CURRICULUM VITAE — **Keiichi Umetsu** (梅津敬一)

Contact Information

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Academic Positions and Appointments

Executive Board Member, Hyper Suprime-Cam Subaru Strategic Program	(2023–present)
Steering Committee Member, ESA CHEX-MATE Program	(2023–present)
Research Fellow (Full Professor equivalent), ASIAA	(2014–present)
Kavli Visiting Scholar, Kavli Institute for Astronomy and Astrophysics, Peking University	(2016)
Associate Research Fellow (Tenured), ASIAA	(2010–2013)
Adjunct Research Fellow, LeCosPA Center, National Taiwan University (NTU)	(2008–2012)
Tenure-track Assistant Research Fellow, ASIAA	(2006–2009)
Staff Scientist (Assistant Project Scientist for the Y.-T. Lee AMiBA Project), ASIAA	(2005–2006)
Postdoctoral Fellow, ASIAA	(2001–2005)

Education and Degrees

Ph.D. in Astronomy,	Tohoku University,	Japan	(1998–2001)
M.S. in Astronomy,	Tohoku University,	Japan	(1996–1998)
B.S. in Physics,	Tohoku University,	Japan	(1992–1996)

Summary of Publications

- **Research Metrics:** 218 published refereed papers (see the complete publication list below), with $>$ 21,000 citations and an *h*-index of 80 according to Google Scholar as of September 2026.
- **First/Corresponding Authorship:** 25 papers cited $>$ 2,800 times, including 11 first-author papers with $>$ 100 citations each. Five of these highly cited papers were published after my promotion to Research Fellow in 2014.

Honors and Awards

- **Outstanding Research Award (2025), National Science and Technology Council (NSTC), Taiwan** — Two-time recipient, the maximum permitted under NSTC rules.
- **Outstanding Research Award (2018), National Science and Technology Council (NSTC), Taiwan** — Competitive national research award recognizing sustained research impact and scholarly excellence.
- **Academia Sinica Presidential Scholars Program (2023–2026)** — Academia Sinica-level honorific distinction, featuring a 50% salary enhancement over a three-year term.
- **Academia Sinica Investigator Award (2018–2022, 2023–2027)** — Competitive five-year Academia Sinica grant awarded for two consecutive terms.
- **Academia Sinica Award for Junior Research Investigators (2011)** — Early-career research distinction conferred by Academia Sinica on outstanding faculty at universities and research institutions across Taiwan.
- **Academia Sinica Career Development Award (2009–2013)** — Competitive five-year Academia Sinica grant for early-career faculty.
- **PASJ Excellent Paper Award (2012)** — Awarded to the best paper in PASJ (Okabe, Takada, Umetsu et al. 2010).

Academic Distinctions

- **Founding Member, NASA *CLASH* (2010)** — Core team member of the flagship Multi-Cycle Treasury program.
- **Invited Review, *The Astronomy and Astrophysics Review* (2020)** — 106-page solo review; $>$ 210 citations.
- **Invited Textbook Co-author (2025)** — Advanced graduate textbook in Japanese: "Gravitational Lensing and Gravitational-Wave Astronomy from the Foundations of General Relativity" (*Nippon Hyoron Sha Co., Ltd.*).
- **Invited Lecturer, International School of Physics "Enrico Fermi" (2008)** — Course CLXXII, *Astrophysics of Galaxy Clusters*.

Key Roles in Major International Collaborations

Directed project-level lensing and multi-probe cluster science across successive international programs, providing robust mass anchors essential for cluster astrophysics and cosmology. This leadership spans the Taiwan-led Y.-T. Lee AMiBA project, including commissioning, Sunyaev–Zel'dovich observations, and service as Science Lead; NASA's Multi-Cycle Treasury CLASH program; ESA's XMM-Newton XXL survey; and ESA's CHEX-MATE program.

Steering Committee Member	XMM-Newton Heritage Program: CHEX-MATE	(2023–present)
Executive Board Member	Hyper Suprime-Cam Subaru Strategic Program (HSC-SSP)	(2023–present)
Co-Chair	CHEX-MATE, Lensing Working Group	(2020–present)
Member	Local Volume Complete Cluster Survey (LoVoCCS)	(2018–present)
Co-PI	ALMA Lensing Cluster Survey (ALCS)	(2018–present)
Member	CHEX-MATE	(2018–present)
Member	Beyond Ultra-deep Frontier Fields & Legacy Observations (BUFFALO)	(2017–present)
Member	Reionization Lensing Cluster Survey (RELICS)	(2015–present)
Member	Subaru Prime Focus Spectrograph (PFS) Collaboration	(2014–present)
Member	J-PAS Survey	(2013–present)
Lensing Lead / Member	XMM Ultimate Extragalactic Survey (XXL)	(2011–present)
Member	VLT Large Program for CLASH	(2011–2017)
Principal Investigator	Caltech Submm Observatory (CSO) Bolocam Program for CLASH	(2011–2013)
Member	Cluster Lensing and Supernova Survey with Hubble (CLASH)	(2009–2017)
Principal Investigator	Subaru Telescope Suprime-Cam Program for CLASH	(2009–2014)
Member	HSC-SSP	(2007–present)
Member	Local Cluster Substructure Survey (LoCuSS)	(2005–2016)
Science Lead	Yuan-Tseh Lee Array for Microwave Background Anisotropy (AMiBA)	(2005–2010)
Member	AMiBA	(2001–2016)

Competitive Telescope Allocations as Principal Investigator

Awarded 16 allocations as PI spanning 2000–2026: eight at the Subaru Telescope, five at the Canada–France–Hawaii Telescope (CFHT), and three at the Caltech Submillimeter Observatory (CSO) using Bolocam. Major program series include:

CLASH	Subaru/Suprime-Cam weak-lensing program (2010B, 2012A, 2013A, 2013B)
CLASH	CSO/Bolocam Sunyaev–Zel'dovich program (2010B, 2011A, 2011B)
CHEX-MATE	CFHT weak-lensing program (2019B, 2020A)
LoVoCCS	Subaru/Hyper Suprime-Cam weak-lensing program (2026B)

Research Grants Awarded as Principal Investigator

Total PI funding awarded: **USD 2.8 million**, converted from NTD at a fixed rate of 30 NTD = 1 USD.

PI	NSTC 115-2112-M-001-027-	NSTC(∗)	52K USD	(08/2026–07/2027)
PI	NSTC 112-2112-M-001-027-MY3	NSTC	132K USD	(08/2023–03/2027)
PI	AS-IA-112-M04(1)	Academia Sinica	817K USD	(01/2023–12/2027)
PI	MOST 109-2112-M-001-018-MY3	MOST (NSTC)	128K USD	(08/2020–03/2024)
PI	AS-IA-107-M01(1)	Academia Sinica	800K USD	(01/2018–12/2022)
PI	MOST 106-2628-M-001-003-MY3(2)	MOST (NSTC)	186K USD	(08/2017–07/2021)
PI	MOST 103-2112-M-001-003-MY3	MOST (NSTC)	11K USD	(01/2016–07/2016)
PI	MOST 103-2112-M-001-030-MY3	MOST (NSTC)	90K USD	(08/2014–10/2017)
PI	NSC 100-2112-M-001-008-MY3	NSC (NSTC)	55K USD	(08/2011–07/2014)
PI	AS-98-CDA-M05(3)	Academia Sinica	370K USD	(01/2009–12/2013)
PI	NSC 95-2112-M-001-020-MY3	NSC (NSTC)	62K USD	(08/2008–01/2012)
PI	NSC 95-2112-M-001-074-MY2	NSC (NSTC)	63K USD	(10/2006–07/2008)

(∗) National Science and Technology Council (NSTC), formerly the Ministry of Science and Technology (MOST) and National Science Council (NSC) of Taiwan

(1) Academia Sinica Investigator Award [中央研究院深耕計畫獲獎]

(2) Research grant for Excellent Junior Research Investigators, MOST [科技部優秀年輕學者研究計畫獲獎]

