

# Suchetha Cooray

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## EDUCATION AND APPOINTMENTS

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- **Stanford University, KIPAC Fellow** California, USA  
*Kavli Institute for Particle Astrophysics and Cosmology* May 2024 -
- **Nagoya University, Postdoctoral Researcher** Nagoya, Japan  
*Kobayashi-Maskawa Institute for the Origin of Particle and the Universe* Apr 2024
- **National Astronomical Observatory of Japan, JSPS Postdoctoral Fellow** Tokyo, Japan  
*Division of Science* Apr 2023 - March 2024
- **Nagoya University, Doctor of Science** Nagoya, Japan  
*Division of Particle & Astrophysical Science, Graduate School of Science* Oct 2020 - Mar 2023
- **Nagoya University, Master of Science** Nagoya, Japan  
*Division of Particle & Astrophysical Science, Graduate School of Science* Oct 2018 - Sep 2020
- **Nagoya University, Bachelor of Science** Nagoya, Japan  
*Fundamental & Applied Physics Program, School of Science* Oct 2014 - Sep 2018

## FELLOWSHIPS & AWARDS

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- **Kavli Institute for Particle Astrophysics and Cosmology Postdoctoral Fellowship, 2024:** Stanford University & SLAC National Accelerator Laboratory
- **Doctoral Thesis, March 2023:** Accepted without revision
- **Ph.D. Professional Toryumon 2023:** *Summa Cum Laude*
- **JSPS Research Fellow (DC1), Apr 2021 - Mar 2024:** Japan Society for Promotion of Science grant number JP21J23611. Research budget: ¥2,200,000. Stipend of ¥2,400,000 per annum.
- **Ph.D. Professional Toryumon, Oct 2020 - Mar 2023:** Program for Leading Graduate Schools, Nagoya University. Research budget: ¥700,000. Stipend of ¥2,400,000 per annum.
- **Japan Student Services Organization Scholarship, Oct 2020:** ¥1,584,000

## PUBLICATIONS

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Selected publications listed below. The full publication list can be accessed at [NASA/ADS](#) or [Google Scholar](#). ORCID is 0000-0002-9217-1696.

- Ma, H.; Takeuchi, T. T.; **Cooray, S.**; Zhu, Y.; *sOPTICS: a modified density-based algorithm for identifying galaxy groups/clusters and brightest cluster galaxies*, 2025, MNRAS, 537, 2, pp.1504-1517 (arxiv:2405.09855)
- Alfonzo, J. P.; Iyer, K. G.; Akiyama, M.; Bryan, G. L.; **Cooray, S.**; Ludwig, E.; Mowla, L.; Omori, K. C.; Pacifici, C.; Speagle, J. S.; Wu, J. F.; *Katachi (開拓): Decoding the Imprints of Past Star Formation on Present-day Morphology in Galaxies with Interpretable CNNs*, 2024, ApJ, 967, 152 (arxiv:2404.05146)
- Takeuchi, T. T.; Yata, K.; Aoshima, M.; Ishii, A.; Kono, K. T.; Nakanishi, K.; Egashira, K.; **Cooray, S.**; Kohno, K.; *"High Dimensional Statistical Analysis and its Application to ALMA Map of NGC 253"*, ApJS, Apr 2024 (arxiv:2203.04535)
- Iwasaki, D.; **Cooray, S.**; Takeuchi, T. T.; *"Extracting an Informative Latent Representation of High-Dimensional Galaxy Spectra"*, NeurIPS (arXiv:2311.17414)

