SUNAO SUGIYAMA

Compiled on September 15, 2022

CONTACT INFORMATION

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RESEARCH INTERESTS

Theoretical and Obserrvational cosmology
large-scale structure of the Universe, gravitational weak/micro lensing, primordial black hole

MAJOR INVOLVEMENT IN LARGE PROJECTS

Subaru HSC weak lensing working group, member (2021-present)

EDUCATION

University of Tokyo, Tokyo, Japan April 2020 – present
Ph.D. course in Physics, July, 2018
Supervisor: Prof. Masahiro Takada

University of Tokyo, Tokyo, Japan April 2018 – March 2020
M.S. in Physics, July, 2018
Dissertation: *"Validation of cosmological analysis based on perturbation theory for wide-field galaxy survey"*
Supervisor: Prof. Masahiro Takada

University of Tokyo, Tokyo, Japan April 2014 – March 2018
B.A. in Physics, March, 2018

AWARDS AND FELLOWSHIP

Research Fellowships for Young Scientists (Doctoral Course Students, DC2), Japan Society for the Promotion of Science, Apr. 2021 – present

International Graduate Program for Excellence in Earth-Space Science (IGPEES), World-leading InnovativeGraduate Study Program (WINGS), Sep. 2018 – present

GRANTS

Grant-in-Aid for JSPS Research Fellows (DC2)

OBSERVATIONS

PI, Definitive search for PBH dark matter in the multiverse cosmology with HSC (Subaru website)

PUBLICATIONS

For up-to-date list of my papers, please see ADS.

* = Author list alphabeticized

Major author

1. **Sugiyama, Sunao**, M. Takada, H. Miyatake, et al. HSC Year 1 cosmology results with the minimal bias method: HSC ×BOSS galaxy-galaxy weak lensing and BOSS galaxy clustering. Phys. Rev. D, 105(12):123537, June 2022:123537. doi: 10.1103/PhysRevD.105.123537

2. **Sugiyama, Sunao**. FFT based evaluation of microlensing magnification with extended source. *arXiv e-prints*, arXiv:2203.06637, March 2022:arXiv:2203.06637

3. H. Miyatake, **Sugiyama, Sunao**, M. Takada, et al. Cosmological inference from the emulator based halo model II: Joint analysis of galaxy-galaxy weak lensing and galaxy clustering from HSC-Y1 and SDSS. *arXiv e-prints*, arXiv:2111.02419, November 2021:arXiv:2111.02419

4. **Sugiyama, Sunao**, M. Takada, and A. Kusenko. Possible evidence of QCD axion stars in HSC and OGLE microlensing events. *arXiv e-prints*, arXiv:2108.03063, August 2021:arXiv:2108.03063

5. **Sugiyama, Sunao**, V. Takhistov, E. Vitagliano, et al. Testing stochastic gravitational wave signals from primordial black holes with optical telescopes. *Physics Letters B*, 814:136097, March 2021:136097. doi: 10.1016/j.physletb.2021.136097

6. **Sugiyama, Sunao**, M. Takada, Y. Kobayashi, et al. Validating a minimal galaxy bias method for cosmological parameter inference using HSC-SDSS mock catalogs. Phys. Rev. D, 102(8):083520, October 2020:083520. doi: 10.1103/PhysRevD.102.083520

7. *A. Kusenko, M. Sasaki, **Sugiyama, Sunao**, et al. Exploring Primordial Black Holes from the Multiverse with Optical Telescopes. Phys. Rev. Lett., 125(18):181304, October 2020:181304. doi: 10.1103/PhysRevLett.125.181304

8. **Sugiyama, Sunao**, T. Kurita, and M. Takada. On the wave optics effect on primordial black hole constraints from optical microlensing search. MNRAS, 493(3):3632–3641, April 2020:3632–3641. doi: 10.1093/mnras/staa407

Contributing author

9. Y. Park, T. Sunayama, M. Takada, et al. Cluster cosmology with anisotropic boosts: Validation of a novel forward modeling analysis and application on SDSS redMaPPer clusters. *arXiv e-prints*, arXiv:2112.09059, December 2021:arXiv:2112.09059

10. H. Miyatake, Y. Kobayashi, M. Takada, et al. Cosmological inference from emulator based halo model I: Validation tests with HSC and SDSS mock catalogs. *arXiv e-prints*, arXiv:2101.00113, December 2020:arXiv:2101.00113

11. H. Niikura, M. Takada, N. Yasuda, et al. Microlensing constraints on primordial black holes with Subaru/HSC Andromeda observations. *Nature Astronomy*, 3:524–534, April 2019:524–534. doi: 10.1038/s41550-019-0723-1

