

# So Chigusa

## Curriculum Vitae

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### EDUCATION

- 2020 Ph.D. in Physics, Department of Physics, University of Tokyo
- 2017 M.A. in Physics, Department of Physics, University of Tokyo
- 2015 B.A. in Physics, Department of Physics, University of Tokyo

### PROFESSIONAL APPOINTMENTS

- 2020 Postdoctoral Fellow, Lawrence Berkeley National Laboratory
- 2020 Postdoctoral Fellow, High Energy Accelerator Research Organization (KEK)

### AWARDS AND HONORS

- Best presentation award for young scientists @ Unraveling the History of the Universe 2020 2020/06/02
- ,Best Poster Award @ HPNP 2019 2019/02/22

### GRANTS AND FELLOWSHIPS

- 2020 Research Fellowships for Young Scientists (PD), JSPS (3100000 JPY)
- 2017 Research Fellowships for Young Scientists (DC1), JSPS (2800000 JPY)
- 2015 Program for Leading Graduate Schools, MEXT

### TEACHING EXPERIENCES

- 2015 Teaching Assistant for an undergraduate course “Quantum Mechanics II”, Department of Physics, University of Tokyo, Apr.–Sep.

### PUBLICATIONS

- [1] C.W. Bauer, S. Chigusa and M. Yamazaki, *Quantum Parton Shower with Kinematics*, 2310.19881.
- [2] S. Chigusa, A. Ito, K. Nakayama and V. Takhistov, *Effects of Finite Material Size On Axion-magnon Conversion*, 2310.17704.
- [3] S. Chigusa, S. Girmohanta, Y. Nakai and Y. Zhang, *Aiming for Tops of ALPs with a Muon Collider*, 2310.11018.

- [4] S. Chigusa, D. Kondo, H. Murayama, R. Okabe and H. Sudo, *Axion detection via superfluid  $^3\text{He}$  ferromagnetic phase and quantum measurement techniques*, 2309.09160.
- [5] S. Chigusa, T. Moroi, K. Nakayama and T. Sighanugrist, *Dark matter detection using nuclear magnetization in magnet with hyperfine interaction*, 2307.08577.
- [6] S. Chigusa, T. Moroi and Y. Shoji, *Stability of Electroweak Vacuum and Supersymmetric Contribution to Muon  $g-2$* , 2306.16596.
- [7] S. Chigusa, M. Hazumi, E.D. Herbschleb, N. Mizuochi and K. Nakayama, *Light Dark Matter Search with Nitrogen-Vacancy Centers in Diamonds*, 2302.12756.
- [8] S. Chigusa and M. Yamazaki, *Quantum simulations of dark sector showers*, *Phys. Lett. B* **834** (2022) 137466 [2204.12500].
- [9] S. Chigusa, T. Moroi and Y. Shoji, *Upper bound on the smuon mass from vacuum stability in the light of muon  $g-2$  anomaly*, *Phys. Lett. B* **831** (2022) 137163 [2203.08062].
- [10] S. Chigusa, S. Li, Y. Nakai, W. Zhang, Y. Zhang and J. Zheng, *Deeply learned preselection of Higgs dijet decays at future lepton colliders*, *Phys. Lett. B* **833** (2022) 137301 [2202.02534].
- [11] S. Chigusa, K. Hamaguchi, T. Moroi, A. Niki and K. Ono, *Studying squark mass spectrum through gluino decay at 100 TeV future hadron colliders*, *Phys. Lett. B* **817** (2021) 136332 [2102.07910].
- [12] S. Chigusa, T. Moroi and K. Nakayama, *Axion/hidden-photon dark matter conversion into condensed matter axion*, *JHEP* **08** (2021) 074 [2102.06179].
- [13] S. Chigusa, Y. Nakai and J. Zheng, *Implications of gravitational waves for supersymmetric grand unification*, *Phys. Rev. D* **104** (2021) 035031 [2011.04090].
- [14] S. Chigusa, T. Moroi and Y. Shoji, *Precise Calculation of the Decay Rate of False Vacuum with Multi-Field Bounce*, *JHEP* **11** (2020) 006 [2007.14124].
- [15] S. Chigusa, M. Endo and K. Kohri, *Constraints on electron-scattering interpretation of XENON1T excess*, *JCAP* **10** (2020) 035 [2007.01663].
- [16] S. Chigusa, T. Moroi and K. Nakayama, *Detecting light boson dark matter through conversion into a magnon*, *Phys. Rev. D* **101** (2020) 096013 [2001.10666].
- [17] S. Chigusa, *Probing Electroweakly Interacting Massive Particles with Drell-Yan Process at 100 TeV Colliders*, Ph.D. thesis, Tokyo U., 2020.