- **Cooray, S.;** Takeuchi, T. T.; Kashino, D.; Yoshida, S. A.; Ma, H.; Kono, K. T.; *"Galaxy Manifold: Characterizing and understanding galaxies with two parameters"*, 2023, MNRAS, 524, 4, 4976
- **Cooray, S.;** Takeuchi, T. T.; Ideguchi, S.; Akahori, T.; Miyashita, Y.; Takahashi, K.; *"Wavelets and sparsity for Faraday tomography"*, 2023, PASJ, 75, 1, S85
- **Cooray, S.;** Takeuchi, T. T.; Akahori, T.; Miyashita, Y.; Ideguchi, S.; Takahashi, K.; Ichiki, K.; *"An Iterative Reconstruction Algorithm for Faraday Tomography"*, 2021, MNRAS, 500, 4, 5129
- Kono, K. T.; Takeuchi, T. T.; **Cooray, S.;** Nishizawa, A. J.; Murakami, K.; *"A study on the Baryon Acoustic Oscillation with Topological Data Analysis"*, arxiv:2006.02905
- **Cooray, S.;** Takeuchi, T. T.; Yoda, M.; Sorai, K., *"A Method for Unmasking Incomplete Astronomical Signals: Application to CO Multi-line Imaging of Nearby Galaxies Project"*, 2020, PASJ, 72, 4, 61
- Sorai, K.; ... ; **Cooray, S.;** et. al. , *"CO Multi-line Imaging of Nearby Galaxies (COMING). IV. Overview of the project"*, 2019, PASJ, 71, 1, S14

## SCIENTIFIC COLLABORATIONS

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- Roman Science Collaboration Cosmology Science Group
- Roman Science Collaboration Galaxy and Quasar Science Group
- Roman Galaxy Redshift Survey Project Infrastructure Team
- Subaru PFS Cosmology Mock Group
- CO Multi-line Imaging of Nearby Galaxies (COMING)
- SKA-Japan Galaxy Evolution Science Working Group
- SKA-Japan Faraday Tomography Engineering Working Group
- Cosmology and Astrophysics with Machine Learning Simulations (CAMELS)

## SCIENTIFIC CONTRIBUTIONS

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- Referee for ApJ and A&A
- Author of the CRAFT code.
- Organizer of the Astro Students' Gathering at Nagoya University.

## SKILLS SUMMARY

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- **Languages:** English, Japanese, Sinhala
- **Programming languages:** Python, R, C, Fortran, .NET, IDL, and others
- **Programming Frameworks:** Differentiable programming such as PyTorch and JAX.

## SEMINARS & INVITED TALKS

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- **24/01/22:** Astronomical Institute Colloquium - Tohoku University: *"A Comprehensive Understanding of the Light from Galaxies"*
- **24/01/09:** AI@HEP Workshop - KEK: *"AI Methods in Galaxy Formation"*
- **23/11/03:** Charlie Conroy's Group Meeting - Harvard University: *"A Comprehensive Understanding of the Light from Galaxies"*
- **23/10/30:** CAS Seminar - Center for Astrophysical Sciences, John Hopkins University: *"A Comprehensive Understanding of the Light from Galaxies"*

- **23/10/27:** Galaxy Formation Group Meeting - Center for Computational Astrophysics, Flatiron Institute: *"A Comprehensive Understanding of the Light from Galaxies"*
- **23/10/26:** Astro Data Lab Seminar - Princeton University: *"A Comprehensive Understanding of the Light from Galaxies"*
- **23/10/24:** NYU CCPP Astro Seminar - New York University: *"Forward Modeling of Light from Galaxies"*
- **23/10/19:** Survey Science Group Meeting - Chicago University: *"A Forward Modeling Approach to Understanding the Light from Galaxies"*
- **23/10/16:** CPAC Seminar - Argonne National Laboratory: *"A Forward Modeling Approach to Understanding the Light from Galaxies"*
- **23/10/10:** BCCP/Cosmology Seminar - UC Berkeley: *"A Forward Modeling Approach to Understanding the Light from Galaxies"*
- **23/08/17:** KIPAC Magnetism Group Meeting - Stanford University: *"CRAFT: A New Faraday Tomography Technique"*
- **23/08/15:** KIPAC Galaxy Formation & Cosmology Group Meeting - Stanford University: *"Future of Empirical Galaxy Formation Models"*
- **23/08/08:** KIPAC Tea Talk - Stanford University: *"Simulating the Light of Observed Galaxies"*
- **23/06/13:** Physics Department Constitution Day Colloquium - Nagoya: *"Generative Models for Physics Research"*
- **23/04/12:** NAOJ Science Colloquium - Tokyo: *"Learning Representations of Galaxies"*
- **23/03/07:** SKA-Japan Workshop 2022 - Tokyo: *"Wavelets and Sparsity for Faraday Tomography"*
- **23/02/20:** SKA-Japan Webinar Series - Online: *"Galaxy Manifold with SKA"*
- **22/12/13:** IPMU Astro Lunch Seminar - Tokyo: *"Machine Learning-based Approach to Understanding Galaxies"*
- **22/11/22:** Machine Learning in Astrophysics - Nagoya: *"Understanding Galaxies through Dimensionality Reduction"*
- **21/10/12:** NECO Collaboration Teletalk - Online: *"Observing Magnetism with Faraday Tomography"*

