

Akimasa Kataoka

Assistant Professor
Division of Science, National Astronomical Observatory of Japan

CONTACT INFORMATION

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EMPLOYMENT

Assistant Professor, Division of Science, National Astronomical Observatory of Japan	2019-present
Assistant Professor, Graduate University for Advanced Studies (SOKENDAI)	2017-present
Assistant Professor, Division of Theoretical Astronomy, National Astronomical Observatory of Japan	2017-2019
NAOJ Fellow	
Division of Theoretical Astronomy, National Astronomical Observatory of Japan	Apr. 2017- Nov. 2017
Humboldt Research Fellow	
Institute of Theoretical Astrophysics, Center for Astronomy, Heidelberg University	Dec. 2016 - Mar. 2017
JSPS Postdoctoral Fellowship for Research Abroad	
Institute of Theoretical Astrophysics, Center for Astronomy, Heidelberg University	Apr. 2015 - Nov. 2016
JSPS Research Fellow (PD)	
Department of Earth and Planetary Sciences, Tokyo Institute of Technology	Oct. 2014 - Mar. 2015
JSPS Research Fellow (DC1)	
Division of Theoretical Astronomy, National Astronomical Observatory of Japan	Apr. 2012 - Sep. 2014

EDUCATION

Ph.D., Graduate University for Advanced Studies (SOKENDAI)	Apr. 2012 - Sep. 2014
M.S., Department of Astronomy, Graduate School of Science, Kyoto University	Apr. 2010 - Mar. 2012
B.A., Faculty of Science, Kyoto University	Apr. 2006 - Mar. 2010

RESEARCH INTERESTS

Planet formation, protoplanetary disks, radio observations, mechanical and optical properties of dust aggregates

PROFESSIONAL MEMBERSHIPS

The International Astronomical Union (IAU)	2022-present
Udenkon (Japan Radio Astronomy Forum)	2020-present
Humboldtian	2017-present
Rironkon (organization of theoretical astrophysicists in Japan)	2013-present
The Japanese Society for Planetary Sciences	2013-present
The Astronomical Society of Japan	2010-present

GRANTS

JSPS KAKNHI Grant-in-Aid for Scientific Research (C), 22K03680, 3,000,000 yen for 5 years	Apr. 2022- Mar. 2027
JSPS KAKNHI Grant-in-Aid for Scientific Research on Innovative Areas (research area proposal type), 19H05088, 2,000,000 yen for 2 years	Apr. 2019- Mar. 2023
JSPS KAKNHI Grant-in-Aid for Early-Career Scientists, 18K13590, 3,300,000 yen for 3 years	Apr. 2018- Mar. 2021
JSPS KAKNHI Grant-in-Aid for Young Scientists (B), 15K17606, 3,100,000 yen for 3 years	Apr. 2015- Mar. 2018

AWARDS

25th Astronomical Society of Japan Young Astronomer Award 2020	2021
The Japanese Society for Planetary Sciences Best Researcher Award 2020	2021
Young Scientist Award at Sant Cugat Forum on Astrophysics	2016
Nagakura research award of SOKENDAI	2015
the President Prize of SOKENDAI	2014
the best presentation prize at the Japanese Society for Planetary Sciences	2013

REFEREES AND ACADEMIC SERVICES

Academic referee for

The Astrophysical Journal, Astronomy and Astrophysics, Monthly Notice of Royal Astronomical Society, and
Publication of Astronomical Society of Japan

Science assessor / reviewer

MSCA4Ukraine reviewer through Humboldt foundation 2023

Subaru telescope science assessor

JCMT science assessor

Science assessor of ALMA Cycle 6-7, Category 4 2018-2019

Contribution to community

Committee member of Research Coordination Committee, NAOJ 2022-present

Committee member of Rironkon Dec. 2018-Nov. 2020

member of NAOJ seminar committee 2018-2021

Committee members for thesis

Committee member for the master thesis by Shiori Koshisaka, SOKENDAI 2023

Committee member for the Ph.D. thesis by Jungha Kim, SOKENDAI 2020

TEACHING

Invited lecture at Kobe University, Planet formation 2022

Lecture at SOKENDAI, Basic seminar (fluid dynamics, mainly for master course students) 2018-2019

