PERSONAL INFORMATION

Name: **Andy Shu Ho To**
Date of birth: 02/11/1996
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RESEARCH EXPERIENCE

01/09/2023 – present	**ESA Research Fellow in Space Science** Directorate of Science, European Space Agency, European Space Research and Technology Centre, Noordwijk, Netherlands.
23/09/2019 – 23/08/2023	**STFC PhD Candidate** Mullard Space Science Laboratory, University College London, United Kingdom.

EDUCATION

23/09/2019 – 23/08/2023	**PhD in Solar Physics** Thesis: "Coronal Plasma Composition Evolution and Solar Activity" at Mullard Space Science Laboratory, University College London, United Kingdom. Supervisors: Prof. Sarah Matthews, Prof. Lidia van Driel-Gesztelyi, Dr David M. Long, Dr Deborah Baker
01/09/2018 – 31/08/2019	**Master's degree in Theoretical Physics (Distinction)** King's College London, United Kingdom.
01/09/2015 – 30/08/2018	**Bachelor's degree in Physics (2:I)** Imperial College London, United Kingdom.

FUNDING & AWARD HISTORY

2023	ESA Postdoctoral Research Fellowship	ca. 350,000 Euros
2023	ESA Faculty Research Grant	17,000 Euros
2023	NAOJ travel grant	2,500 Euros
2023	UK STFC Long Term Attachment Grant	7,000 Euros
2019	STFC PhD Studentship	ca. 160,000 Euros
2020	UCL Doctoral School Research Poster Competition	500 Euros

RESEARCH VISITS

10/2024 – 11/2024	UH Institute for Astronomy	3 weeks
09/2024 – 10/2024	Lockheed Martin Solar and Astrophysics Laboratory	2 weeks
09/2024	Naval Research Laboratory	1 week
01/2023 – 03/2023	University of Tokyo	2 months

AWARDED OBSERVING TIME

Time granted upon evaluation of observing proposals by a committee of experts.

PI *"Understanding the Correlation between Solar Abundances and F10.7 Radio Emission"*
JVLA (S band) 4hrs, joint observations with GREGOR, SST, IRIS, Hinode, published 1 article

SUPERVISION OF STUDENTS

12/01/2026 – present	*"Linking FIP Bias Measurements with Ground Based Observations"* **Ferdia Quinn**, Internship Programme at Dublin City University, Dublin, Ireland.
01/09/2025 – 28/02/2026	*"Exploring Elemental Composition Across the Solar Atmospheric Layers."* **Anna Bauernfeind**, Internship Programme at European Space Agency, European Space Research and Technology Centre, Noordwijk, Netherlands.
01/02/2025 – present	"*Signs of Sulphur fractionation under high magnetic field strength"* **Dominik Orlovskij**, Internship Programme and final year project at Dublin City University, Dublin, Ireland. Paper submitted to Philosophical Transactions of the Royal Society **First author on Orlovskij et al. 2026; RSPTA**
01/06/2025 – 15/08/2025	*"Predicting Solar Flares: Uncovering Early Warning Signs in Hinode/EIS Spectroscopic Data"* **Despina Ioannide**, Summer Programme at European Space Agency, European Space Research and Technology Centre, Noordwijk, Netherlands.
01/06/2024 – 15/08/2024	"*Uncovering solar flares through statistical analysis of Hinode observations."*

	Abigail Burden, Internship Programme at European Space Agency, European Space Research and Technology Centre, Noordwijk, Netherlands. **Coauthor on To et al. 2025; ApJ, 993, 102. doi:10.3847/1538-4357/ae07de**
01/06/2024 – 15/08/2024	*"Multi-spectral characterisation of solar atmospheric dynamic"* **Eva Sola Viladesau**, Internship Programme at European Space Agency, European Space Research and Technology Centre, Noordwijk, Netherlands.

TEACHING ACTIVITIES

2025, 2026	*"Space Weather"*, Guest lecturer, Leiden University, Leiden, Netherlands.
2025	Mentor for the Solar Orbiter Hackathon, European Space Agency, European Space Research and Technology Centre, Noordwijk, Netherlands
2020, 2021, 2022	Python tutor, MSSL work experience week, Mullard Space Science Laboratory, United Kingdom.
2021 – 2022	UCL Solar Physics Course Lecturer Assistant, Mullard Space Science Laboratory, United Kingdom.