(3) Academia Sinica Career Development Award [中央研究院前瞻計畫獲獎]

Selected Professional Activities and Community Service

- **Journal Referee**: Reviewed manuscripts for research journals, including *The Astrophysical Journal* (ApJ); *The Astrophysical Journal Letters* (ApJL); *Monthly Notices of the Royal Astronomical Society* (MNRAS); *Astronomy & Astrophysics* (A&A); *Journal of Cosmology and Astroparticle Physics* (JCAP); *Physical Review D* (PRD); *The Open Journal of Astrophysics* (OJA); *Proceedings of the Japan Academy, Series B* (PJA Series B); *LSST Dark Energy Science Collaboration Notes*.
- **Funding Agency Reviewer**: Reviewed research proposals for major funding agencies, including the French National Research Agency (ANR); Netherlands Organisation for Scientific Research (NWO); Swiss National Science Foundation (SNSF); National Science and Technology Council (NSTC), Taiwan.
- **Review Committee Member:** Appointed to serve on the Review Committee for the 2027 Academia Sinica Scholar Award, Mathematics and Physical Sciences Division (2026).
- **External Academic Reviewer**: Provided evaluations for academic promotions at institutions, including Caltech (USA).
- **External Science Assessor**: Invited by the Joint ALMA Observatory (JAO) to serve as an External Science Assessor for ALMA Large Programs (Cycle 13, 2026).
- **Observing Proposal Reviewer**: Reviewed proposals for facilities including the XRISM X-ray Satellite; Subaru Telescope; Magellan Telescopes; Canada–France–Hawaii Telescope (CFHT).
- **Thesis Examiner**: Examined Ph.D. theses for candidates at universities in Taiwan, Hong Kong, Italy, and India.

Institutional Leadership and Management Experience (selected key contributions)

Provided sustained institutional leadership in research and faculty development at ASIAA, including serving as Chair of the Faculty Search Committee from 2016 to 2021 and leading faculty searches in 2017, 2018, 2019, and 2021.

Co-organizer	Survey Science Meeting Series, ASIAA	(2026–present)
Chair	Taiwanese Time Allocation Committee for CFHT	(2018A, 2018B, 2019A, 2019B)
Chair	Faculty Search Committee, ASIAA	(2016–2021)
Co-organizer	ASIAA–NTU Joint Colloquium Series	(2015–2018)
Member	Faculty Search Committee, ASIAA	(2014–2022)
Member	Promotion and Appointment Committee, ASIAA	(2014–2022, 2026–present)
Member	Research Manpower Committee, ASIAA	(2011–2014, 2021–present)
Member	Standing Executive Committee, ASIAA	(2011–2014)
Chair	Postdoctoral Search and Liaison Committee, ASIAA (renamed Research Manpower Committee in 2011)	(2009–2012)

Conference and Workshop Organization

- SOC Chair, Cosmic Innovation: New Windows on the Universe, ASIAA (2027; scheduled)
- SOC Member, CHEX-MATE Conference 2027, Villa Mondragone, Italy (2027; scheduled)
- SOC Member, 2025 Merging Cluster Workshop, Seoul, Korea (2025)
- SOC Member, KIAS Workshop on Cosmology and Structure Formation, Seoul, Korea (2018, 2020, 2022, 2024)
- SOC Member, Panchromatic Panoramic Studies of Galaxy Clusters, ASIAA (2019)
- SOC Member, TIARA Summer School on Astrostatistics and Big Data, ASIAA (2017)
- SOC Member, Subaru HSC Sciences on Variable and Transients, NCU, Taiwan (2009)
- SOC Member, AMiBA Workshop, Hilo, Hawaii, USA (2005)
- Organizer or co-organizer of five ASIAA-hosted meetings (2008–2016), including the Subaru HSC Survey Collaboration Meeting (2016, organizer)

Research Staff and Scholars Mentored or Hosted at ASIAA

Sangjun Cha	EACOA Fellow	(09/2026–present)
Bau-Ching Hsieh	Project Research Manager, ASIAA	(05/2019–present)
Shutaro Ueda	NSTC Research Scholar	(08/2022–01/2025) → Assoc. Prof., Kanazawa U.
Sandor M. Molnar	Visiting Assoc. Professor, ASIAA	(01/2016–08/2020) → Retired from ASIAA
Bau-Ching Hsieh	Support Scientist, ASIAA	(01/2013–04/2019) → Research Manager, ASIAA

Postdoctoral Researchers Supervised at ASIAA as PI

Michele Pizzardo	(05/2025–present)
Chayan Mondal†	(06/2024–09/2025) → Faculty, S. N. Bose National Centre for Basic Sciences, India
Shouvik Roy Choudhury†	(07/2023–present)
Sut-Ieng Tam	(09/2020–07/2024) → Tenure-track Assistant Professor, NYCU, Taiwan
Luis A. Díaz Garcia	(08/2018–06/2020) → Severo Ochoa Fellow, IAA-CSIC, Spain
Shutaro Ueda	(04/2018–03/2022) → Associate Professor, Kanazawa University, Japan
I-Non Chiu	(06/2016–12/2020) → Associate Professor, NCKU, Taiwan
Yuichi Higuchi	(05/2016–01/2019) → Data Scientist, Accenture, Japan
Nicole Czakon	(07/2013–08/2016) → Staff Data Scientist, Slack, USA
Jean Coupon	(01/2012–09/2013) → Data Scientist, Expedia, Switzerland
Nobuhiro Okabe	(06/2009–08/2013) → Associate Professor, Hiroshima University, Japan

† ASIAA Distinguished Postdoctoral Fellow

External Visiting Scholars Hosted at ASIAA

Sandor M. Molnar	Visiting Scholar, Konkoly Observatory, Hungary	(09/2020–present)
Toshifumi Futamase	Professor Emeritus, Tohoku University, Japan	(06/2023–07/2025)
Adam Amara	Professor and Head, Math/Physics, University of Surrey, UK	(01/2019–07/2024)
Chieh-An Lin	Ph.D. student, CEA Saclay, France	(02/2016–03/2016)
Chieh-An Lin	Ph.D. student, CEA Saclay, France	(11/2014–01/2015)
Hiroyuki Ikeda	JSPS Postdoctoral Fellow, Japan	(04/2014–03/2015)
Tom Broadhurst	Ikerbasque Professor, University of the Basque Country, Spain	(01/2009–07/2024)

Graduate Students and Research Assistants Supervised

Hsin Fan	PhD, NTU/Astrophys	(11/2023–08/2025)	co-advised by Prof. Hsi-Yu Schive
Sut-Ieng Tam	Master, NTU/Physics	(10/2014–08/2016)	
James H.-S. Chan	Research Assistant, ASIAA	(09/2009–12/2010)	
Li-Yen Hsu	Master, NTU/Physics	(01/2009–07/2010)	
Chia-Jung Shih	Master, NTU/Astrophys	(07/2007–07/2009)	
Yi-Jung Yang	Research Assistant, ASIAA	(07/2007–10/2007)	

Undergraduate Students Supervised

Fang-Chia Lee	Research Assistant, ASIAA	(10/2006–07/2007)
Chia-Jung Shih	ASIAA Summer Student, ASIAA	(06/2006–08/2006)
Yang-Ting Chien	ASIAA Summer Student, ASIAA	(06/2002–08/2002)

Teaching Experience

Delivered invited lectures at international schools and universities, including the "Enrico Fermi" International School of Physics.