SUPERVISING EXPERIENCES

students

Kiyoaki Doi (5 year Ph.D. course of SOKENDAI) 2019-present

postdocs

Takahiro Ueda (JSPS fellowship), mass estimate of protoplanetary disks 2019-2023

other deeply involved early-career postdocs/students

Misako Tatsuuma (supervised the Ph.D. thesis on N-body simulations of dust aggregates) 2017-present

Tomohiro Mori (supervised the Ph.D. thesis on ALMA polarimetric observations) 2017-2018

Satoshi Ohashi (collaborations on ALMA polarimetric observations) 2017-

Adriana Pohl (collaborations on a project of dust coagulation and polarimetric observations at Heidelberg) 2015-2017

co-supervised students

Hideaki Takemura (official co-supervisor at SOKENDAI) 2018-2023

Tomohiro Yoshida (official co-supervisor at SOKENDAI) 2021-present

academic assistant

Yuko Matsushita Apr. 2021 - present

Seongjoong Kim Apr. 2020 - Mar. 2021

REFERENCES

Professor Emeritus Kohji Tomisaka

National Astronomical Observatory of Japan (retired)

E-mail: kohji.tomisaka@nao.ac.jp

Prof. Hidekazu Tanaka

Tohoku University

Website: <https://jupiter.astr.tohoku.ac.jp/~hidekazu/>

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Prof. Dr. Cornelis P. Dullemond

Heidelberg University

Website: <https://www.ita.uni-heidelberg.de/~dullemond/index.shtml?lang=en>

E-mail: dullemond@uni-heidelberg.de

Prof. Hideko Nomura

CONFERENCE TALKS

Invited talks

1. "Millimeter-wave polarization in protoplanetary disks," Five years after HL Tau, online, Dec 7-11, 2020
2. "Polarized dust emission in protoplanetary disks," Workshop on Polarization in Protoplanetary Disks and Jets,, Sant Cugat, Spain, May 20-24, 2019
3. "ALMA polarization observations towards protoplanetary disks," Polarimetry in the ALMA era: a new crossroads of astrophysics, March 25-29th, 2019, NAOJ, Japan
4. "Measuring the grain size and finding the magnetic fields by ALMA polarization", Planet-Forming Disks, March 4-8th, 2019, Como, Italy
5. "Dust and polarization," SOKENDAI Asia Winter School 2019, February 27th - March 1st, 2019, NAOJ, Japan
6. "mm-wave polarization of protoplanetary disks: alignment of scattering?," Cosmic Dust and Magnetism 2018, October 30 - November 2nd, 2018, KASI, Korea
7. "millimeter-wave polarization as a tool of investigating the planet formation," East-Asia ALMA Science Workshop 2017 - Korea. Nov.27-29,2017, KASI, Daejeon, Korea
8. "millimeter-wave polarization of protoplanetary disks: alignment or scattering?," Submm/mm/cm QUESO Workshop 2017, Oct.25-25,2017, ESO, Garching, Germany
9. "millimeter-wave polarization as a tool of investigating the planet formation," JpGU-AGU Joint Meeting 2017, May.20-25,2017, Makuhari Messe, Chiba, Japan
10. "ALMA revolution on planet formation," Japan-German planet & disk workshop, Sep.25-30, 2016, Beach Hotel Sunshine, Ishigaki, Japan