INSTITUTIONAL RESPONSIBILITIES AND POSITIONS OF TRUST

2025 – present	Reviewer for Astronomy & Astrophysics, Philosophical Transactions of the Royal Society, The Astrophysical Journal
2025 – present	SunPy advisory board
2024 – present	Solar Orbiter, Hinode, IRIS co-observation coordinator
2024 – 2025	IRIS planner
2024 – 2025	Local and Scientific Organising Committee (LSOC), European Space Agency Science Workshop 17
2020	Solarnet school coordinator, Mullard Space Science Laboratory, UCL

OUTREACH AND PUBLIC ENGAGEMENT

04/2026	*"Solar cycle through the eyes of our ancestors"*, Astronomy on Tap Leiden
2023, 2024, 2025	ESA/ESTEC open day Solar Orbiter representative
2021, 2022	UCL/Mullard Space Science Laboratory work experience week demonstrator

INVITED TALKS

03/2026	Seminar – Solar Orbiter Community building Webinars, ESA/ESTEC. Title: *"Solar Orbiter coordination with Hinode and IRIS"*
06/2025	Invited Talk – Hinode 18/IRIS 16 Meeting, London, United Kingdom. Title: *"Systematic non-thermal velocity increase preceding soft X-ray flare onset"*
06/2025	Invited Talk – Royal Society Theo Murphy Meeting, Edinburgh, United Kingdom. Title: *"Understanding EUV solar plasma composition in flares: spatial and temporal perspectives"*
12/2024	Invited Talk – Solar-C EUVST Science Meeting, Online. Title: *"Strange Coronal Composition Variation and Where to Find Them"*
11/2024	Seminar – Dublin City University, Dublin, Ireland. Title: *"Strange Coronal Composition Variation and Where to Find Them"*
10/2024	Seminar – Lockheed Martin Solar and Astrophysics Laboratory, California, United States. Title: "*Strange Coronal Composition Variation and Where to Find Them*"
10/2024	Seminar – Naval Research Laboratory, Washington, D.C., United States. Title: "*Strange Coronal Composition Variation and Where to Find Them*"
02/2024	Seminar – European Space Agency Heliophysics Seminar, Nethelands. Title: "*Strange Coronal Composition Variation and Where to Find Them*"
08/2023	Seminar – The European Solar Physics Online Seminars (ESPOS), Online. Title: *"Coronal Plasma Composition Evolution and Solar Activity"*
02/2023	Seminar – National Astronomical Observatory of Japan, Tokyo, Japan. Title: *"Coronal Plasma Composition Evolution and Solar Activity"*
01/2023	Seminar – Kyoto University, Kyoto, Japan, Title: *"Coronal Plasma Composition Evolution and Solar Activity"*

CONFERENCE TALKS

08/2026	COSPAR2026,

Talk title:*" Systematic Nonthermal Velocity Increase Preceding Soft X-Ray Flare Onset: A Large-scale Hinode/EIS Study"*

08/2024 Hinode-17/IRIS-15/SPHERE-3 Joint Science Meeting, Montana, United States.
Talk title:*"Identifying Plasma Fractionation Processes in the Chromosphere Using IRIS"*

06/2024 Coronal Loops Workshop, Tenerife, Spain.
Talk title: "*Spatial and temporal evolution of elemental abundances in cooling flare loops"*

02/2024 ESA Space Science Workshops 16, Madrid, Spain.
Talk title: *"Spatially Resolved Plasma Composition Evolution in an X-class Flare"*

10/2023 Hinode-16/IRIS-13 Joint Science Meeting, Niigata, Japan.
Talk title: *"Spatially Resolved Plasma Composition Evolution in an X-class Flare"*

09/2022 COSPAR, Athens, Greece.
Talk title: *"Understanding the Correlation between Solar Abundances and F10.7 Radio Emission"*

09/2021 Hinode 14/IRIS-11 Joint Science Meeting, Prague, Czech Republic.
Talk title: *"The evolution of plasma composition during a solar flare"*

09/2021 XVIIth Hvar Astrophysical Colloquium, Online.
Talk title: *"The evolution of plasma composition during a solar flare"*

08/2021 Solarnet Summer School – High Resolution Solar Physics, Online.
Talk title: *"The evolution of plasma composition during a solar flare"*

05/2021 SolFER Spring Meeting on Solar Flare Energy Release, Online.
Talk title: *"The evolution of plasma composition during a solar flare"*

05/2021 National Astronomy Meeting, Online.
Talk title: *"The evolution of plasma composition during a solar flare"*

12/2020 Solar Orbiter Workshop, St Andrews, United Kingdom.
Talk title: *"The evolution of plasma composition during transient events"*

PUBLICLY AVAILABLE DATASET

2025 *"Hinode/EIS Solar Flare Footpoint Non-Thermal Velocity Dataset (2011–2024) [Data set]."*
To, Andy S. H. (2025). Zenodo. https://doi.org/10.5281/zenodo.15613861

Bibliograhy

Summary

Refereed publications: 20
Refereed publications as first author: 5
Citations: 229 (total), 47 (first author publications), from NASA ADS
H-index: 11