- Guest lecturer for General Astronomy, Yuan-Zhe University, Taiwan (November 21, 2019) [**invited**]: 90-min lecture titled "*My Journey through Taiwan: from Gravitational Lensing to Dark Matter*"
- Lecturer for TIARA Winter School on Galaxies and Stellar Clusters, NTHU, Taiwan (January 25–29, 2010) [**invited**]: 75-min lecture titled "*Lensing and AMiBA Studies of Galaxy Clusters*"
- Lecturer for Joint LeCosPA-FGCPA Summer School on Cosmology, NTU, Taiwan (June 20–23, 2009) [**invited**]: 80-min lectures on "*The Large-Scale Structure in the Universe (I)*" and "*(II)*"
- Lecturer for International School of Physics "Enrico Fermi", Course CLXXII, Varenna, Italy (July 15–25, 2008) [**invited**]: 60-min lectures on "*Cluster Weak Gravitational Lensing*" and "*CMB Interferometer*"
- Guest lecturer for Department of Physics, NTU, Taiwan (May 12–14, 2008) [**invited**]: Taught a series of lectures (3 hours) on "*Cosmology and Gravitational Lensing*"
- Lecturer for ASIAA Summer Student Program, ASIAA (2006, 2007, 2010, 2011) [**invited**]: Delivered 60-min introductory lectures on physical cosmology and gravitational lensing
- Guest lecturer for Astronomical Institute, Tohoku University, Japan (June 28–July 2, 2004) [**invited**]: Taught a series of lectures (6 hours) on "*Weak Gravitational Lensing: Theory, Methods, and Applications*"

Public Engagement in Education and Outreach

Promoting astrophysics to diverse audiences through public talks, media features, and outreach activities in Taiwan and beyond.

- Public lecture in Japanese at Nagai Teen's University [中学生のための大学], Nagai City Library, Yamagata, Japan (October 21, 2026): "見えない宇宙をどう見るか ― ダークマターと宇宙の進化の謎 ―"
- Public lecture in Japanese at Nagai Teen's University [中学生のための大学], Nagai City Library, Yamagata, Japan (October 15, 2025): "重力レンズ現象と宇宙の大構造"
- Guest lecture in Japanese for visiting students from Osaka Public University at ASIAA (January 16, 2025): "*Overview of ASIAA and My Research on Dark Matter through Gravitational Lensing*"
- Public lecture in Japanese at Nagai Cross-industrial Exchange Meeting [長井異業種研究会], Yamagata, Japan (October 18, 2023): "宇宙の蜃気楼*:* 重力レンズで見る世界とダークマター"
- Public lecture in Chinese for "Prospect Lecture Series: 100 Years of Spacetime Distortion" [2019 展望系列科學普及演講], NTU, Taiwan (May 31, 2019): "經由重力透鏡探索暗物質*: Looking at Dark Matter through Gravitational Lenses*"
- Media interview in Chinese by Unique Satellite TV [非凡電視台] at the Ministry of Science and Technology Outstanding Research Award Ceremony, Taiwan (May 24, 2019)
- Public lecture in Chinese for "NTU Azalea Festival 2017" [2017 臺大杜鵑花節], Taiwan (March 11, 2017): "*Gravitational Lensing in the Universe*"
- Media interview in Chinese by Central News Agency [中央社 CNA], Taiwan (December 2013): "日本女婿星繫台湾"
- Public lecture in Chinese for "Special Open House for NTU Undergraduate Students", ASIAA (April 11, 2010): "*Cosmology and Extragalactic Projects at ASIAA*"
- Media interview by Scientific American Taiwan Edition (October 3, 2008)
- Public lecture in Chinese for "Special Open House for NTU Undergraduate Students", ASIAA (March 23, 2008): "*Introduction to Cosmology*"

Selected Invited Talks at International Conferences and Workshops

1. 2027 Annual Meeting of the Physical Society of Taiwan, Hsinchu (NTHU), Taiwan, January 19–21, 2027 [**invited** (one of invited speakers in Astrophysics/Gravity & Cosmology); title forthcoming]
2. The 12th KIAS Workshop on Cosmology and Structure Formation, Seoul (Korea Institute for Advanced Study), Korea, November 1–7, 2026 [**invited**]: *"'Equilibrium-Free Cluster Lensing and Dynamics with the Extended CLUMI+ Framework"*
3. New Frontiers in Observational Cosmology with Gravitational Waves and Cosmic Microwave Background (GW-CMB 2025), National Central University, Taiwan, November 6–7, 2025 [**invited**]: *"Dark Matter and Baryons beyond Equilibrium: Cluster Outskirts and Infall"*
4. 2025 Merging Cluster Workshop, Yonsei University, Seoul, Korea, October 27–30, 2025 [**invited**]: *"Dissecting Cluster Infall and Substructure via Equilibrium-Free Dynamics and Lensing"*
5. Tracing Cosmic Evolution with Galaxy Clusters V, Sesto, Italy, July 7–11, 2025 [**invited**]: *"Weak Lensing in the Era of Multi-Probe Cluster Cosmology and Astrophysics"*
6. The 11th KIAS Workshop on Cosmology and Structure Formation, October 27–November 2, 2024 (special arrangement made to give the invited talk remotely) [**invited**]: *"Advancing Cluster Lensing Mass Inversion: Joint Analysis of Weak Lensing and Escape Velocity Measurements around Galaxy Clusters"*
7. Mini Workshop on AGN and Galaxy Evolution, Yuan-Zhe University, Taiwan, August 10–11, 2023 [**invited**]: *"Testing Models of Cosmic Structure Formation with Combined Weak and Strong Gravitational Lensing in Galaxy Clusters"*
8. Lensing at Different Scales: Strong, Weak, and Synergies between the Two, Kavli Institute for Cosmological Physics (KICP) of the University of Chicago, USA, July 31–August 4, 2023 [**invited**]: *"Testing Models of Structure Formation with Combined Strong and Weak Gravitational Lensing in Galaxy Clusters"*
9. Dissecting Cluster Cosmology: toward a Roadmap for Forthcoming Cluster Surveys, Trieste (Institute for the Fundamental Physics of the Universe), Italy, July 3–7, 2023 [**invited**]: *"Cosmological Mass Calibration of Galaxy Clusters with Weak Lensing: Gaussian-Likelihood and Likelihood-Free Approaches"*
10. The 2022 NSTC International Researcher Workshop, Department of Natural Sciences and Sustainable Development, National Science and Technology Council (NSTC), Taiwan, November 16, 2022 [**invited**]: *"My Research with International Collaboration in Taiwan"*
11. 2022 Spring Symposium – Galaxy Clusters: Challenging Our Cosmological Perspectives, Space Telescope Science Institute (STScI), USA, April 25–29, 2022 (arranged as a fully virtual conference due to the COVID-19 pan-

demic) [**invited**]: *"Probing Dark Matter Structure with Strong and Weak Lensing from Space"*