PRESENTATIONS AT CONFERENCES, WORKSHOPS, AND MEETINGS

2022

23. **Cosmology analysis with Subaru HSC Y3 data and SDSS data: a joint analysis of cosmic shear + galaxy-galaxt lensing + galaxy clustering**, 2022 Autumn Annual Meeting of ASJ, 2022, Sep., *Oral*

22. **Revealing the nature of dark matter with gravitational lensing: weak and microlensing**, Colloqium at Osaka theoretical astrophysics group, 2022, Jul., *Oral* (**Invited Talk**)

21. **HSC cosmology: Joint analysis of galaxy-galaxy lensing and clustering from Subaru HSC and SDSS data**, 77th Annual Meeting of JPS, 2022, Mar., *Oral*

20. **Exploring Primordial black hole with microlensing observation of Andromeda galaxy**, Subaru Users Meeting 2021, 2022, Jan., *Oral*

2021

19. **Joint analysis of galaxy-galaxy lensing and clustering at large scales from Subaru HSC and SDSS data**, 34th astro-theory Symposium, 2021, Dec., *Oral*

18. **Joint analysis of galaxy-galaxy lensing and clustering at large scales from Subaru HSC and SDSS data**, 10th workshop on observational cosmology, 2021, Nov., *Oral*

17. **Joint analysis of galaxy-galaxy lensing and clustering at large scales from Subaru HSC and SDSS data**, 2021 Autumn Annual Meeting of ASJ, 2021, Sep., *Oral*

16. **Exploring Dark Matter Candidates with Microlensing**, KEK theory seminar, 2021, Apr., *Oral* (**Invited Talk**)

2020

15. **Constraining PBH with HSC microlensing**, IPMU phenomenology lunch journal club, 2020, Dec., *Oral* (**Invited Talk**)

14. **Testing stochastic gravitational wave signals by PBH microlensing**, 4th KEK-PH + KEK-Cosmo Joint Lectures and Workshop on "Gravitational Wave", 2020, Nov., *Oral* (**Invited Talk**)

13. **Observational constraint on PBH scenarios with HSC microlensing**, 9th workshop on observational cosmology, 2020, Nov., *Oral*

12. **Developing a method of cosmological parameter inference from galaxy survey data by Subaru/HSC**, Summer school for young researchers in astronomy/astrophysics, 2020, Aug., *Oral*

11. **Validating a minimal galaxy bias method for cosmological parameter inference using HSC-SDSS mock catalog**, Seminar at Daniel Eisenstein group@CfA, 2020, Aug., *Oral* (**Invited Talk**)

10. **Validation of PT-based method and cosmological parameter constraint with HSC-Y1 data**, 2020 Spring Annual Meeting of ASJ, 2020, Mar.

9. **Constraints on Primordial Black Holes with Microlensing**, Informal seminar at Takahashi and Asada Labs, 2020, Feb., *Oral*

8. **Validation of PT-based method for cosmology analysis with wide field galaxy survey data**, Seminar at astro group of Hirosaki University, 2020, Feb., *Oral*

7. **Constraints on Primordial Black Holes with Microlensing: Wave & Finite Source Effects / PBH from Multiverse**, Berkeley Week at Kavli IPMU, 2020, Jan., *Oral*

2019

6. **Validation of PT-based method for cosmology analysis of wide field galaxy survey data**, 2019 Autumn Annual Meeting of ASJ, 2019, Sep., *Oral*

5. **Test and validation of PT-based cosmology : g-g lensing and clustering**, PT chat, 2019, Apr., *Poster*

4. **On the wave effect of PBH microlensing in the observation of the M31 stars**, 2019 Spring Annual Meeting of ASJ, 2019, Mar., *Oral*

3. **Wave Effect on PBH Microlensing**, Accelerating universe in the dark, 2019, Mar., *Poster*

2018

2. **Wave effect on PBH micro-lensing and constraintWave effect on PBH micro-lensing and constraint**, 7th workshop on observational cosmology, 2018, Dec., *Oral*

1. **Review of new BAO reconstruction method**, Summer school for young researchers in astronomy/astrophysics, 2018, Aug., *Oral*

PEER REVIEWS

Reviewer of International Journal of Modern Physics D

PRESS RELEASES

Primordial black holes and the search for dark matter from the multiverse (IPMU website)

PROGRAMMING SKILLS

Computing Language	C, C++, Python, HSC pipeline (for image analysis)
Code developed	`fft-extended-source`
Software Maintenance	`dark emulator` as a part of Dark Quest Project

PROFESSIONAL SOCIETY

The Astronomical Society of Japan (ASJ), 2018 – present

The Physical Society of Japan (JPS), 2022 – present

SEMINARS AND WORKSHOPS ORGANIZED

IPMU weekly lunch seminar (co-organizer), 2019 – 2021

HSC weaklensing mini workshop, Aug. 2022