Fumio Uchida

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Employment

Apr. 2024 –: JSPS PD (one year term),
Theory Center, Institute of Particle and Nuclear Studies (IPNS), KEK, Tsukuba, Japan

Education

Apr. 2021 – Mar. 2024: Ph.D., Physics, Graduate School of Science, University of Tokyo, Tokyo, Japan
Dissertation: "Probing the Early Universe with the Evolution of Primordial Magnetic Fields"
Advisor: Jun'ichi Yokoyama

Jan. 2023 – Mar. 2023: visiting Cosmology Initiative, Arizona State University, Arizona, US

Apr. 2019 – Mar. 2021: M.S., Physics, Graduate School of Science, University of Tokyo, Tokyo, Japan
Thesis: "Generation of baryon isocurvature perturbations from primordial magnetic fields and its cosmological consequence"
Advisor: Jun'ichi Yokoyama

Apr. 2015 – Mar. 2019: B.S., Physics, School of Science, University of Tokyo

Fellowship

Apr. 2023 – Mar. 2024: JSPS DC2 Fellowship Grant

Oct. 2019 – Mar. 2024: FoPM, WINGS Program, University of Tokyo

Publication list

7. Fumio Uchida*, Kohei Kamada, and Hiroyuki Tashiro, Revisiting constraints on primordial magnetic fields from spectral distortions of cosmic microwave background, arXiv:2411.03183.
6. Fumio Uchida*, Motoko Fujiwara, Kohei Kamada, and Jun'ichi Yokoyama. New comprehensive description of the scaling evolution of the cosmological magneto-hydrodynamic system, arXiv:2405.06194.
5. Kazuki Yanagihara, Fumio Uchida, Tomohiro Fujita, and Shinji Tsujikawa. Low-Scale Inflation-

ary Magnetogenesis without Baryon Isocurvature Problem, Phys. Rev. D 110 (2024) 8, 083506, doi:10.1103/PhysRevD.110.083506, arXiv:2312.07938.

4. Koichi Miyamoto, Soichiro Yamazaki, Fumio Uchida, Kotaro Fujisawa, and Naoki Yoshida. Quantum algorithm for the Vlasov simulation of the large-scale structure formation with massive neutrinos, Phys. Rev. Research 6 (2024) 013200, doi:10.1103/PhysRevResearch.6.013200, arXiv:2310.01832.
3. Soichiro Yamazaki, Fumio Uchida, Kotaro Fujisawa, and Naoki Yoshida. Quantum algorithm for collisionless Boltzmann simulation of self-gravitating systems, arXiv:2303.16390.
2. Fumio Uchida*, Motoko Fujiwara, Kohei Kamada, and Jun'ichi Yokoyama. New description of the scaling evolution of the cosmological magneto-hydrodynamic system, PLB 843 (2023) 138002, doi:10.1016/j.physletb.2023.138002, arXiv:2212.14355.
1. Kohei Kamada, Fumio Uchida*, and Jun'ichi Yokoyama. Baryon isocurvature constraints on the primordial hypermagnetic fields, JCAP 04 (2021) 034, doi:10.1088/1475-7516/2021/04/034, arXiv:2012.144351.

* indicates that FU is the corresponding author

Presentations

International conferences

- Contributed talk, "Hosking integral and its implications for primordial magnetic fields", COSMO24, Kyoto University, Kyoto, Japan, Oct. 2024.
- Contributed talk, "Monopole-wrapping axion domain wall", COSMO23, IFT, Madrid, Spain, Sep. 2023.
- Contributed talk, "The magneto-hydrodynamic evolution of the cosmological magnetic fields", The 31st Workshop on General Relativity and Gravitation in Japan (JGRG31), the University of Tokyo, Tokyo, Japan, Oct. 2022.
- Contributed talk, "Baryon isocurvature constraints about the origin of the cosmological magnetic field", The 26th International Summer Institute on Phenomenology of Elementary Particle Physics and Cosmology (SI2022), Fuji-Yoshida, Yamanashi, Japan, Sep. 2022.
- Contributed talk (Online), "The scaling evolution of the cosmological magneto-hydrodynamic system", The 15th Asia Pacific Physics Conference (APPC15), Aug. 2022.
- Contributed talk (Online), "Baryon isocurvature constraints on the primordial magnetic fields", COSMO21, Aug. 2021.
- Contributed talk (Online), "Constraints on primordial magnetic fields from baryon isocurvature perturbations", PASCOS 2021, the 26th International Symposium on Particle Physics, String Theory, and Cosmology, Jun. 2021.
- Contributed talk (Online), "Constraints on baryogenesis from primordial magnetic fields", The Online Workshop on General Relativity and Gravitation in Japan (Online JGRG), Nov. 2020.
- Contributed talk (Online), "Constraint on the intergalactic magnetic field from baryon isocurvature

perturbations at the Big-Bang Nucleosynthesis", AAPPS-DACG Workshop on Astrophysics, Cosmology and Gravitation, Nov. 2020.