PUBLICATION LIST

Refereed papers as first author or led by supervised students or postdocs

1. Ueda, T., **Kataoka, A.**, & Tsukagoshi, T., 2022, "Massive Compact Dust Disk with a Gap around CW Tau Revealed by ALMA Multiband Observations," *The Astrophysical Journal*, 930, 56
2. Tatsuuma, M., & **Kataoka, A.**, 2021, "Rotational Disruption of Porous Dust Aggregates due to Gas Flow in Protoplanetary Disks," *The Astrophysical Journal*, 913, 132
3. Ueda, T., **Kataoka, A.**, Zhang, S., Zhu, Z., Carrasco-González, C., et al., 2021, "Impact of Differential Dust Settling on the SED and Polarization: Application to the Inner Region of the HL Tau Disk," *The Astrophysical Journal*, 913, 117
4. Doi, K., & **Kataoka, A.**, 2021, "Estimate on Dust Scale Height from the ALMA Dust Continuum Image of the HD 163296 Protoplanetary Disk," *The Astrophysical Journal*, 912, 164
5. Mori, T., & **Kataoka, A.**, 2021, "Modeling of the ALMA HL Tau Polarization by Mixture of Grain Alignment and Self-scattering," *The Astrophysical Journal*, 908, 153
6. Ohashi, S., **Kataoka, A.**, van der Marel, N., Hull, C. L. H., Dent, W. R. F., et al., 2020, "Solving Grain Size Inconsistency between ALMA Polarization and VLA Continuum in the Ophiuchus IRS 48 Protoplanetary Disk," *The Astrophysical Journal*, 900, 81
7. Ueda, T., **Kataoka, A.**, & Tsukagoshi, T., 2020, "Scattering-induced Intensity Reduction: Large Mass Content with Small Grains in the Inner Region of the TW Hya disk," *The Astrophysical Journal*, 893, 125
8. Ohashi, S., & **Kataoka, A.**, 2019, "Radial Variations in Grain Sizes and Dust Scale Heights in the Protoplanetary Disk around HD 163296 Revealed by ALMA Polarization Observations," *The Astrophysical Journal*, 886, 103
9. **Kataoka, A.**, Tsukagoshi, T., Pohl, A., Muto, T., Nagai, H., et al., 2017, "The Evidence of Radio Polarization Induced by the Radiative Grain Alignment and Self-scattering of Dust Grains in a Protoplanetary Disk," *The Astrophysical Journal*, 844, L5
10. Tatsuuma, M., **Kataoka, A.**, & Tanaka, H., 2019, "Tensile Strength of Porous Dust Aggregates," *The Astrophysical Journal*, 874, 159
11. **Kataoka, A.**, Okuzumi, S., & Tazaki, R., 2019, "Millimeter-wave Polarization Due to Grain Alignment by the Gas Flow in Protoplanetary Disks," *The Astrophysical Journal*, 874, L6
12. Mori, T., **Kataoka, A.**, Ohashi, S., Momose, M., Muto, T., et al., 2019, "An Observational Study for Grain Dynamics in the AS 209 Disk with Submillimeter Polarization," *The Astrophysical Journal*, 883, 16
13. Ohashi, S., **Kataoka, A.**, Nagai, H., Momose, M., Muto, T., et al., 2018, "Two Different Grain Size Distributions within the Protoplanetary Disk around HD 142527 Revealed by ALMA Polarization Observation," *The Astrophysical Journal*, 864, 81
14. **Kataoka, A.**, 2017, "Dust Coagulation with Porosity Evolution," *Formation, Evolution, and Dynamics of Young Solar Systems*, 445, 143