## CONFERENCE & WORKSHOP TALKS

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- **24/03/11:** Spring Annual Meeting of Astronomical Society of Japan - Tokyo, Japan: *"Generative Model of Simulated Galaxies for Fitting Observed SEDs"*
- **23/12/12:** Observational Cosmology Workshop - Saga, Japan: *"A Flexible Galaxy Formation Model for Field-level Inference"*
- **23/11/13:** Galaxy Workshop - Tokyo, Japan: *"A New Approach to Inferring Galaxy Physical Properties"*
- **23/09/01:** HSC Medium Band Workshop - Nagoya, Japan: *"Realistic Simulation of the Light from Galaxies"*
- **23/03/22:** Galaxy Formation and Evolution in the Data Science Era - Santa Barbara, USA: *"Learning representations of galaxies from simulations and observations"*
- **23/03/15:** Spring Annual Meeting of Astronomical Society of Japan - Tokyo, Japan: *"Generative Model of Simulated Galaxies for Fitting Observed SEDs"*
- **23/02/20:** Galaxy Evolution Workshop 2022 - Kyoto, Japan: *"Fitting Simulated Galaxies to Observations"*
- **22/12/21:** Rironkon Symposium 2022 - Fukushima, Japan: *"Generative Modeling for Galaxy Star Formation Histories"*
- **22/12/12:** Observational Cosmology Workshop 2022 - Tokyo, Japan: *"A Data-driven Model of Galaxy Star Formation Histories"*
- **22/10/05:** Data Science in Astronomy 2022 - Tokyo, Japan: *"Dimensionality Reduction to Understand Galaxies"*
- **22/09/22:** 9th East Asian Numerical Astrophysics Meeting - Okinawa, Japan: *"Disentangling galaxy star formation histories"*
- **22/09/15:** Autumn Annual Meeting of Astronomical Society of Japan - Niigata, Japan: *"Disentangling the connection between present-day galaxies and their star formation histories"*

