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# Curriculum Vitae

Motoko Fujiwara

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## Personal Data

First name : Motoko (素子)  
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Nationality : Japan  
Citizenship : Japan  
Sex : Female  
Birth : Ibaraki, Japan, October 4, 1994  
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## Education

Mar. 2022 : Ph.D. in Theoretical Physics (Advisor: Prof. Junji Hisano)  
: Dissertation “Electroweakly Interacting Spin-1 Dark Matter and Its Phenomenology”  
: E-lab, Nagoya University, Japan

Mar. 2019 : Master of Science in Theoretical Physics (Advisor: Prof. Junji Hisano)  
: Master Thesis “Direct detection of a pseudoscalar mediator dark matter model”  
: E-lab, Nagoya University, Japan

Mar. 2017 : Bachelor of Science in Theoretical Physics (Advisor: Prof. Tetsutaro Higaki)  
: Bachelor’s Degree Thesis “Magnetic Monopole in SU(5) Grand Unified Theory”  
: Keio University, Japan

## Research Interests

Theoretical Particle Physics:

Physics beyond the Standard Model, **Dark Matter**, Compact Star, Electroweak Theory,  
Effective Field Theory, Neutrino Physics,  $CP$  Violation, Electric Dipole Moment,  
Phase Transition

## Academic Career

- Dec. 2024 - : Assistant professor at University of Toyama
- Oct. 2022 - : Postdoctoral researcher at Technical University of Munich
- Apr.-Sep. 2022 : Postdoctoral researcher at University of Tokyo

## Fellowships

- Apr. 2020 – Mar. 2022 : Research Fellow of Japan Society for the Promotion of Science (JSPS)  
: Nagoya University, Japan
- Oct. 2019 – Mar. 2020 : Research Assistant  
: Nagoya University, Japan

## Teaching experience

- May. 2023 : Lecturer for in “Multi-messenger Astronomy 2” (Master course)  
: Department of Physics, Technical University of Munich  
: “Introduction to Dark Matter”  
: Giving 90 min. introductory course of dark matter (theories & experiments)  
: Making exercises for tutorial & problem for examination
- Apr. 2019 – Jul. 2019 : Teaching Assistant for undergraduate students  
: Department of Physics, Nagoya University, Japan  
: “Study support”

## Outreach

- Apr. 2020 – : [KMI Science Communication Team](#) [Japanese site only]

I formed a group of students who are interested in science communication and outreach activities. We are releasing online articles to introduce mysteries in our universe such as dark matter and the matter-antimatter asymmetry. Our outreach activities were commended as **Nagoya University President’s Award (2022)**, and we got JPY 100,000 as a supplemental prize.

## Grants

- May. 2024 : [Early career support for women at NAT](#)  
1 yr position to prepare to be principal investigator  
Talent Management and Diversity Council of TUM, Germany  
TV-L 13 salary (Oct. 2024-Sep. 2025) was awarded
- Sep. 2022 : Travel Support for Giving Invited Talk and Staying in Germany  
1 month stay in Technical U. of Munich, MPI für Kernphysik  
JSPS Core-to-Core Program (DMnet), Japan  
(850,000 JPY)
- Jun. 2022 : Travel Support for Staying in Germany  
1 month stay in Technical U. of Munich, Heidelberg U., MPI für Kernphysik  
JSPS Core-to-Core Program (DMnet), Japan  
(1,110,000 JPY)
- Mar. 2022 : University President's Award [KMI Science Communication Team],  
Nagoya University, Japan  
(100,000 JPY, for Outreach Activities)
- Apr. 2020 – Mar. 2022 : Research Fellowships for Young Scientists (DC2), JSPS, Japan  
(2,100,000 JPY)
- Dec. 2019 : Travel Support for a young researcher, Particle Physics group, Japan  
(47,672 JPY)