12. A Multi-Wavelength View of Galaxy Clusters: Deriving Masses in the Era of Wide-Field Surveys, Madrid (ESA/ESAC), Spain, September 8–10, 2020 → postponed to a virtual conference on September 6–9, 2021 due to the COVID-19 pandemic [**invited review**]: *"Weak Lensing Mass Measurements and Mass Scaling Relations on Cluster–Group Scales"*
13. The 9th KIAS Workshop on Cosmology and Structure Formation, Seoul (Korea Institute for Advanced Study), Korea, November 2–8, 2020 (hybrid online/in-person conferencing due to the COVID-19 pandemic) [**SOC, invited**]: *"A Short Final Remark"*
14. SkyPy Project Meeting, Manchester, UK (→ changed to an online meeting due to the COVID-19 pandemic), April 15–17, 2020 [**invited**]: *"Galaxy Cluster Modeling"*
15. The First Shanghai Assembly on Cosmology and Galaxy Formation, Shanghai (Shanghai Jiao Tong University), China, November 4–8, 2019 [**invited**]: *"Unveiling Cosmic Structure Formation by Cluster Lensing"*
16. MATERA OSCURA: Cosmology and Dark Matter within Galaxies and Clusters, Matera, Italy, September 2–6, 2019 [**invited review**]: *"Unveiling the Mass Structure of Galaxy Clusters from Lensing and Multiwavelength Observations"*
17. Tracing Cosmic Evolution with Clusters of Galaxies IV, Sesto, Italy, July 8–12, 2019 [**invited**]: *"Unveiling Cosmic Structure Formation with Cluster Lensing"*
18. Joint XXL-HSC Collaboration Meeting, Ovronnaz, Switzerland, July 4–5, 2019 [**invited**]: *"The Fundamental Plane of Galaxy Clusters"*
19. Cosmology Frontier in Particle Physics: Astroparticle Physics and Early Universe, Taipei (NTU), Taiwan, September 27–29, 2018 [**invited**]: *"Testing CDM Predictions with Galaxy Cluster Gravitational Lensing"*
20. The 5th Korea-Japan Workshop on Dark Energy, Daejon (Korea Astronomy and Space Science Institute), Korea, August 6–10, 2018 [**invited**]: "*Discovery of a New Fundamental Plane Dictating Galaxy Cluster Evolution from Gravitational Lensing*"
21. SnowCluster 2018: The Physics of Galaxy Clusters, Snowbird, Utah, USA, March 18–23, 2018 [**invited**]: *"Discovery of a New Fundamental Plane Dictating Galaxy Cluster Evolution from Gravitational Lensing"*
22. 2018 Annual Meeting of the Physical Society of Taiwan, Taipei (NTU), Taiwan, January 24–26, 2018 [**invited** (one of 4 invited speakers in Astrophysics/Gravity & Cosmology)]: *"Formation and Growth of Cosmic Giants: Lensing View of Galaxy Cluster Halos"*
23. First of a three-part conference series (Asia/Australia, America, Europe) organized by UCLA: Shedding Light on the Dark Universe with Extremely Large Telescopes, Lanzhou, China, August 30–September 2, 2017 [**invited**]: *"Testing LCDM Predictions with Cluster Lensing in the ELT Era"*
24. Exploring Dark Matter and Dark Ages with Lensing Clusters, Sesto, Italy, July 24–28, 2017 [**invited**]: *"Characterizing Galaxy Clusters with Gravitational Lensing: Halo Shape and Splashback Radius"*
25. Subaru International Partnership Science and Instrumentation Workshop, Tokyo (NAOJ), Japan, March 22–24, 2017 [**invited**]: *"Cluster Gravitational Lensing with Subaru"*
26. The 10th East Asian Meeting on Astronomy (EAMA10), Seoul (Seoul National University), Korea, September, 27–30, 2016 [**invited**]: *"Ensemble Mass Distribution of Galaxy Clusters from the CLASH Survey"*
27. Clusters with Nick Kaiser Day, Hong Kong (IAS/HKUST), February 17, 2016 [**invited**]: *"Recent Progress in Cluster Weak Lensing"*
28. The 6th KIAS Workshop on Cosmology and Structure Formation, Seoul (Korea Institute for Advanced Study), Korea, November 3–6, 2014 [**invited**]: *"Subaru Shear-and-Magnification Weak-Lensing Analysis of CLASH Galaxy Clusters"*
29. Synergy of HSC and Hiroshima CORE-U Projects, Hiroshima (Hiroshima University), Japan, August 27, 2014 [**invited**]: *"Subaru Weak-Lensing Shear and Magnification Analysis of CLASH Galaxy Clusters"*
30. Clusters Paris 2014: Future Directions in Galaxy Cluster Surveys, Paris, France, June 23–27, 2014 [**invited**]: *"CLASH: Subaru Weak-Lensing Results"*
31. PASCOS 2013: 19th International Symposium on Particles, Strings and Cosmology, Taipei, Taiwan, November 20–26, 2013 [**invited**]: *"Mass Distribution in and around Galaxy Clusters from Gravitational Lensing"*
32. Copenhagen-Asia-America Network for Dark cosmologY (CAANDY) kick-off meeting, Copenhagen (DARK Cosmology Centre), Denmark, August 12–17, 2013 [**invited**]: *"Cosmology and Cluster Astrophysics Programs at ASIAA"*
33. Tracing Cosmic Evolution with Clusters of Galaxies III, Sesto, Italy, July 1–5, 2013 [**invited review**]: *"Cluster Mass Distribution from Weak-Lensing Shear and Magnification"*
34. SZX HUNTSVILLE 2011: Cosmology with X-ray and Sunyaev-Zeldovich Effect Observations of Galaxy Clusters,

Huntsville, USA, September 19–22, 2011 [**invited**]: *"Mass and Hot Baryons from Cluster Lensing and SZE Observations"*

35. XXL Consortium Meeting, Corsica, France, May 2–6, 2011 [**invited**]: *"Cluster Weak Gravitational Lensing With Subaru Observations"*
36. APCTP Topical Research Program 2010: Recent Progress in Dark Universe and Astrophysics, Seoul, Korea, December 16–17, 2010 [**invited**]: *"Galaxy Cluster Gravitational Lensing as a Cosmological Probe"*
37. Horiba International Conference: COSMO/CosPA 2010, Tokyo (University of Tokyo), Japan, September 26 – October 1, 2010 [**invited**]: *"Probing the Distribution of Mass in Clusters of Galaxies using Weak + Strong Gravitational Lensing"*
38. CMB Workshop, Tokyo (NAOJ), Japan, June 7–9, 2010 [**invited**]: *"The AMiBA Project and the Cluster Cosmology Program in Taiwan"*
39. Japan-Princeton Subaru HSC Science/Survey Workshop, Tokyo (NAOJ), Japan, January 17–20, 2009 [**invited**]: *"Cluster Multiwavelength Studies"*
40. Subaru Users Meeting 2007: New Strategy of Subaru (II), Tokyo (NAOJ), Japan, January 29–31, 2008 [**invited**]: *"ASIAA Research Highlights and Prospects with HSC"*
41. CosPA 2007: International Symposium on Cosmology and Particle Astrophysics, Taipei (NTU), Taiwan, November 13–15, 2007 [**invited**]: *"A Moment Method for Measuring the Higher-Order Weak Lensing Effects"*
42. Asia Science Forum, Sendai (Sendai International Center), Japan, September 10–11, 2007 [**invited**]: *"Progress of the AMiBA Project"*
43. The 21st Century Center-of-Excellence Program "Exploring New Science by Bridging Particle-Matter Hierarchy", Sendai (Tohoku University), Japan, February 14–16, 2007 [**invited**]: *"Status of the AMiBA Project"*
44. CosPA 2006: International Symposium on Cosmology and Particle Astrophysics, Taipei (NTU), Taiwan, November 15–17, 2006 [**invited**]: *"Probing the Distribution of Mass in Galaxy Clusters using Subaru Weak Lensing Observations"*
45. Zao Cluster Workshop, Zao, Japan, October 24–26, 2006 [**invited**]: *"Weak Lensing Analysis of Galaxy Clusters"*
46. Inaugural Japan-Taiwan ALMA Science Workshop, Taipei, Taiwan, December 15–16, 2005 [**invited**]: *"SZ Science with AMiBA and ALMA"*

Selected Colloquia and Seminars

1. Seminar, Manipal Centre for Natural Sciences Centre of Excellence, Manipal Academy of Higher Education, India, August 20, 2025 (online conferencing) [**invited**]: *"Weak Lensing in the Multi-Probe Era of Cluster Cosmology and Astrophysics"*
2. Colloquium, Institute of Astronomy, National Central University, Taiwan, November 29, 2024 [**invited**]: *"Unveiling Dark Matter and Structure Formation through Multi-probe Observations of Galaxy Clusters"*
3. Colloquium, Physics Department, National Cheng Kung University, Taiwan, March 17, 2023 [**invited**]: *"Testing the Collisionless Nature of Dark Matter using Gravitational Lensing in Galaxy Clusters"*
4. Colloquium, South-Western Institute for Astronomy Research (SWIFAR), Yunnan University, China (online conferencing due to the COVID-19 pandemic), September 3, 2020 [**invited**]: *"Unveiling Cosmic Structure Formation by Cluster Weak Lensing"*
5. HSC Online Seminar Series, Subaru HSC Collaboration (Japan, Taiwan, USA+), June 16, 2020 [**invited**]: *"HSC-XXL: Weak-lensing Mass Measurements and Scaling Relations on Cluster-Group Scales"*
6. Seminar, Leung Center for Cosmology and Particle Astrophysics (LeCosPA), NTU, Taiwan, October 22, 2018 [**invited**]: *"Testing Cold Dark Matter Models with Galaxy Cluster Gravitational Lensing"*
7. Astronomy Colloquium, Department of Physics and Institute of Astronomy, National Tsing-Hua University, Taiwan, October 5, 2018 [**invited**]: *"Testing CDM Predictions with Galaxy Cluster Gravitational Lensing"*
8. Seminar, High-Energy Theory Group, Institute of Physics, Academia Sinica, Taiwan, September 19, 2018 [**invited**]: *"Testing CDM Predictions with Galaxy Cluster Gravitational Lensing"*
9. Colloquium, Institute of Astronomy, National Central University, Taiwan, December 2, 2016 [**invited**]: *"Lensing Constraints on the Mass Profile Shape and Splashback Radius of Galaxy Clusters"*
10. Seminar, National Astronomical Observatories of China, Chinese Academy of Sciences, China, May 20, 2016 [**invited**]: *"Ensemble Mass Distribution of Galaxy Clusters from the CLASH Survey: Concentration–Mass Relation, Stacked Mass Profile, and Splashback Radius"*
11. Colloquium, Department of Astronomy, Shanghai Jiaotong University, China, May 16, 2016 [**invited**]: *"Ensemble Mass Distribution of Galaxy Clusters from the CLASH Survey: Concentration-Mass Relation, Stacked Mass Profile, and Splashback Radius"*