15. **Kataoka, A.**, Tsukagoshi, T., Momose, M., Nagai, H., Muto, T., et al., 2016, "Submillimeter Polarization Observation of the Protoplanetary Disk around HD 142527," *The Astrophysical Journal*, 831, L12
16. Pohl, A., **Kataoka, A.**, Pinilla, P., Dullemond, C. P., Henning, T., et al., 2016, "Investigating dust trapping in transition disks with millimeter-wave polarization," *Astronomy and Astrophysics*, 593, A12
17. **Kataoka, A.**, Muto, T., Momose, M., Tsukagoshi, T., & Dullemond, C. P., 2016, "Grain Size Constraints on HL Tau with Polarization Signature," *The Astrophysical Journal*, 820, 54
18. **Kataoka, A.**, Muto, T., Momose, M., Tsukagoshi, T., Fukagawa, M., et al., 2015, "Millimeter-wave Polarization of Protoplanetary Disks due to Dust Scattering," *The Astrophysical Journal*, 809, 78
19. **Kataoka, A.**, Okuzumi, S., Tanaka, H., & Nomura, H., 2014, "Opacity of fluffy dust aggregates," *Astronomy and Astrophysics*, 568, A42
20. **Kataoka, A.**, Tanaka, H., Okuzumi, S., & Wada, K., 2013, "Fluffy dust forms icy planetesimals by static compression," *Astronomy and Astrophysics*, 557, L4
21. **Kataoka, A.**, Tanaka, H., Okuzumi, S., & Wada, K., 2013, "Static compression of porous dust aggregates," *Astronomy and Astrophysics*, 554, A4
22. **Kataoka, A.**, Machida, M. N., & Tomisaka, K., 2012, "Exploring Magnetic Field Structure in Star-forming Cores with Polarization of Thermal Dust Emission," *The Astrophysical Journal*, 761, 40