## Honors and Award

- Oct 2024 : [JPS Young Scientist Awards 2025](#)  
“Theoretical study on dark matter search using neutron star temperature observation”
- May 2023 : [Springer Thesis](#)  
“Electroweak-Interacting Spin-1 Dark Matter and Its Phenomenology”
- Mar. 2022 : Nagoya University President’s Award [KMI Science Communication Team]  
(Honoring for [Outreach Activities](#))
- Sep. 2021 : Best Talk Award in “Flavor Physics workshop 2021 (FPWS2021)”
- Jul. 2021 : Best Self Presentation Award in “1st KMI Flash”
- Mar. 2021 : Best Poster Award in “Higgs as a Probe of New Physics 2021 (HPNP2021)”  
Selected from 35 candidates by the poster jury (Chair: Prof. Howard E. Haber)
- Sep. 2019 : Student Presentation Award of the Physical Society of Japan
- Mar. 2019 : Dean’s Award from Faculty of Science, Nagoya University
- Jan. 2019 : Research Promotion Award from Department of Physics, Nagoya University

# Publication List

## Publications with peer review process

- [1] **M. Fujiwara**, G. Herrera and S. Horiuchi, “Neutrino Diffusion within Dark Matter Spikes,” [arXiv:[2412.00805](#) [hep-ph]].
- [2] F. Uchida, **M. Fujiwara**, K. Kamada and J. Yokoyama, “New comprehensive description of the scaling evolution of the cosmological magneto-hydrodynamic system,” [arXiv:[2405.06194](#) [astro-ph.CO]].
- [3] **M. Fujiwara**, Gonzalo Herera, “Tidal Disruption Events and Dark Matter Scatterings with Neutrinos and Photons,” *Phys. Lett. B* **851**, 138573 (2024) [arXiv:[2312.11670](#) [hep-ph]].
- [4] **M. Fujiwara**, K. Hamaguchi, N. Nagata, M. E. Ramirez-Quezada, “Vortex Creep Heating vs. Dark Matter Heating in Neutron Stars,” *Phys. Lett. B* **848**, 138341 (2024) [arXiv:[2309.02633](#) [hep-ph]].
- [5] **M. Fujiwara**, K. Hamaguchi, N. Nagata, M. E. Ramirez-Quezada, “Vortex Creep Heating in Neutron Stars,” *JCAP* **03**, 051 (2024) [arXiv:[2308.16066](#) [astro-ph.HE]].
- [6] **M. Fujiwara**, “Electroweak-Interacting Spin-1 Dark Matter and Its Phenomenology,” doi:[10.1007/978-981-99-1035-9](#) [Springer thesis].
- [7] F. Uchida, **M. Fujiwara**, K. Kamada and J. Yokoyama, “New description of the scaling evolution of the cosmological magneto-hydrodynamic system,” *Phys. Lett. B* **843**, 138002 (2023) [arXiv:[2212.14355](#) [astro-ph.CO]].
- [8] **M. Fujiwara**, K. Hamaguchi, N. Nagata, J. Zheng, “Capture of Electroweak Multiplet Dark Matter in Neutron Stars,” *Phys.Rev.D* **106** (2022) 5, 055031 [arXiv:[2204.02238](#) [hep-ph]].
- [9] T. Abe, **M. Fujiwara**, J. Hisano and K. Matsushita, “Gamma-ray line from electroweakly interacting non-abelian spin-1 dark matter,” *JHEP* **10**, 163 (2021) [arXiv:[2107.10029](#) [hep-ph]].
- [10] **M. Fujiwara**, J. Hisano and T. Toma, “Vanishing or non-vanishing rainbow? Reduction formulas of electric dipole moment,” *JHEP* **10**, 237 (2021) [arXiv:[2106.03384](#) [hep-ph]].
- [11] **M. Fujiwara**, J. Hisano, C. Kanai and T. Toma, “Electric dipole moments in the extended scotogenic models,” *JHEP* **04**, 114 (2021) [arXiv:[2012.14585](#) [hep-ph]].
- [12] T. Abe, **M. Fujiwara**, J. Hisano and K. Matsushita, “A model of electroweakly interacting non-abelian vector dark matter,” *JHEP* **07**, 136 (2020) [arXiv:[2004.00884](#) [hep-ph]].