12. Seminar, Key Lab for Astrophysics, Shanghai Normal University, China, May 13, 2016 [**invited**]: *"Ensemble Mass Distribution of Galaxy Clusters from the CLASH Survey: Concentration–Mass Relation, Stacked Mass Profile, and Splashback Radius"*
13. KIAA-PKU Colloquium, Kavli Institute for Astronomy & Astrophysics, Peking University, China, May 11, 2016 [**invited**]: *"Ensemble Mass Distribution of Galaxy Clusters from the CLASH Survey: Concentration–Mass Relation, Stacked Mass Profile, and Splashback Radius"*
14. Colloquium, Astronomical Institute, Tohoku University, Japan, June 30, 2015 [**invited**]: *"The Full Strength of Cluster Gravitational Lensing: Mass Distribution in and around Cosmic Giants from the CLASH Survey"*
15. Seminar, Department of Physics, University of Hong Kong, Hong Kong, December 4, 2014 [**invited**]: *"The Full Strength of Cluster Gravitational Lensing: Distribution of Matter in and around Cosmic Giants from the CLASH Survey"*
16. HEP Seminar, National Center for Theoretical Sciences, National Tsing-Hua University, Taiwan, September 18, 2014 [**invited**]: *"Weak Gravitational Lensing Effects by Galaxy Clusters"*
17. Astrophysics Colloquium, NASA Jet Propulsion Laboratory (JPL), USA, April 24, 2014 [**invited**]: *"CLASH: Weak-Lensing Shear and Magnification Analysis of 20 Galaxy Clusters"*
18. Colloquium, Institute of Astronomy, National Tsing-Hua University, Taiwan, April 20, 2012 [**invited**]: *"Clusters of Galaxies as Cosmic Lenses"*
19. Colloquium, Institute of Physics, Academia Sinica, Taiwan, June 21, 2011 [**invited**]: *"Galaxy Cluster Gravitational Lensing as Cosmological Probes"*
20. Colloquium, Department of Physics, Hokkaido University, Japan, June 11, 2010 [**invited**]: *"Galaxy Cluster Gravitational Lensing as a Cosmological Probe"*
21. Colloquium, Institute of Astronomy, National Central University, Taiwan, April 9, 2010 [**invited**]: *"Probing the Dark Matter Density Profile by Galaxy Cluster Gravitational Lensing"*
22. Astrophysics Seminar in Fall Semester, Department of Physics, NTU, Taiwan, November 6, 2008 [**invited**]: *"Cluster Weak Lensing and Sunyaev-Zel'dovich Effects in AMiBA Galaxy Clusters"*
23. Astrophysics Seminar in Spring Semester, Department of Physics, NTU, Taiwan, May 29, 2008 [**invited**]: *"Testing LCDM with Cluster Gravitational Lensing"*
24. Colloquium, Institute of Astronomy, National Central University, Taiwan, April 20, 2007 [**invited**]: *"Gravitational Lensing in Galaxy Clusters"*
25. Seminar, National Center for Theoretical Sciences, NTU, Taiwan, November 30, 2006 [**invited**]: *"Probing Dark Energy and Dark Matter with Gravitational Lensing"*

Selected Key Publications and Scientific Achievements

My research seeks to understand the assembly and fundamental nature of dark matter across cosmic time, using galaxy clusters as natural laboratories and gravitational lensing as a direct probe of the mass distribution in the Universe. The representative publications below trace this program from robust cluster-lensing mass reconstruction, through tests of dark-matter structure and halo assembly, to physically interpretable inference for multi-probe survey science.

- Publications are listed in reverse-chronological order. Papers currently submitted to refereed journals are marked in blue.
- My name is underlined. An asterisk ($*$) indicates the corresponding author. Double underlining indicates students or postdoctoral researchers whom I directly supervised or mentored in the work reported in the publication. Citation counts are from Google Scholar.

1. Keiichi Umetsu*, "*Why Azimuthal Averaging Works in Halo Lensing: Symmetry and Power Counting for Nonlinear Shear and Magnification*", submitted to **The Astrophysical Journal** (arXiv:2609.08825)
   $\rightarrow$ Developed a symmetry- and power-counting framework explaining why the mean-field approximation in halo lensing is accurate. Demonstrated percent-level population-median residuals in triaxial-halo populations.
2. Keiichi Umetsu*, Raphael Gavazzi, Mauro Sereno, Nobuhiro Okabe, Emmanuel Bertin, Gianluca Castignani, Stefano Ettori, Fabio Gastaldello, Carlo Giocoli, Scott T. Kay, Junhan Kim, Maggie Lieu, Lorenzo Lovisari, Ben J. Maughan, Mario Nonino, Lorenzo Pizzuti, Etienne Pointecouteau, Gabriel W. Pratt, Mario Radovich, Elena Rasia, Mariachiara Rossetti, Harshda Saxena, & Jack Sayers, "*CHEX-MATE: AMALGAM Weak-lensing Analysis of 41 Planck Sunyaev–Zel'dovich-selected Galaxy Clusters*", **Astronomy & Astrophysics**, 715, A177 (November 2026) $\rightarrow$ Led the homogeneous weak-lensing analysis of 41 Planck Sunyaev–Zel'dovich-selected galaxy clusters, providing the first population-level weak-lensing mass calibration for CHEX-MATE.

