mikura, Y. Tada and S. Yokoyama.
EPL **132**, no.3, 39001 (2020) [arXiv:2008.00628 [hep-th]]

27th Nov. 2020 **Outstanding Presentation Award Gold Prize**, *Online JGRG Workshop 2020*, Manifestly covariant theory of stochastic inflation, L. Pinol, S. Renaux-Petel, Y. Tada.

Feb. 2019 **Young representative speaker**, *FAPESP-JSPS Workshop on dark energy, dark matter, and galaxies*, Aspects of primordial black hole as dark matter, K. Inomata, M. Kawasaki, A. Kusenko, K. Mukaida, Y. Tada, T. T. Yanagida, and S. Yokoyama.

24th Mar. 2017 **Director's Award**, *ICRR Master and Doctor Thesis Workshop*, Institute for Cosmic Ray Research, The University of Tokyo.

## Funding

1st Apr. 2021–31st Mar. 2024 **JSPS Grant-in-Aid for Early-Career Scientists**, *Inflationary universe in light of stochastic calculus, primordial black holes, and gravitational waves*.
No. 21K13918, Principal Investigator, ¥4,680,000

1st Apr. 2019–31st Mar. 2021 **JSPS Grant-in-Aid for Early-Career Scientists**, *Aspects of gravity and quantum theory in the stochastic formalism*.
No. 19K14707, Principal Investigator, ¥1,560,000

25th Apr. 2018–31st Mar. 2021 **Grant-in-Aid for JSPS Fellows**, *Curvature Perturbations and Primordial Black Hole Formation in the Inflationary Universe*.
No. 18J01992, JSPS Fellow (PD), ¥3,640,000