- [13] T. Abe, **M. Fujiwara**, J. Hisano and Y. Shoji, “Maximum value of the spin-independent cross section in the 2HDM+a,” *JHEP* **01**, 114 (2020) [arXiv:1910.09771 [hep-ph]].
- [14] T. Abe, **M. Fujiwara** *et al.* [LHC Dark Matter Working Group], “LHC Dark Matter Working Group: Next-generation spin-0 dark matter models,” *Phys. Dark Univ.* **27**, 100351 (2020) [arXiv:1810.09420 [hep-ex]].
- [15] T. Abe, **M. Fujiwara** and J. Hisano, “Loop corrections to dark matter direct detection in a pseudoscalar mediator dark matter model,” *JHEP* **02**, 028 (2019) [arXiv:1810.01039 [hep-ph]].

## Presentations

### • Presentations at International Conferences

1. “Dark matter landscape,” **Plenary talk** (invitation confirmed), Feb. 18, 2025, KEK-PH 2025, Tsukuba, Japan
2. “Boosted dark matter signatures from dark matter spike,” Sep. 1, 2024, The Dark Matter Landscape: From Feeble to Strong Interactions, Mainz, Germany
3. [poster] “Tidal disruption events and dark matter scatterings with neutrinos and photons,” July 1, 2024, Invisible 2024, Bologna, Italy
4. “Dark matter heating vs. vortex creep heating in old neutron stars,” Mar. 22, 2024, Quarkonia meet Dark Matter, Garching, Germany
5. “Dark matter heating vs vortex creep heating in old neutron stars,” July 10, 2023, The Dark Side of the Universe, Kigali, Rwanda
6. “Dark matter heating vs vortex creep heating in old neutron stars,” May 29, 2023, Dark Matter 2023, Santander, Spain
7. “Dark matter heating vs vortex creep heating in old neutron stars,” April 25, 2023, Munich Dark Matter Meeting, Garching, Germany
8. “Weakly Interacting Massive Particle: Current Status and Search Strategy,” **Invited talk**, Nov. 29, 2022, Kashiwa Dark Matter Symposium 2022, Kashiwa, Japan (Online)
9. “Dark matter capture in neutron stars,” **Selected presentation** (elevator pitches), Nov. 18, 2022, Virtual Humboldt Colloquium “Top Global Research” and the Humboldt Network: New Frontiers of German-Japanese Scientific Cooperation, German and Japan (Online)
10. “Electroweakly Interacting Vector Dark Matter,” **Invited talk**, Sep. 14, 2022, The 2nd DMnet International Symposium “Direct and Indirect Dark Matter Search”, Heidelberg, Germany