3. Keiichi Umetsu*, Michele Pizzardo, Antonaldo Diaferio, & Margaret J. Geller, "*Cluster Lensing Mass Inversion (CLUMI+): Combining Dynamics and Weak Lensing around Galaxy Clusters*", **The Astrophysical Journal**, 990(1), 70 (September 2025) [7 citations]
   → Developed the CLUMI+ framework, which enables joint inference of the gravitational potential in and around galaxy clusters from gravitational lensing and galaxy kinematics without assuming dynamical equilibrium.
4. Sut-Ieng Tam*, Keiichi Umetsu, Andrew Robertson, & Ian G. McCarthy, "*Testing the Collisionless Nature of Dark Matter with the Radial Acceleration Relation in Galaxy Clusters*", **The Astrophysical Journal**, 953(2), 169 (August 2023) [7 citations]
   → Turned the cluster-scale radial acceleration relation into a quantitative test of dark-matter self-interactions using matched CDM and SIDM cosmological hydrodynamical simulations.
5. Keiichi Umetsu*, Shutaro Ueda, Bau-Ching Hsieh, Mario Nonino, I-Non Chiu, Masamune Oguri, Sandor M. Molnar, Anton M. Koekemoer, & Sut-Ieng Tam, "*Line-of-sight Elongation and Hydrostatic Mass Bias of the Frontier Fields Galaxy Cluster Abell 370*", **The Astrophysical Journal**, 934(2), 169 (August 2022) [13 citations]
   → Revealed extreme line-of-sight elongation and substantial hydrostatic mass bias in the massive merging cluster Abell 370 through joint weak-lensing and X-ray analysis.
6. Sut-Ieng Tam, Keiichi Umetsu*, & Adam Amara, "*Likelihood-free Forward Modeling for Cluster Weak Lensing and Cosmology*", **The Astrophysical Journal**, 925(2), 145 (February 2022) [20 citations]
   → Developed the first simulation-based framework to combine cluster-abundance evolution with cosmology-dependent weak-lensing mass calibration self-consistently, without requiring an explicit analytic likelihood.
7. Keiichi Umetsu*, *"Cluster–Galaxy Weak Lensing"*, **The Astronomy and Astrophysics Review**, 28(1), 7 (December 2020) [207 citations]
   → Authored an invited, 106-page solo review that synthesizes the theoretical foundations, methodology, and scientific reach of cluster–galaxy weak lensing for the broader astrophysical community.
8. Yong Tian*, Keiichi Umetsu, Chung-Ming Ko, Megan Donahue, & I-Non Chiu, "*The Radial Acceleration Relation in CLASH Galaxy Clusters*", **The Astrophysical Journal**, 896(1), 70 (June 2020) [81 citations]
   → Established the first lensing-based radial acceleration relation spanning brightest-cluster-galaxy and cluster scales, without relying on equilibrium assumptions and while accounting for the full baryonic mass budget.
9. Keiichi Umetsu*, Mauro Sereno, Maggie Lieu, Hironao Miyatake, Elinor Medezinski, Atsushi J. Nishizawa, Paul Giles, Fabio Gastaldello, Ian G. McCarthy, Martin Kilbinger, Mark Birkinshaw, Stefano Ettori, Nobuhiro Okabe, I-Non Chiu, Jean Coupon, Dominique Eckert, Yutaka Fujita, Yuichi Higuchi, Elias Koulouridis, Ben Maughan, Satoshi Miyazaki, Masamune Oguri, Florian Pacaud, Marguerite Pierre, David Rapetti, & Graham P. Smith, *"Weak-lensing Analysis of X-Ray-selected XXL Galaxy Groups and Clusters with Subaru HSC Data"*, **The Astrophysical Journal**, 890(2), 148 (February 2020) [118 citations]
   → Led the HSC weak-lensing calibration of 136 X-ray-selected XXL groups and clusters, providing a robust mass anchor across two decades in halo mass for multi-probe cluster cosmology.
10. Keiichi Umetsu*, Mauro Sereno, Sut-Ieng Tam, I-Non Chiu, Zuhui Fan, Stefano Ettori, Daniel Gruen, Teppei Okumura, Elinor Medezinski, Megan Donahue, Massimo Meneghetti, Brenda Frye, Anton Koekemoer, Tom Broadhurst, Adi Zitrin, Italo Balestra, Narciso Benitez, Yuichi Higuchi, Peter Melchior, Amata Mercurio, Julian Merten, Alberto Molino, Mario Nonino, Marc Postman, Piero Rosati, Jack Sayers, & Stella Seitz, *"The Projected Dark and Baryonic Ellipsoidal Structure of 20 CLASH Galaxy Clusters"*, **The Astrophysical Journal**, 860(2), 104 (June 2018) [84 citations]
    → Measured the ensemble projected halo ellipticity of 20 CLASH clusters from two-dimensional shear maps with magnification constraints, and demonstrated close alignment of the dark-matter and X-ray gas distributions.
11. Keiichi Umetsu* & Benedikt Diemer, *"Lensing Constraints on the Mass Profile Shape and the Splashback Radius of Galaxy Clusters"*, **The Astrophysical Journal**, 836(2), 231 (February 2017) [115 citations]
    → Provided the first direct lensing constraint on the splashback radius, opening gravitational lensing as a probe of physical halo boundaries and accretion dynamics.
12. Keiichi Umetsu*, Adi Zitrin, Daniel Gruen, Julian Merten, Megan Donahue, & Marc Postman, *"CLASH: Joint Analysis of Strong-lensing, Weak-lensing Shear, and Magnification Data for 20 Galaxy Clusters"*, **The Astrophysical Journal**, 821(2), 116 (April 2016) [308 citations]
    → Delivered the benchmark joint strong- and weak-lensing analysis of 20 CLASH clusters, demonstrating a cuspy ensemble total-mass profile and Λ CDM-consistent concentrations for the X-ray-selected subsample.
13. Keiichi Umetsu*, Mauro Sereno, Elinor Medezinski, Mario Nonino, Tony Mroczkowski, Jose M. Diego, Stefano Ettori, Nobuhiro Okabe, Tom Broadhurst, & Doron Lemze, *"Three-dimensional Multi-probe Analysis of the Galaxy Cluster A1689"*, **The Astrophysical Journal**, 806(2), 207 (June 2015) [85 citations]
    → Advanced three-dimensional multi-probe inference for Abell 1689 by jointly modeling strong and weak lensing, X-ray, and Sunyaev–Zel'dovich data in a triaxial framework, constraining its intrinsic geometry and hydrostatic bias.