First author publications

1. "*Chromospheric dynamics and turbulence regulate the solar FIP effect*"
   To, Andy S. H., Laming, J. M., Reep, J., Finley, A. J. (accepted for publication in Philosophical Transactions of the Royal Society A)
2. *"Systematic non-thermal velocity increase preceding soft X-ray flare onset."*
   To, Andy S. H., Burden, A., Baker, D., Eklund, H., Brooks, D. H., Hayes, L. A., Martínez-Sykora, J., Testa, P., Reep, J., Janvier, M., Imada, S., Hernandez Camero, J., Long, D. M., Mihailescu, T., Weberg, M. J. (2025). The Astrophysical Journal, 993, 102. doi:10.3847/1538-4357/ae07de
3. *"Spatially resolved plasma composition evolution in a solar flare – The effect of reconnection outflow."*
   To, Andy S. H., Brooks, D. H., Imada, S., French, R. J., van Driel-Gesztelyi, L., Baker, D., Long, D. M., Ashfield, W., Hayes, L. A. (2024). Astronomy and Astrophysics, 691, 95T. doi:2024A&A...691A..95T
4. *"Understanding the Relationship between Solar Coronal Abundances and F10.7 cm Radio Emission."*
   To, Andy S. H., James, A. W., Bastian, T. S., van Driel-Gesztelyi, L., Long, D. M., Baker, D., Brooks, D. H., Lomuscio, S., Stansby, D., Valori, G. (2023). The Astrophysical Journal, 948, 121T. doi:2023ApJ...948..121T
5. *"The Evolution of Plasma Composition during a Solar Flare.*"
   To, Andy S. H., Long, D. M., Baker, D., Brooks, D. H., van Driel-Gesztelyi, L., Laming, J. M., Valori, G. (2021). The Astrophysical Journal, 911, 86T. doi:2021ApJ...911...86T

Co-author publications

6. *"Radiative hydrodynamic simulations of FIP fractionation in solar flares."*

Reep, J. W., Fushimi Benavitz, L., **To, Andy S. H.**, Brooks, D. H., Laming, J. M., Antolin, P., Long, D. M., Baker, D. (submitted to Philosophical Transactions of the Royal Society A)