11. “Capture of Dark Matter in Neutron Star,” **Invited talk**, Aug. 5, 2022, IBS and KMI Joint Workshop 2022, Online
12. “Capture of Dark Matter in Neutron Star,” **Invited talk**, Jun. 13, 2022, international workshop UGAP2022, Kashiwa, Japan (Online)
13. “Electroweakly Interacting Spin-1 Dark Matter and Its Phenomenology,” May 12, 2022, Physics in LHC and Beyond, Matsue, Japan (Online)
14. “Electroweakly Interacting Spin-1 Dark Matter and Its Phenomenology,” **Invited talk**, Mar. 10, 2022, KEK-PH + KEK-COSMO joint mini-workshop, Tsukuba, Japan (Online)
15. “Gamma-ray line from electroweakly interacting non-abelian spin-1 dark matter,” Aug. 2, 2021, Asia-Pacific Workshop on Particle Physics and Cosmology 2021, Seoul, Korea (Online)
16. “A model of electroweakly interacting non-abelian vector dark matter,” Jun. 17, 2021, PASCOS 2021, Daejeon, Korea (Online)
17. [poster] “A model of electroweakly interacting non-abelian vector dark matter,” Jun. 15, 2021, Quarkonia meet Dark Matter, Kashiwa, Japan (Online)
18. “A model of electroweakly interacting non-abelian vector dark matter,” May. 23, 2021, PHENO 2021, Pittsburgh, USA (Online)
19. [poster] “A model of electroweakly interacting non-abelian vector dark matter,” Mar. 27, 2021, Higgs as a Probe of New Physics 2021 (HPNP2021), Osaka, Japan (Online)
20. [poster] “A model of electroweakly interacting non-abelian vector dark matter,” Nov. 16, 2021, KMI School 2020, Nagoya, Japan (Online)
21. “Maximum value of the spin-independent cross section in the 2HDM+a,” Feb. 18, 2020, KEK-PH2020, Tsukuba, Japan
22. “Maximum value of the spin-independent cross section in the 2HDM+a,” Sep. 9, 2019, TAUP2019, Toyama, Japan
23. [poster] “Loop corrections to dark matter direct detection in a pseudoscalar mediator dark matter model,” Feb. 21, 2019, KMI School 2019, Nagoya, Japan
24. [poster] “Loop corrections to dark matter direct detection in a pseudoscalar mediator dark matter model,” Feb. 18, 2019, Higgs as a Probe of New Physics 2019 (HPNP2019), Osaka, Japan
25. “Loop corrections to dark matter direct detection in a pseudoscalar mediator dark matter model,” Dec. 4, 2018, KEK-PH2018, Tsukuba, Japan

26. [poster] “Loop corrections to dark matter direct detection in a pseudoscalar mediator dark matter model,” (Poster) Nov. 15, 2018, Mini-workshop “Hints for New Physics in Heavy Flavor Physics”, Nagoya, Japan

• **Presentations at National Conferences (Japan)**

1. “Vortex creep heating in neutron stars: Current status in light of surface temperature observations,” Sep. 5, 2023, Microscopic approach from pair correlation to pair condensation, RCNP, Japan
2. “Dark matter heating vs vortex creep heating in old neutron stars,” Aug. 28, 2023, The Progress of the Particle Physics 2023 (PPP2023), YITP, Japan
3. [poster] “Capture of Dark Matter in Neutron Star,” Aug. 29, 2022, The Progress of the Particle Physics 2022 (PPP2022), Kyoto, Japan (Online)
4. “Capture of Dark Matter in Neutron Star,” Aug. 4, 2022, RCNP workshop on Neutron Star 2022, Osaka, Japan (Online)
5. “Electroweakly Interacting Spin-1 Dark Matter and Its Phenomenology,” Feb. 19, 2022, New Higgs Working Group, 32nd regular meeting, Osaka, Japan (Online)
6. “EFT approach for DM annihilation,” Nov. 3, 2021, EFT Study Meeting, Morioka, Japan
7. “Vanishing or non-vanishing rainbow? Reduction formulas of electric dipole moment,” Sep. 27, 2021, Flavor Physics workshop 2021 (FPWS2021), Japan (Online)
8. “Gamma-ray line from electroweakly interacting non-abelian spin-1 dark matter,” Sep. 21, 2021, ILC Summer Camp 2021, Japan (Online)
9. “Gamma-ray line from electroweakly interacting non-abelian spin-1 dark matter,” Sep. 14, 2021, JPS 2021 Fall meeting, Japan (Online)
10. “Gamma-ray line from electroweakly interacting non-abelian spin-1 dark matter,” Sep. 6, 2021, The Progress of the Particle Physics 2021 (PPP2021), YITP, Japan (Online)
11. “Gamma-ray line from electroweakly interacting non-abelian spin-1 dark matter,” Aug. 7, 2021, YONUPA Summer School 2019, Japan (Online)
12. “Vanishing or non-vanishing rainbow? Reduction formulas of electric dipole moment,” Aug. 7, 2021, YONUPA Summer School 2019, Japan (Online)
13. “Vanishing or non-vanishing rainbow? Reduction formulas of electric dipole moment,” Jul. 17, 2021, 30th regular meeting of New Higgs Working Group, Osaka, Japan (Online)