14. Keiichi Umetsu*, Elinor Medezinski, Mario Nonino, Julian Merten, Marc Postman, Massimo Meneghetti, Megan Donahue, Nicole Czakon, Alberto Molino, Stella Seitz, Daniel Gruen, Doron Lemze, Italo Balestra, Narciso Benitez, Andrea Biviano, Tom Broadhurst, Holland Ford, Claudio Grillo, Anton Koekemoer, Peter Melchior, Amata Mercurio, John Moustakas, Piero Rosati, & Adi Zitrin, *"CLASH: Weak-Lensing Shear-and-Magnification Analysis of 20 Galaxy Clusters"*, **The Astrophysical Journal**, 795(2), 163 (November 2014) [421 citations]
→ Established the homogeneous shear-and-magnification weak-lensing analysis of 20 CLASH clusters, delivering mass-profile reconstructions and halo-mass measurements with controlled systematics.
15. Keiichi Umetsu*, *"Model-Free Multi-Probe Lensing Reconstruction of Cluster Mass Profiles"*, **The Astrophysical Journal**, 769(1), 13 (May 2013) [48 citations]
→ Developed the CLUMI framework, combining weak-lensing shear and magnification to break the mass-sheet degeneracy and incorporating strong-lensing constraints to extend mass reconstruction into cluster cores.
16. Keiichi Umetsu*, Elinor Medezinski, Mario Nonino, Julian Merten, Adi Zitrin, Alberto Molino, Claudio Grillo, Mauricio Carrasco, Megan Donahue, Andisheh Mahdavi, Dan Coe, Marc Postman, Anton Koekemoer, Nicole Czakon, Jack Sayers, Tony Mroczkowski, Sunil Golwala, Patrick M. Koch, Kai-Yang Lin, Sandor M. Molnar, Piero Rosati, Italo Balestra, Amata Mercurio, Marco Scodeggio, Andrea Biviano, Timo Anguita, Leopoldo Infante, Gregor Seidel, Irene Sendra, Stephanie Jouvel, Ole Host, Doron Lemze, Tom Broadhurst, Massimo Meneghetti, Leonidas Moustakas, Matthias Bartelmann, Narciso Benitez, Rychard Bouwens, Larry Bradley, Holland Ford, Yolanda Jimenez-Teja, Daniel Kelson, Ofer Lahav, Peter Melchior, John Moustakas, Sara Ogaz, Stella Seitz, & Wei Zheng, *"CLASH: Mass Distribution in and around the Galaxy Cluster MACS J1206.2-0847 from a Full Cluster Lensing Analysis"*, **The Astrophysical Journal**, 755(1), 56 (August 2012) [170 citations]
→ Established the first benchmark full-lensing analysis in CLASH by combining weak-lensing shear and magnification with strong-lensing constraints and demonstrating consistency across semi-independent strong-lens models.
17. Keiichi Umetsu*, Tom Broadhurst, Adi Zitrin, Elinor Medezinski, Dan Coe, & Marc Postman, *"A Precise Cluster Mass Profile Averaged from the Highest Quality Lensing Data"*, **The Astrophysical Journal**, 738(1), 41 (September 2011b) [166 citations]
→ Established a precise benchmark stacked full-lensing mass profile for massive galaxy clusters from pre-CLASH data, combining weak and strong lensing, and showing agreement with the cuspy NFW form expected in ΛCDM.
18. Keiichi Umetsu*, Tom Broadhurst, Adi Zitrin, Elinor Medezinski, & Li-Yen Hsu, *"Cluster Mass Profiles from a Bayesian Analysis of Weak Lensing Distortion and Magnification Measurements: Applications to Subaru Data"*, **The Astrophysical Journal**, 729(2), 127 (March 2011a) [191 citations]
→ Developed a Bayesian shear-and-magnification framework that breaks the mass-sheet degeneracy and reconstructs binned cluster mass profiles beyond the virial radius.
19. Keiichi Umetsu*, Elinor Medezinski, Tom Broadhurst, Adi Zitrin, Nobuhiro Okabe, Bau-Ching Hsieh, & Sandor M. Molnar, *"The Mass Structure of the Galaxy Cluster Cl0024+1654 from a Full Lensing Analysis of Subaru and ACS/NIC3 Observations"*, **The Astrophysical Journal**, 714(2), 1470 (May 2010) [117 citations]
→ Resolved earlier strong- versus weak-lensing mass discrepancies in Cl 0024+1654 through improved background-galaxy selection and a joint full-lensing analysis.
20. Keiichi Umetsu*, Mark Birkinshaw, Guo-Chin Liu, Jiun-Huei Proty Wu, Elinor Medezinski, Tom Broadhurst, Doron Lemze, Adi Zitrin, Paul T. P. Ho, Chih-Wei Locutus Huang, Patrick M. Koch, Yu-Wei Liao, Kai-Yang Lin, Sandor M. Molnar, Hiroaki Nishioka, Fu-Cheng Wang, Pablo Altamirano, Chia-Hao Chang, Shu-Hao Chang, Su-Wei Chang, Ming-Tang Chen, Chih-Chiang Han, Yau-De Huang, Yuh-Jing Hwang, Homin Jiang, Michael Kesteven, Derek Y. Kubo, Chao-Te Li, Pierre Martin-Cocher, Peter Oshiro, Philippe Raffin, Tashun Wei, & Warwick Wilson, *"Mass and Hot Baryons in Massive Galaxy Clusters from Subaru Weak Lensing and AMiBA Sunyaev–Zel'dovich Effect Observations"*, **The Astrophysical Journal**, 694(2), 1643 (April 2009) [140 citations]
→ Led the weak-lensing analysis for the Taiwan-led AMiBA project, combining Subaru lensing and Sunyaev–Zel'dovich measurements to constrain cluster masses and hot-gas fractions directly.
21. Keiichi Umetsu* & Tom Broadhurst, *"Combining Lens Distortion and Depletion to Map the Mass Distribution of A1689"*, **The Astrophysical Journal**, 684(1), 177 (September 2008) [192 citations]
→ Demonstrated and corrected the radial dilution caused by cluster-member contamination in Abell 1689, reconciling weak- and strong-lensing mass profiles through joint shear and magnification measurements.
22. Yuki Okura, Keiichi Umetsu*, & Toshifumi Futamase, *"A Method for Weak-Lensing Flexion Analysis by the HOLICs Moment Approach"*, **The Astrophysical Journal**, 680(1), 1 (June 2008) [78 citations]
→ Developed the HOLICs flexion estimator as a higher-order extension of the Kaiser–Squires–Broadhurst moment method and applied it to Abell 1689, obtaining a clear flexion detection.
23. Yuki Okura, Keiichi Umetsu*, & Toshifumi Futamase, *"A New Measure for Weak-Lensing Flexion"*, **The Astrophysical Journal**, 660(2), 995 (May 2007) [93 citations]
→ Introduced the HOLICs moment formalism for weak-lensing flexion, relating higher-order galaxy-image moments to first- and second-flexion estimators.

Complete List of Publications: Keiichi Umetsu

- Publications in each category are listed in reverse-chronological order. Papers currently submitted to refereed journals are marked in blue.
- My name is underlined. An asterisk ($*$) indicates the corresponding author. Double underlining indicates students or postdoctoral researchers whom I directly supervised or mentored in the work reported in the publication.
- See my NASA/ADS library: https://ui.adsabs.harvard.edu/public-libraries/YfVHJhW3T6K0z00QW7fl3w
- See my Google Scholar profile: https://scholar.google.com/citations?user=JHAdrV0AAAAJ
- See my ORCID profile: https://orcid.org/0000-0002-7196-4822

(A) Refereed Journal Publications and Submitted Manuscripts

1. Jiashuo Zhang, Tom Broadhurst, Tzihong Chiueh, Keiichi Umetsu, Hsi-Yu Schive, Chian-Chou Chen, Jeremy Lim, Jose M. Diego, Paloma Morilla, Pablo G. Perez-Gonzalez, & Rogier Windhorst, "*JWST Evidence for a Sharp Cosmic Daybreak at $z = 15$*", submitted to **Nature Astronomy** (arXiv:2609.28257)
2. Jiashuo Zhang, Tom Broadhurst, Alvaro Pozo, Tzihong Chiueh, Hsi-Yu Schive, Bo-Ren You, Jeremy Lim6, Francine Marleau, Tomomi Sunayama, Keiichi Umetsu, Mariam Bouhmadi-Lopez, & Masamune Oguri, "*Generating the Wide Sequence of Diffuse Galaxies with de Broglie Waves of Dark Matter*", submitted to **Nature Astronomy** (arXiv:2609.11510)
3. Keiichi Umetsu*, "*Why Azimuthal Averaging Works in Halo Lensing: Symmetry and Power Counting for Nonlinear Shear and Magnification*", submitted to **ApJ** (arXiv:2609.08825)
4. Anthony Englert, Shenming Fu, Ian Dell'Antonio, Mohamed Abdullah, Shrouk Abdulshafy, Eddie Aljamal, William Black, Nicole Chidester, Douglas Clowe, M. Cooper, Megan Donahue, Zacharias Escalante, August (Gus) Evrard, Eric Habjan, Soren Helhoski, Ruoning Lan, Binyang Liu, Jacqueline McCleary, Hironao Miyatake, Mireia Montes, Priyamvada Natarajan, Jessica Nelson, Michelle Ntampaka, Elena Pierpaoli, Marc Postman, Rahul Shinde, Jubee Sohn, Fuyuko Tanaka, David Turner, Keiichi Umetsu, Yousuke Utsumi, Ray Wang, & Gillian Wilson, submitted to **ApJS** (arXiv:2607.16417)
"*LoVoCCS. III. Third Generation Pipeline & The Hercules Supercluster*"
5. R. Gavazzi*, K. Umetsu, E. Bertin, A. Donnarumma, M. Sereno, N. Okabe, & L. Ingoglia, submitted to **A&A**
"*AMALGAM: A Large Sample of Galaxy Clusters for Weak Lensing from Pixels in Multi-band Images to Galaxy Photometry and Shape*"
6. Sut-Ieng Tam*, Keiichi Umetsu, Adam Amara, Dominique Eckert, Manon Regamey, Nicolas Cerardi, I-Non Chiu, Mauro Sereno, Florian Pacaud, Sunayana Bhargava, Christian Garrel, Fabio Gastaldello, Elias Koulouridis, Ben Maughan, Rogério Monteiro-Oliveira, & Marguerite Pierre, submitted to **ApJ** (arXiv:2602.11989)
"*Simulation-Based Cosmological Mass Calibration of XXL Galaxy Clusters using HSC Weak Lensing*"
7. I-Hsuan Li, Shutaro Ueda, I-Non Chiu, & Keiichi Umetsu, **ApJ** in press (arXiv:2601.14392)
"*An Azimuthally Resolved Study of Sloshing Cold Fronts in Three Nearby Galaxy Clusters*"
8. Keiichi Umetsu*, Raphael Gavazzi, Mauro Sereno, Nobuhiro Okabe, Emmanuel Bertin, Gianluca Castignani, Stefano Ettori, Fabio Gastaldello, Carlo Giocoli, Scott T. Kay, Junhan Kim, Maggie Lieu, Lorenzo Lovisari, Ben J. Maughan, Mario Nonino, Lorenzo Pizzuti, Etienne Pointecouteau, Gabriel W. Pratt, Mario Radovich, Elena Rasia, Mariachiara Rossetti, Harshda Saxena, & Jack Sayers, **A&A**, 715, A177 (November 2026)
"*CHEX-MATE: AMALGAM Weak-lensing Analysis of 41 Planck Sunyaev–Zel'dovich-selected Galaxy Clusters*"
9. I-Non Chiu, Kai-Feng Chen, Masamune Oguri, Satoshi Miyazaki, Surhud More, Atsushi J. Nishizawa, Nobuhiro Okabe, Ken Osato, Naomi Ota, Tomomi Sunayama, Sut-Ieng Tam, & Keiichi Umetsu, **The Open Journal of Astrophysics**, Volume 9 (September 2026)
"*Weak-lensing Shear-Selected Galaxy Clusters from the Hyper Suprime-Cam Subaru Strategic Program: III. A Precision Cosmological Sample Enabled by Optical Confirmation*"
10. Adriana Gavidia, Junhan Kim, Jack Sayers, Mauro Sereno, Loris Chappuis, Dominique Eckert, Keiichi Umetsu, Herve Bourdin, Federico De Luca, Stefano Ettori, Massimo Gaspari, Raphael Gavazzi, Scott Kay, Lorenzo Lovisari, Pasquale Mazzotta, Gabriel Pratt, Elena Rasia, & Mariachiara Rossetti, **A&A**, 710, A40 (June 2026)
"*CHEX-MATE: Cluster Multi-Probes in Three Dimensions (CLUMP-3D) II. Combined Gas and Dark Matter Analysis from X-ray, SZE, and WL*"