- **22/09/14:** Autumn Annual Meeting of Astronomical Society of Japan - Niigata, Japan: *"Application of machine learning in Faraday tomography"*
- **22/03/03:** Spring Annual Meeting of Astronomical Society of Japan - Online: *"Reconstructing Galaxy Star Formation History with Present-day Galaxy Manifold"*
- **22/03/02:** Spring Annual Meeting of Astronomical Society of Japan - Online: *"Wavelets and sparsity for solving the inverse problem in Faraday tomography"*
- **22/02/16:** First Stars and First Galaxies Workshop 2021 - Tokyo & Online: *"Time Evolution on the Galaxy Manifold"*
- **22/02/08:** Galaxy Evolution Workshop 2021 - Tokyo & Online: *"Galaxy Manifold: A Unification of Observed Galaxy Properties"*
- **21/12/11:** Sri Lanka Students' Association in Japan Annual Research Conference - Online: *"Unmasking the unseen"*
- **21/12/02:** Galactic Star Formation 2021 - Online: *"Understanding Galaxy Evolution through Machine Learning"*
- **21/09/15:** Autumn Annual Meeting of Astronomical Society of Japan - Online: *"Understanding Galaxy Evolution through Machine Learning"*
- **21/03/19:** SKA Science Conference, "A precursor view of the SKA Sky" - Online: *"An Iterative Reconstruction Algorithm for Faraday Tomography"*
- **21/03/18:** Spring Annual Meeting of Astronomical Society of Japan - Online: *"Understanding Galaxy Evolution through Machine Learning"*
- **21/02/05:** Galaxy Evolution Workshop 2020 - Online: *"Understanding Galaxy Evolution through Machine Learning"*
- **20/12/01:** Science at Low Frequencies VII (SALF VII) - Online: *"An Iterative Reconstruction Algorithm for Faraday Tomography"*
- **20/11/18:** First Stars and First Galaxies Workshop 2020 - Sendai, Japan: *"Understanding Galaxy Evolution through Machine Learning"*
- **20/11/09:** ADASS XXX - Online: *"An Iterative Reconstruction Algorithm for Faraday Tomography"*
- **20/09/14:** The Physical Society of Japan, Autumn Meeting 2020 - Online: *"An Iterative Reconstruction Algorithm for Faraday Tomography"*
- **20/09/09:** Autumn Annual Meeting of Astronomical Society of Japan - Online: *"Understanding Galaxy Evolution through Machine Learning"*
- **20/06/09:** SAZERAC 2020 - Online: *"Understanding Galaxy Evolution through Machine Learning"*
- **20/03/17:** Spring Annual Meeting of Astronomical Society of Japan - Tsukuba, Japan: *"Understanding Galaxy Evolution through Machine Learning"*
- **19/11/21:** SKA-Japan science workshop "Cosmic Magnetism" 2019 - National Observatory of Japan, Mitaka, Japan: *"A Reconstruction Method for Faraday Tomography in SKA Cosmic Magnetism"*
- **19/11/12:** First Stars and Galaxies Workshop - Nagoya University, Nagoya, Japan: *"Understanding Galaxy Evolution through Machine Learning"*
- **19/09/13:** Autumn Annual Meeting of Astronomical Society of Japan - Kumamoto University, Kumamoto, Japan: *"A Method for Reconstruction of Masked Pixels: Application in CO Multi-line Imaging of Nearby Galaxies (COMING)"*
- **19/09/05:** SKA-Japan Symposium 2019 - National Observatory of Japan, Mitaka, Japan: *"A Reconstruction Method for Faraday Tomography in SKA Cosmic Magnetism"*
- **19/05/29:** Data Science Methods in Astronomy 2019 - Institute of Statistics and Mathematics, Tachikawa, Japan: *"Data Reconstruction Methods in Astrophysics and Cosmology"*
- **18/12/09:** Sri Lanka Students' Association in Japan Annual Research Conference - Tokyo, Japan: *"Reconstruction of Masked Astronomical Images"*
- **18/12/04:** Science at Low Frequencies V (SALF V) - Nagoya, Japan: *"Reconstruction of Masked Images in Radio Observations: Application in CO Multi-line Imaging of Nearby Galaxies Project as Nobeyama Radio Observatory"*

- **18/11/05:** The 8th KIAS Workshop on Cosmology and Structure Formation - Seoul, South Korea: *"An Iterative Data Reconstruction Method for Incomplete Measurements in All-Sky Surveys"*
- **18/09/19:** Autumn Annual Meeting of Astronomical Society of Japan - Himeji, Japan: *"An Iterative Data Reconstruction Method for Incomplete Measurements in All-Sky Surveys"*
- **18/06/06:** 5th Galaxy Evolution Workshop - Ehime, Japan: *"An Iterative Data Reconstruction Method for Incomplete Measurements in All-Sky Surveys"*
- **17/12/10:** Sri Lanka Students' Association in Japan Annual Research Conference - Tokyo, Japan: *"Large Scale Mapping of the Nearby Universe with Data from Large Galaxy Surveys"*
- **17/06/18:** International Conference on Asian Studies - Ottawa, Canada *"Large Scale Mapping of the Nearby Universe with Data from Large Galaxy Surveys"*