- [18] S. Chigusa, Y. Hosomi, T. Moroi and M. Saito, *Determining Wino Lifetime in Supersymmetric Model at Future 100 TeV pp Colliders*, *Phys. Lett. B* **803** (2020) 135260 [1912.00592].
- [19] S. Chigusa, T. Moroi and K. Nakayama, *Signals of Axion Like Dark Matter in Time Dependent Polarization of Light*, *Phys. Lett. B* **803** (2020) 135288 [1911.09850].
- [20] S. Chigusa, T. Moroi and Y. Shoji, *Bounce Configuration from Gradient Flow*, *Phys. Lett. B* **800** (2020) 135115 [1906.10829].
- [21] S. Chigusa, S. Kasuya and K. Nakayama, *Novel Flavon Stabilization with Trimaximal Neutrino Mixing*, *Phys. Rev. D* **100** (2019) 015030 [1905.11517].
- [22] T. Abe, S. Chigusa, Y. Ema and T. Moroi, *Indirect studies of electroweakly interacting particles at 100 TeV hadron colliders*, *Phys. Rev. D* **100** (2019) 055018 [1904.11162].
- [23] S. Asai, S. Chigusa, T. Kaji, T. Moroi, M. Saito, R. Sawada et al., *Studying gaugino masses in supersymmetric model at future 100 TeV pp collider*, *JHEP* **05** (2019) 179 [1901.10389].
- [24] S. Chigusa, Y. Ema and T. Moroi, *Probing electroweakly interacting massive particles with Drell–Yan process at 100 TeV hadron colliders*, *Phys. Lett. B* **789** (2019) 106 [1810.07349].
- [25] S. Chigusa, S. Kasuya and K. Nakayama, *Flavon Stabilization in Models with Discrete Flavor Symmetry*, *Phys. Lett. B* **788** (2019) 494 [1810.05791].
- [26] S. Chigusa and K. Nakayama, *Anomalous Discrete Flavor Symmetry and Domain Wall Problem*, *Phys. Lett. B* **788** (2019) 249 [1808.09601].
- [27] S. Chigusa, T. Moroi and Y. Shoji, *Decay Rate of Electroweak Vacuum in the Standard Model and Beyond*, *Phys. Rev. D* **97** (2018) 116012 [1803.03902].
- [28] S. Chigusa, T. Moroi and Y. Shoji, *State-of-the-Art Calculation of the Decay Rate of Electroweak Vacuum in the Standard Model*, *Phys. Rev. Lett.* **119** (2017) 211801 [1707.09301].
- [29] S. Chigusa and T. Moroi, *Bottom-Tau Unification in Supersymmetric SU(5) Models with Extra Matters*, *PTEP* **2017** (2017) 063B05 [1702.00790].
- [30] S. Chigusa and T. Moroi, *Bottom-tau unification in a supersymmetric model with anomaly-mediation*, *Phys. Rev. D* **94** (2016) 035016 [1604.02156].

#### Invited Seminar Presentations

1. “Light DM Search With Nitrogen-Vacancy Centers in Diamonds”, 2023/11/13, UC Davis,
2. “Vacuum Decay @ NLO: from the SM to a BSM for the muon g-2”, 2023/09/28, KEK IPNS Seminar,
3. “Estimating eV-Scale Background Rates for Dark Matter Direct Detection”, 2023/09/26, KEK Theory Seminar,
4. “Quantum Simulations of Dark Sector Showers”, 2022/05/23, The University of Tokyo,
5. “固体中の「アクシオン」を用いた軽いボソン暗黒物質の直接探索”, 2021/03/01, Toyama, Kanazawa University,
6. “Detecting Light Boson Dark Matter through Conversion into Magnon (Online)”, 2020/06/22, Nagoya University,
7. “Detecting Light Boson Dark Matter through Conversion into Magnon (Online)”, 2020/06/12, UC Berkeley,
8. “Detecting Light Boson Dark Matter through Conversion into Magnon (Online)”, 2020/06/02, Kyushu University,
9. “Detecting Light Boson Dark Matter through Conversion into Magnon (Online)”, 2020/05/20, IBS,
10. “Detecting Light Boson Dark Matter through Conversion into Magnon (Online)”, 2020/05/14, TDLI and INPAC,
11. “Flowing to the Bounce”, 2019/10/24, Tohoku University,
12. “Indirect Studies of Electroweakly Interacting Particles at 100 TeV Hadron Colliders”, 2019/07/23, Osaka University,
13. “Indirect Studies of Electroweakly Interacting Particles at 100 TeV Hadron Colliders”, 2019/05/16, University of Florida,
14. “Indirect Studies of Electroweakly Interacting Particles at 100 TeV Hadron Colliders”, 2019/05/10, Florida State University,
15. “Indirect Studies of Electroweakly Interacting Particles at 100 TeV Hadron Colliders”, 2019/04/09, KEK,
16. “Solutions to Domain Wall Problem in Models with Discrete Flavor Symmetry”, 2019/01/11, Hokkaido University,

17. “Probing Electroweakly Interacting Massive Particles with Drell-Yan Process at 100 TeV Hadron Colliders”, 2018/10/16, Nagoya University