14. “Electroweakly interacting spin-1 dark matter,” Jan. 23, 2021, 29th regular meeting of New Higgs Working Group, Osaka, Japan (Online)
15. [poster] “A model of electroweakly interacting non-abelian vector dark matter,” Jun. 2, 2020, Unrevealing the history of the universe and matter evolution with underground physics, Japan (Online)
16. “Review on Theory of Dark Matter,” Feb. 23, 2020, Workshop of Underground Physics, Kamioka, Japan
17. “Direct detection of a pseudoscalar mediator dark matter,” Sep. 17, 2019, JPS 2019 Fall meeting, Yamagata, Japan (Online)
18. “Direct detection of a pseudoscalar mediator dark matter,” Aug. 5, 2019, YONUPA Summer School 2019, Shiga, Japan
19. [poster] “Vacuum stability of the THDM+a,” Jul. 29, 2019, The Progress of the Particle Physics 2019 (PPP2019), Kyoto, Japan
20. “Direct detection of a pseudoscalar mediator dark matter,” Jun. 11, 2019, Workshop of Neutrino Oscillation and Flavor Physics, Nagoya, Japan
21. “Maximum value of the spin-independent cross section in the THDM+a,” Mar. 14, 2019, JPS 2019 74th Annual Meeting, Fukuoka, Japan
22. “Loop corrections of pseudoscalar mediator DM model and future detectability,” Sep. 14, 2018, JPS 2019 Fall meeting, Matsumoto, Japan
23. “Loop corrections of pseudoscalar mediator DM model and future detectability,” Aug. 23, 2018, 23rd regular meeting of New Higgs Working Group, Osaka, Japan
24. [poster] “Loop corrections of pseudoscalar mediator DM model and future detectability,” Aug. 6, 2018, The Progress of the Particle Physics 2018 (PPP2018), Kyoto, Japan

#### • Seminar Presentations

1. “Dark matter self-interaction: the fate of the spike & annihilation-boosted dark matter in the Milky Way galaxy,” **Invited talk**, Oct. 3, 2024, U. Toyama, Japan
2. “Dark matter heating vs vortex creep heating in old neutron stars,” **Invited talk**, May 13, 2024, U. Tübingen, Germany
3. “Dark matter heating in old isolated neutron stars,” Apr. 24, 2024, U. Vienna, Austria
4. “Dark matter heating vs vortex creep heating in old neutron stars,” **Invited talk**, Oct. 31, 2023, U. Warsaw, Poland