Other refereed papers

1. Hwang, J., Kim, J., Pattle, K., Lee, C. W., Koch, P. M., et al., 2022, "The JCMT BISTRO Survey: A Spiral Magnetic Field in a Hub-filament Structure, Monoceros R2," *The Astrophysical Journal*, 941, 51
2. Ward-Thompson, D., Karoly, J., Pattle, K., Whitworth, A., Kirk, J., et al., 2023, "First BISTRO Observations of the Dark Cloud Taurus L1495A-B10: The Role of the Magnetic Field in the Earliest Stages of Low-mass Star Formation," *The Astrophysical Journal*, 946, 62
3. Ching, T.-C., Qiu, K., Li, D., Ren, Z., Lai, S.-P., et al., 2022, "The JCMT BISTRO-2 Survey: Magnetic Fields of the Massive DR21 Filament," *The Astrophysical Journal*, 941, 122
4. Hwang, J., Kim, J., Pattle, K., Lee, C. W., Koch, P. M., et al., 2022, "The JCMT BISTRO Survey: A Spiral Magnetic Field in a Hub-filament Structure, Monoceros R2," *The Astrophysical Journal*, 941, 51
5. Kwon, W., Pattle, K., Sadavoy, S., Hull, C. L. H., Johnstone, D., et al., 2022, "B-fields in Star-forming Region Observations (BISTRO): Magnetic Fields in the Filamentary Structures of Serpens Main," *The Astrophysical Journal*, 926, 163
6. Lyo, A.-R., Kim, J., Sadavoy, S., Johnstone, D., Berry, D., et al., 2021, "The JCMT BISTRO Survey: An 850/450 μm Polarization Study of NGC 2071IR in Orion B," *The Astrophysical Journal*, 918, 85
7. Takemura, H., Nakamura, F., Ishii, S., Shimajiri, Y., Sanhueza, P., et al., 2021, "The C^{18}O core mass function toward Orion A: Single-dish observations," *Publications of the Astronomical Society of Japan*, 73, 487
8. Eswaraiah, C., Li, D., Furuya, R. S., Hasegawa, T., Ward-Thompson, D., et al., 2021, "The JCMT BISTRO Survey: Revealing the Diverse Magnetic Field Morphologies in Taurus Dense Cores with Sensitive Submillimeter Polarimetry," *The Astrophysical Journal*, 912, L27
9. Kanagawa, K. D., Hashimoto, J., Muto, T., Tsukagoshi, T., Takahashi, S. Z., et al., 2021, "ALMA Observation of the Protoplanetary Disk around WW Cha: Faint Double-peaked Ring and Asymmetric Structure," *The Astrophysical Journal*, 909, 212
10. Arzoumanian, D., Furuya, R. S., Hasegawa, T., Tahani, M., Sadavoy, S., et al., 2021, "Dust polarized emission observations of NGC 6334. BISTRO reveals the details of the complex but organized magnetic field structure of the high-mass star-forming hub-filament network," *Astronomy and Astrophysics*, 647, A78
11. Ngoc, N. B., Diep, P. N., Parsons, H., Pattle, K., Hoang, T., et al., 2021, "Observations of Magnetic Fields Surrounding LkHa 101 Taken by the BISTRO Survey with JCMT-POL-2," *The Astrophysical Journal*, 908, 10
12. Doi, Y., Hasegawa, T., Furuya, R. S., Coudé, S., Hull, C. L. H., et al., 2020, "The JCMT BISTRO Survey: Magnetic Fields Associated with a Network of Filaments in NGC 1333," *The Astrophysical Journal*, 899, 28
13. Yamaguchi, M., Akiyama, K., Tsukagoshi, T., Muto, T., **Kataoka, A.**, et al., 2020, "Super-resolution Imaging of the Protoplanetary Disk HD 142527 Using Sparse Modeling," *The Astrophysical Journal*, 895, 84
14. Bi, J., van der Marel, N., Dong (董若冰), R., Muto, T., Martin, R. G., et al., 2020, "GW Ori: Interactions between a Triple-star System and Its Circumtriple Disk in Action," *The Astrophysical Journal*, 895, L18
15. Kim, S., Takahashi, S., Nomura, H., Tsukagoshi, T., Lee, S., et al., 2020, "The Detection of Dust Gap-ring Structure in the Outer Region of the CR Cha Protoplanetary Disk," *The Astrophysical Journal*, 888, 72
16. Soon, K.-L., Momose, M., Muto, T., Tsukagoshi, T., **Kataoka, A.**, et al., 2019, "Investigating the gas-to-dust ratio in the protoplanetary disk of HD 142527," *Publications of the Astronomical Society of Japan*, 71, 124
17. Matsumoto, M., Tsuchiyama, A., Nakato, A., Matsuno, J., Miyake, A., et al., 2019, "Discovery of fossil asteroidal ice in primitive meteorite Acfer 094," *Science Advances*, 5, eaax5078
18. Tazaki, R., Tanaka, H., **Kataoka, A.**, Okuzumi, S., & Muto, T., 2019, "Unveiling Dust Aggregate Structure in Protoplanetary Disks by Millimeter-wave Scattering Polarization," *The Astrophysical Journal*, 885, 52