#### Presentations at International Conferences (Oral)

1. “Light Dark Matter Search with Nitrogen-Vacancy Centers in Diamonds”, 2023/12/05, PNU-IBS workshop on Axion Physics : Search for axions, Busan, Korea,
2. “Light Dark Matter Search with Nitrogen-Vacancy Centers in Diamonds”, 2023/06/27, PAS-COS 2023, UC Irvine,
3. “Topical theory talk: Vacuum stability”, 2023/06/23, Workshop for Tera-Scale Physics and Beyond, Hakata,
4. “Axion detection with spin dynamics: magnons and axions (Invited)”, 2023/04/06, Joint IQ Initiative and PITT PACC Workshop: Axions, Fundamental and Synthetic, The University of Pittsburgh,
5. “Upper bound on the smuon mass from vacuum stability in the light of muon  $g-2$  anomaly”, 2022/06/07, PPC 2022, St. Louis,
6. “Axion/Hidden-Photon Dark Matter Conversion into Condensed Matter Axion (Invited)”, 2022/02/08, KEK IPNS-IMSS-QUP Joint workshop, Online,
7. “Direct detection of light bosonic dark matter using spin excitation”, 2021/08/03, COSMO’21, Online,
8. “Anomaly Mediation at Future Hadron Colliders”, 2020/08/04, KEK-PH 2020, Tsukuba,
9. “Flowing to the Bounce”, 2020/01/14, Berkeley Week, IPMU,
10. “Indirect Studies of Electroweakly Interacting Particles at 100 TeV Hadron Colliders”, 2019/08/20, SI 2019, Gangneung, Korea,
11. “Flowing to the Bounce”, 2019/08/09, NHWG26, Osaka,
12. “Indirect Studies of Electroweakly Interacting Particles at 100 TeV Hadron Colliders”, 2019/05/22, SUSY 2019, Texas,
13. “Indirect Studies of Electroweakly Interacting Particles at 100 TeV Hadron Colliders”, 2019/05/06, Pheno 2019, Pittsburgh,
14. “Flavon Stabilization in Models with Discrete Flavor Symmetry”, 2018/12/06, KEK-PH 2018 winter, Tsukuba,

15. “Decay Rate of the Electroweak Vacuum in the Standard Model and Beyond”, 2018/05/24, Planck 2018, Bonn,
16. “Bottom-Tau Unification in Supersymmetric Models”, 2017/02/06, New Physics Forum, IPMU,
17. “Bottom-Tau unification in Supersymmetric Model with Anomaly-Mediation”, 2016/07/05, SUSY 2016, Melbourne

**(Poster)**

1. “Roles of lattice defects in dark matter direct detection experiments”, 2022/12/13, QUPosium 2022, Tsukuba,
2. “Probing Electroweakly Interacting Massive Particles with Precision Measurements at 100 TeV Hadron Colliders (poster)”, 2019/02/21, HPNP2019, Osaka

**(Oral)** Presentations at Domestic Conferences

1. “LHC Run 3 と高輝度 LHC で探る新物理模型（シンポジウム講演）”, 2023/09/18, JPS 2023 Fall, Tohoku University,
2. “高エネルギー反応におけるパートンシャワーへの量子計算の応用（シンポジウム講演）”, 2023/03/25, JPS 2023 Spring, Online,
3. “物性系を用いた軽い暗黒物質の直接探索（招待講演）”, 2021/09/09, PPP 2021, Online,
4. “スピン励起を用いた軽いボソン暗黒物質の直接探索（招待講演）”, 2021/03/31, KEK「素核宇・物性」連携研究会, Online,
5. “XENON1T 実験の結果を説明する模型への制限”, 2020/09/08, ダークマターの懇談会2020 online, Online,
6. “特徴的なシグナルを用いた暗黒物質模型の探索（招待講演）”, 2020/08/11, 新テラスケール研究会, Online,
7. “マグノンを用いた軽いボソン暗黒物質の直接探索”, 2020/06/02, Unraveling the History of the Universe 2020, Online,
8. “Flavon Stabilization without Domain Wall Problem in Discrete Flavor Symmetry Models (in Japanese)”, 2019/06/11, Neutrino Oscillation and Flavor Physics, Nagoya,
9. “Zero Mode Problem in the Calculation of Decay Rate of the SM Electroweak vacuum”, 2018/09/15, JPS 2018, Shinshu,

10. “Bottom-Tau unification in Supersymmetric Model with Anomaly-Mediation”, 2016/09/21, JPS 2016, Miyazaki

**(Poster)**

1. “レプトン加速器におけるヒッグス事象の機械学習を用いた事前選択（ポスター）”, 2022/08/29, PPP 2022, Online,
2. “Indirect Search of WIMP Dark Matter at Future 100 TeV Collider (Poster)”, 2018/08/09, PPP 2018, Kyoto,
3. “Bottom Tau Unification in Supersymmetric Models (Poster)”, 2017/08/03, PPP 2017, Kyoto