Domestic conferences [lang: Japanese]

- Poster, 「Hosking 積分と磁気乱流」, 基研研究会 熱場の量子論とその応用, Yukawa Institute for Theoretical Physics, Kyoto, Japan, Sep. 2024.
- Contributed talk, "Hosking integral and its implications for constraining primordial magnetic fields", 基研研究会 素粒子物理学の進展 2024, Yukawa Institute for Theoretical Physics, Kyoto, Japan, Aug. 2024.
- Contributed talk, 「初期磁場発展の記述の精密化」, 第３５回 理論懇シンポジウム「理論天文学・宇宙物理学の広がり：さらなる発展に向けて」, Fukushima, Fukushima, Japan, Dec. 2023.
- Contributed talk, 「宇宙磁場の磁気流体力学的発展の包括的記述」, 日本物理学会 2022 年秋季大会, Okayama University of Science, Okayama, Japan, Sep. 2022.
- Contributed talk (Online), 「初期磁場のバリオン揺らぎ生成の効果による制限」, 日本物理学会 2021 年年次大会, Mar. 2021.
- Contributed talk (Online), 「磁場によるバリオン数生成シナリオに対する、バリオン揺らぎからの制限」, 日本物理学会 2020 年秋季大会, Sep. 2020.
- Poster (Online), 「バリオン非対称の起源としての宇宙磁場にバリオン揺らぎが与える制限」, 基研研究会 素粒子物理学の進展 2020, Aug. 2020– Sep. 2020.

Seminars and workshops

- Seminar, "Implications from spatial fluctuations of primordial magnetic helicity", seminar, DESY Theory Group, Hamburg, Germany, Oct. 2024.
- Colloquium, "Hosking integral and its implications for primordial magnetic fields", Theoretical Physics Colloquium (astrophysics), Rikkyo University, Tokyo, Japan, Jun. 2024.
- Contributed talk, "The baryon isocurvature problem of primordial magnetic fields", Berkeley Week, the University of Tokyo, Tokyo, Japan, Mar. 2024.
- Seminar, "Probing the early universe with cosmological magnetic fields", Cosmology group of Waseda University, Tokyo, Japan, Nov. 2023.
- Seminar, "BBN constraint on the origin of the cosmological magnetic field", Astrophysics group of NORDITA, Sep. 2023.
- Contributed talk, "Monopole wrapped by domain wall?", RESCEU Summer School 2023, Shinshu University, Nagano, Japan, Aug. 2023.
- Contributed talk, "Do primordial magnetic fields survive until today?", Second Mini-workshop on the Early Universe, Suwa lake, Nagano, Japan, Jul. 2023.
- Seminar, "Quantum algorithm for collisionless Boltzmann simulation", High Energy Physics Theory Group of the University of Tokyo, Tokyo, Japan, May. 2023.

- Contributed talk (Online), "On the evolution of the primordial magnetic field", Workshop on "Fundamental Cosmology: from Beginning to End", Mar. 2023.
- Seminar, "On the evolution of the primordial magnetic field", Cosmology group of Carnegie Mellon University, Pennsylvania, US, Mar. 2023.
- Seminar (Online), "Analytic description of the evolution of the primordial magnetic field", High energy theory group of Keio University, Feb. 2023.
- Seminar, "Toward the description of the evolution of the primordial magnetic field", Cosmology group of Arizona State University, Arizona, US, Feb. 2023.
- Seminar, "BBN constraint on the origin of the cosmological magnetic field", Cosmology group of Tokyo Institute of Technology, Tokyo, Japan, Nov. 2022.
- Seminar [lang: Japanese], 「初期磁場に対するビッグバン元素合成からの制限」, High Energy Physics Theory Group of Saitama University, Saitama, Japan, Nov. 2022.
- Contributed talk (Online), "Magneto-hydrodynamic evolution of the cosmological magnetic fields", RESCEU Summer School 2022, Aug. 2021.
- Contributed talk (Online), "Dynamics of the magnetized plasma in the early universe", RESCEU Summer School 2021, Aug. 2021.
- Contributed talk (Online), "A baryogenesis scenario from helical magnetic fields and constraints on it", RESCEU Summer School 2020, Aug. 2020.