19. Tazaki, R., Tanaka, H., Muto, T., **Kataoka, A.**, & Okuzumi, S., 2019, "Effect of dust size and structure on scattered-light images of protoplanetary discs," *Monthly Notices of the Royal Astronomical Society*, 485, 4951
20. Zhu, Z., Zhang, S., Jiang, Y.-F., **Kataoka, A.**, Birnstiel, T., et al., 2019, "One Solution to the Mass Budget Problem for Planet Formation: Optically Thick Disks with Dust Scattering," *The Astrophysical Journal*, 877, L18
21. Coudé, S., Bastien, P., Houde, M., Sadavoy, S., Friesen, R., et al., 2019, "The JCMT BISTRO Survey: The Magnetic Field of the Barnard 1 Star-forming Region," *The Astrophysical Journal*, 877, 88
22. Harrison, R. E., Looney, L. W., Stephens, I. W., Li, Z.-Y., Yang, H., et al., 2019, "Dust Polarization in Four Protoplanetary Disks at 3 mm: Further Evidence of Multiple Origins," *The Astrophysical Journal*, 877, L2
23. Liu, J., Qiu, K., Berry, D., Di Francesco, J., Bastien, P., et al., 2019, "The JCMT BISTRO Survey: The Magnetic Field in the Starless Core ρ Ophiuchus C," *The Astrophysical Journal*, 877, 43
24. Wang, J.-W., Lai, S.-P., Eswaraiah, C., Pattle, K., Di Francesco, J., et al., 2019, "JCMT BISTRO Survey: Magnetic Fields within the Hub-filament Structure in IC 5146," *The Astrophysical Journal*, 876, 42
25. Yang, H., Li, Z.-Y., Stephens, I. W., **Kataoka, A.**, & Looney, L., 2019, "Does HL Tau disc polarization in ALMA band 3 come from radiatively aligned grains?," *Monthly Notices of the Royal Astronomical Society*, 483, 2371
26. Soam, A., Pattle, K., Ward-Thompson, D., Lee, C. W., Sadavoy, S., et al., 2018, "Magnetic Fields toward Ophiuchus-B Derived from SCUBA-2 Polarization Measurements," *The Astrophysical Journal*, 861, 65
27. Hull, C. L. H., Yang, H., Li, Z.-Y., **Kataoka, A.**, Stephens, I. W., et al., 2018, "ALMA Observations of Polarization from Dust Scattering in the IM Lup Protoplanetary Disk," *The Astrophysical Journal*, 860, 82
28. Kwon, J., Doi, Y., Tamura, M., Matsumura, M., Pattle, K., et al., 2018, "A First Look at BISTRO Observations of the ρ Oph-A core," *The Astrophysical Journal*, 859, 4
29. Stephens, I. W., Yang, H., Li, Z.-Y., Looney, L. W., **Kataoka, A.**, et al., 2017, "ALMA Reveals Transition of Polarization Pattern with Wavelength in HL Tau's Disk," *The Astrophysical Journal*, 851, 55
30. Arakawa, S., Tanaka, H., **Kataoka, A.**, & Nakamoto, T., 2017, "Thermal conductivity of porous aggregates," *Astronomy and Astrophysics*, 608, L7
31. Tsukamoto, Y., Okuzumi, S., & **Kataoka, A.**, 2017, "Apparent Disk-mass Reduction and Planetesimal Formation in Gravitationally Unstable Disks in Class 0/I Young Stellar Objects," *The Astrophysical Journal*, 838, 151
32. Gunkelmann, N., **Kataoka, A.**, Dullemond, C. P., & Urbassek, H. M., 2017, "Low-velocity collisions of chondrules: How a thin dust cover helps enhance the sticking probability," *Astronomy and Astrophysics*, 599, L4
33. Tazaki, R., Tanaka, H., Okuzumi, S., **Kataoka, A.**, & Nomura, H., 2016, "Light Scattering by Fractal Dust Aggregates. I. Angular Dependence of Scattering," *The Astrophysical Journal*, 823, 70
34. Muto, T., Tsukagoshi, T., Momose, M., Hanawa, T., Nomura, H., et al., 2015, "Significant gas-to-dust ratio asymmetry and variation in the disk of HD 142527 and the indication of gas depletion," *Publications of the Astronomical Society of Japan*, 67, 122
35. Akiyama, E., Muto, T., Kusakabe, N., **Kataoka, A.**, Hashimoto, J., et al., 2015, "Discovery of a Disk Gap Candidate at 20 AU in TW Hydrae," *The Astrophysical Journal*, 802, L17
36. Fukagawa, M., Tsukagoshi, T., Momose, M., Saigo, K., Ohashi, N., et al., 2013, "Local Enhancement of the Surface Density in the Protoplanetary Ring Surrounding HD 142527," *Publications of the Astronomical Society of Japan*, 65, L14
37. Shinnaga, H., Novak, G., Vaillancourt, J. E., Machida, M. N., **Kataoka, A.**, et al., 2012, "Magnetic Field in the Isolated Massive Dense Clump IRAS 20126+4104," *The Astrophysical Journal*, 750, L29