11. Lorenzo Pizzuti, Federico Rivano, Keiichi Umetsu, & Andrea Biviano, **Universe**, 12, 124 (April 2026)
"*CLASH-VLT: the Fifth Force in Chameleon Gravity from Joint Lensing and Kinematics Cluster Mass Profiles*"

12. M. Regamey, D. Eckert, R. Seppi, W. Hartley, K. Umetsu, S. Tam, & D. Gerolymatou, **A&A**, 708, A260 (April 2026)
"*Galaxy Cluster Count Cosmology with Simulation-based Inference*"

13. L. Pizzuti, A. Biviano, K. Umetsu, E. Agostoni, A. Autorino, A. M. Pombo, A. Mercurio, & M. D'Addona, **JCAP**, 03, 022 (March 2026)
"*CLASH-VLT: Constraining Deviation from GR with the Mass Profiles of Nine Massive Galaxy Clusters*"

14. I-Non Chiu, Vittorio Ghirardini, Sebastian Grandis, Nobuhiro Okabe, Esra Bulbul, Y. Emre Bahar, Fabian Balzer, Nicolas Clerc, Johan Comparat, Florian Kleinebreil, Matthias Kluge, Ang Liu, Rogerio Monteiro-Oliveira, Masamune Oguri, Florian Pacaud, Miriam Ramos Ceja, H. Thomas Reiprich, Jeremy Sanders, Tim Schrabback, Riccardo Seppi, Martin Sommer, Sut-Ieng Tam, Keiichi Umetsu, & Xiaoyuan Zhang, **A&A**, 704, A110 (December 2025)
"*The SRG/eROSITA All-Sky Survey. The Weak-Lensing Mass Calibration and the Stellar Mass-to-Halo Mass Relation from the Hyper Suprime-Cam Subaru Strategic Program*"

15. A. Pozo, T. Broadhurst, H. N. Luu, G. Smoot, K. Umetsu, T. Chiueh, H.-Y. Schive, R. Emami, L. Hernquist, P. Mocz, & M. Vogelsberger, **A&A**, 704, A34 (December 2025)
"*Infalling Ultra Faint Dwarfs as Emissaries of the Axiverse?*"

16. J. P. Breuer, N. Werner, F. Mernier, K. Umetsu, A. Simionescu, M. Devlin, L. Di Mascolo, T. Dibblee-Barkman, S. Dicker, B. S. Mason, T. Mroczkowski, C. Romero, C. L. Sarazin, & J. Sievers, **A&A**, 703, A231 (November 2025)
"*The Thermodynamic Structure and Large-scale Structure Filament in MACS J0717.5+3745* "

17. Shouvik Roy Choudhury*, Teppei Okumura, & Keiichi Umetsu, **ApJ Letters**, 994 L26 (November 2025)
"*Cosmological Constraints on Non-phantom Dynamical Dark Energy with DESI Data Release 2 Baryon Acoustic Oscillations: A* $3\sigma+$ *Lensing Anomaly*"

18. Keiichi Umetsu*, Michele Pizzardo, Antonaldo Diaferio, & Margaret J. Geller, **ApJ**, 990, 70 (September 2025)
"*Cluster Lensing Mass Inversion (CLUMI+): Combining Dynamics and Weak Lensing around Galaxy Clusters*"

19. Nobuhiro Okabe, Thomas Reiprich, Sebastian Grandis, I-Non Chiu, Masamune Oguri, Keiichi Umetsu, Esra Bulbul, Emre Bahar, Fabian Balzer, Nicolas Clerc, Johan Comparat, Vittorio Ghirardini, Florian Kleinebreil, Matthias Kluge, Ang Liu, Yen-Ting Lin, Rogério Monteiro-Oliveira, Florian Pacaud, Miriam Ramos Ceja, Jeremy Sanders, Tim Schrabback, Riccardo Seppi, Martin Sommer, & Xiaoyuan Zhang, **A&A**, 700, A46 (August 2025)
"*The SRG/eROSITA All-Sky Survey : Subaru/HSC-SSP weak-lensing mass measurements for the eRASS1 Galaxy Clusters*"

20. Chayan Mondal*, Kanak Saha, Anshuman Borgohain, Brent M. Smith, Rogier A. Windhorst, Naveen Reddy, Chian-Chou Chen, Keiichi Umetsu, & Rolf A. Jansen, **ApJ** 988, 171 (August 2025)
"*GNHeII J1236+6215: A He II* λ*1640 Emitting and Potentially LyC Leaking Galaxy at* $z = 2.9803$ *Unveiled Through JWST & Keck Observations"*

21. L. Chappuis, D. Eckert, M. Sereno, A. Gavidia, J. Sayers, J. Kim, M. Rossetti, K. Umetsu, H. Saxena, I. Bartalucci, R. Gavazzi, A. Rowlands Doblas, E. Pointecouteau, S. Ettori, G. W. Pratt, H. Bourdin, R. Cassano, F. De Luca, M. Donahue, M. Gaspari, F. Gastaldello, V. Ghirardini, M. Gitti, B. Maughan, P. Mazzotta, F. Oppizzi, E. Rasia, & M. Radovich, **A&A**, 699, A141 (July 2025)
"*CHEX-MATE: Multi-probe analysis of Abell 1689*"

22. C. Stuardi, A. Botteon, M. Sereno, K. Umetsu, R. Gavazzi, A. Bonafede, & C. Gheller, **A&A**, 695, L16 (March 2025)
"*Radio Emission from a Massive Node of the Cosmic Web. A Discovery Powered by Machine Learning*"

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"*CHEX-MATE: the Intracluster Medium Entropy Distribution in the Gravity-dominated Regime*"

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→ Co-authored the advanced graduate textbook in Japanese "Gravitational Lensing and Gravitational Wave Astronomy from the Foundations of General Relativity" (T. Futamase, K. Umetsu, & Y. Ito, March 2025) published by *Nippon Hyoron Sha Co., Ltd.* (est. 1918). Authored Chapter 3 on gravitational lensing, presenting its theoretical foundations and cosmological applications.

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