5. “Dark matter heating vs vortex creep heating in old neutron stars,” Aug. 7, 2023, RIKEN iTHEMS, Japan
6. “Dark matter heating vs vortex creep heating in old neutron stars,” Aug. 2, 2023, Kyoto University, Japan
7. “Dark matter heating vs vortex creep heating in old neutron stars,” Jul. 31, 2023, Nagoya University, Japan
8. “Capture of Electroweak Multiplet Dark Matter in Neutron Stars,” **Invited talk**, Dec. 9, 2022, Central China Normal University, Wuhan, China (Online)
9. “Capture of Electroweak Multiplet Dark Matter in Neutron Stars,” **Invited talk**, Oct. 18, 2022, Shinshu University, Japan
10. “Capture of Electroweak Multiplet Dark Matter in Neutron Stars,” **Invited talk**, Jul. 11, 2022, Iwate University, Japan
11. “Capture of Electroweak Multiplet Dark Matter in Neutron Stars,” Jun. 30, 2022, University of Heidelberg, Germany
12. “Capture of Electroweak Multiplet Dark Matter in Neutron Stars,” Jun. 27, 2022, Max-Planck Institute Kernphysik (Heidelberg), Germany
13. “Capture of Electroweak Multiplet Dark Matter in Neutron Stars,” Jun. 13, 2022, Technical University of Munich, Germany
14. “Capture of Electroweak Multiplet Dark Matter in Neutron Stars,” **Invited talk**, May 27, 2022, Keio University, Japan (Online)
15. “Capture of Electroweak Multiplet Dark Matter in Neutron Stars,” May 9, 2022, University of Tokyo (RESCUE, Early Cosmology Group), Japan
16. “Electroweakly Interacting Spin-1 Dark Matter and Its Phenomenology,” May 2, 2022, University of Tokyo (Hongo, High Energy Physics Theory group), Japan (Online)
17. “Vanishing or non-vanishing rainbow? Reduction formulas of electric dipole moment,” **Invited talk**, Nov. 12, 2021, Hiroshima University, Japan (Online)
18. “Electroweakly interacting non-abelian spin-1 dark matter,” **Invited talk**, Oct. 28, 2021, Tohoku University, Japan (Online)
19. “Electroweakly interacting non-abelian spin-1 dark matter,” Oct. 18, 2021, Bethe Center for Theoretical Physics (Bonn University), Germany (Online)
20. “Gamma-ray line from electroweakly interacting non-abelian spin-1 dark matter,” **Invited talk**, Oct. 5, 2021, Okayama University of Science, Japan (Online)

21. “Electroweakly interacting non-abelian spin-1 dark matter,” **Invited talk**, Aug. 18, 2021, Indian Association for the Cultivation of Science, India (Online)
22. “A model of electroweakly interacting non-abelian vector dark matter,” **Invited talk**, Apr. 16, 2021, Kyushu University, Japan (Online)
23. “A model of electroweakly interacting non-abelian vector dark matter,” Apr. 14, 2021, Technical University Munich, Germany (Online)
24. “Electric dipole moments in the extended Scotogenic models,” **Invited talk**, Apr. 12, 2021, University of Tokyo, Japan (Online)
25. “A model of electroweakly interacting non-abelian vector dark matter,” **Invited talk**, Feb. 9, 2021, KEK, Japan (Online)
26. “A model of electroweakly interacting non-abelian vector dark matter,” **Invited talk**, Oct. 30, 2020, Kanazawa University, Japan (Online)
27. “A model of electroweakly interacting non-abelian vector dark matter,” Oct. 13, 2020, Yonsei University, Korea (Online)
28. “A model of electroweakly interacting non-abelian vector dark matter,” **Invited talk**, May. 20, 2020, Kyoto University, Japan (Online)
29. “Loop corrections to dark matter direct detection in a pseudoscalar mediator dark matter model,” **Invited talk**, Jan. 23, 2020, Toyama University, Japan

- **Review talk**

1. “Neutron stars as probe of new physics,” **Invited talk**, Dec. 18, 2023, SFB1258 in Munich, Germany
2. “Particle Dark Matter ~Current status of theory and search~ [Japanese],” 53rd Summer School on Astronomy and Astrophysics, Aug. 3rd, 2023, Tokyo, Japan

- **Career talk**

1. “Early Career Development in Germany,” **Invited talk**, (invitation confirmed) May 13, 2025, JSPS Career Forum, Bonn, Germany
2. “Introduction for career forum,” Aug. 6, 2022, YITP Summer School Career Forum, Online

- **Outreach**

1. “Dark matter capture in neutron stars,” **Invited talk**, Nov. 3, 2022, Garching Maier-Leibnitz-Kolloquium, Technical University of Munich, Germany

2. “Identification of Dark Matter Spin,” Jul. 28, 2021, 1st KMI Flash — Communicate your science! —, Nagoya University, Japan (Online)
3. “Dark Matter — Mysterious Matter in our Universe —,” **Invited talk**, Sep. 29, 2020, KMI ITbM Mix Cafe, Nagoya University, Japan (Online)