7. *"Signs of Sulphur fractionation under high magnetic field strength"*
   Orlovskij, D., **To, Andy S. H.**, Long, D. M. (submitted to Philosophical Transactions of the Royal Society A)
8. *"Dynamic modeling of coronal abundances during flares on M-dwarf stars."*
   Brooks, D. H., Reep, J. W., **To, Andy S. H.**, Fushimi Benavitz, L., Tarr, L. A. (submitted to Philosophical Transactions of the Royal Society A)
9. *"Inverse FIP plasma in the solar atmosphere: a synthesis of current understanding and new insights."*
   Baker, D., Brooks, D. H., Long, D. M., **To, Andy S. H.**, van Driel-Gesztelyi, L., Démoulin, P., Stangalini, M., Yardley, S. L., Mihailescu, T., Hayes, L., Kerr, G. S., Reep, J. W., Valori, G., Laming, J. M., Murabito, M., James, A. W., Mesoraca, A., Testa, P., Pedram, E. (submitted to Philosophical Transactions of the Royal Society A)
10. *"Sulfur fractionation in coronal plumes as observed by Solar Orbiter/SPICE."*
    Mzerguat, S., Janvier, M., Buchlin E., Baker D., **To, Andy S. H.**, Long D. M., Prado N. Z. (submitted to Philosophical Transactions of the Royal Society A)
11. *"Comparing First Ionisation Potential bias diagnostics in the solar atmosphere."*
    Spruksta, K. D., Long, D. M., **To, Andy. S. H.** (submitted to Philosophical Transactions of the Royal Society A)
12. *"Identifying spectroscopic signatures of the ponderomotive force in the solar chromosphere."*
    Long, D. M., Baker D., Yardley S. L., Stangalini, M., **To, Andy S. H.** (submitted to Astronomy & Astrophysics)
13. *"Spatiotemporal Low FIP Abundance: A Catalyst for Coronal Condensation.*"
    Fushimi Benavitz, L., Reep, J. W., Tarr, L. A., **To, Andy S. H.** (2025). The Astrophysical Journal, 992, 4. doi:10.3847/1538-4357/ae019d
14. *"Searching for Evidence of Subchromospheric Magnetic Reconnection on the Sun."*
    Baker, D., van Driel-Gesztelyi, L., James, A. W., Démoulin, P., **To, Andy S. H.,** Murabito, M., Long, D. M., Brooks, D. H., McKevitt, J., Laming, J. M., Green, L. M., Yardley, S. L., Valori, G., Mihailescu, T., Matthews, S. A., Kuniyoshi, H. (2024). The Astrophysical Journal, 970, 39B. doi:2024ApJ...970...39B
15. *"Observation of Alfvén Wave Reflection in the Solar Chromosphere: Ponderomotive Force and First Ionization Potential Effect.*"
    Murabito, M., Stangalini, M., Laming, J. M., Baker, D., **To, Andy S. H.,** Long, D. M., Brooks, D. H., Jafarzadeh, S., Jess, D. B., Valori, G. (2024). Physical Review Letters, 132,. doi:2024PhRvL.132u5201M
16. *"Identifying Plasma Fractionation Processes in the Chromosphere Using IRIS."*
    Long, D. M., Baker, D., **To, Andy S. H.,** van Driel-Gesztelyi, L., Brooks, D. H., Stangalini, M., Murabito, M., James, A. W., Mathioudakis, M., Testa, P. (2024). The Astrophysical Journal, 965, 63L. doi:2024ApJ...965...63L
17. *"Slow Solar Wind Connection Science during Solar Orbiter's First Close Perihelion Passage.*"
    Yardley, S. L., Owen, C. J., Long, D. M., Baker, D., Brooks, D. H., Polito, V., Green, L. M., Matthews, S., Owens, M., Lockwood, M., Stansby, D., James, A. W., Valori, G., Giunta, A., Janvier, M., Ngampoopun, N., Mihailescu, T., **To, Andy S. H.** et al. (2023). The Astrophysical Journal Supplement Series, 267, 11Y. doi:2023ApJS..267...11Y
18. *"The Merging of a Coronal Dimming and the Southern Polar Coronal Hole*."
    Ngampoopun, N., Long, D. M., Baker, D., Green, L. M., Yardley, S. L., James, A. W., **To, Andy S. H.** (2023). The Astrophysical Journal, 950, 150N. doi:2023ApJ...950..150N
19. *"Observational Evidence of S-web Source of the Slow Solar Wind."*
    Baker, D., Démoulin, P., Yardley, S. L., Mihailescu, T., van Driel-Gesztelyi, L., D'Amicis, R., Long, D. M., **To, Andy S. H.,** Owen, C. J., Horbury, T. S., Brooks, D. H., Perrone, D., French, R. J., James, A. W., Janvier, M., Matthews, S., Stangalini, M., Valori, G., Smith, P., Cuadrado, R. A., Peter, H., Schuehle, U., Harra, L., Barczynski, K., Berghmans, D., Zhukov, A. N., Rodriguez, L., Verbeeck, C. (2023). The Astrophysical Journal, 950, 65B. doi:2023ApJ...950...65B
20. *"What Determines Active Region Coronal Plasma Composition?."*
    Mihailescu, T., Baker, D., Green, L. M., van Driel-Gesztelyi, L., Long, D. M., Brooks, D. H., **To, Andy S. H.** (2022). The Astrophysical Journal, 933, 245M. doi:2022ApJ...933..245M
21. *"Evolution of Plasma Composition in an Eruptive Flux Rope.*"

Baker, D., Green, L. M., Brooks, D. H., Démoulin, P., van Driel-Gesztelyi, L., Mihailescu, T., **To, Andy S. H.,** Long, D. M., Yardley, S. L., Janvier, M., Valori, G. (2022). The Astrophysical Journal, 924, 17B. doi:2022ApJ...924...17B

22. *"Spectropolarimetric fluctuations in a sunspot chromosphere.*"
Stangalini, M., Baker, D., Valori, G., Jess, D. B., Jafarzadeh, S., Murabito, M**., To, Andy S. H.,** Brooks, D. H., Ermolli, I., Giorgi, F., MacBride, C. D. (2021). Philosophical Transactions of the Royal Society of London Series A, 379,. doi:2021RSPTA.37900216S
23. *"Alfvénic Perturbations in a Sunspot Chromosphere Linked to Fractionated Plasma in the Corona."*
Baker, D., Stangalini, M., Valori, G., Brooks, D. H., **To, Andy S. H.,** van Driel-Gesztelyi, L., Démoulin, P., Stansby, D., Jess, D. B., Jafarzadeh, S. (2021). The Astrophysical Journal, 907, 16B. doi:2021ApJ...907...16B
24. *"Can Subphotospheric Magnetic Reconnection Change the Elemental Composition in the Solar Corona?."*
Baker, D., van Driel-Gesztelyi, L., Brooks, D. H., Démoulin, P., Valori, G., Long, D. M., Laming, J. M., **To, Andy S. H.,** James, A. W. (2020). The Astrophysical Journal, 894, 35B. doi:2020ApJ...894...35B