GIULIA MURTAS
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PROFESSIONAL HISTORY

- Center for Kinetic Plasma Physics – Department of Physics and Astronomy 2025 – now
  Assistant Professor

- Institute for Astronomy, University of Hawai'i at Mānoa 2024 – 2025
  Postdoctoral Researcher
  Mentor: Prof Colby Haggerty (colbyh@hawaii.edu)

- Los Alamos National Laboratory, Theoretical Division T-2 2022 – 2024
  Postdoctoral Researcher
  Mentor: Dr Fan Guo (guofan@lanl.gov)

EDUCATION

- University of Exeter, College of Engineering, Mathematics and Physical Sciences 2018 – 2022
  PhD in Mathematics
  Thesis Title: Modelling the Partially Ionised Solar Chromosphere
  Supervisor: Prof Andrew Hillier (a.s.hillier@exeter.ac.uk)

- Università degli Studi di Cagliari, Faculty of Sciences 2016 – 2018
  MSc in Physics – 110/110 with Honours
  Thesis Title: Solar Physics and Space Weather Studies through Single-Dish Radio Imaging
  Supervisor: Dr Alberto Pellizzoni (alberto.pellizzoni@inaf.it)

- Università degli Studi di Cagliari, Faculty of Sciences 2013 – 2016
  BSc in Physics – 103/110
  Thesis Title: RFI removal and low frequency maps calibration with SRT
  Supervisor: Dr Alberto Pellizzoni (alberto.pellizzoni@inaf.it)

RESEARCH INTERESTS

My main interest is in computational MHD and its applications in modelling explosive phenomena and particle acceleration in both collisional partially ionized plasmas – such as the solar chromosphere – and collisionless fully ionized plasmas – such as the heliospheric environment. I focus on the differences between magnetic reconnection-driven events taking place in fully and partially ionized plasmas. I am also interested in observations and spectral analysis of the solar chromosphere at centimetric radio frequencies (18 – 26 GHz).

TEACHING AND MENTORING EXPERIENCE

- 2025 – Invited lecture at the University of Cagliari, planned for the Solar Radioastronomy course.
- 2023-2024 – Assisted in the supervision of a graduate student for a project on magnetic reconnection in turbulent collisionless plasmas and two undergraduate students for projects on magnetic reconnection in the solar atmosphere
- 2021 – Assisted in the supervision of a MMath student for a project on reconnection theory and ideal tearing instability

- 2021 – Assisted in the supervision of a student for a summer internship on a 3D numerical study of the kink instability in flux tubes
- 2019-2020 – Postgraduate Teaching Assistant at the University of Exeter for the modules Mathematical Methods (MTH1002) and Mathematics with Physical Applications (PHY2025)

CONFERENCE ORGANISATION

- NAM parallel session 2021, co-organizer, Modelling of the solar atmosphere: topics beyond the magnetohydrodynamic description
- Breaking the Limits 2018 - Super-Eddington accretion onto compact objects, member of local organizing committee (https://matteobachetti.github.io/supereddington2018/)

RECENT CONTRIBUTIONS TO CONFERENCES

- March 2025 – MR2025, Princeton. Talk: Compression acceleration of Protons and Heavier Ions at the Heliospheric Current Sheet.
- December 2024 – AGU24, Washington. Two Posters: Kink instability of flux ropes in chromospheric partially ionized plasmas / Compression acceleration of Protons and Heavier Ions at the Heliospheric Current Sheet.
- July 2024 – COSPAR24, Busan. Talk: Compression Acceleration of Protons and Heavier Ions at the Heliospheric Current Sheet
- April 2024 – EclipseSA, San Antonio. Talk: Compression Acceleration of Protons and Heavier Ions at the Heliospheric Current Sheet
- December 2023 – AGU23, San Francisco. Talk: Modeling the Ion Compression Acceleration in the Heliospheric Current Sheet
- August 2023 – HSR Team Meeting, NJIT. Talk: Modeling the ion compression acceleration in reconnecting current sheets: from the heliospheric current sheet to solar jets.
- June 2023 – Solar Physics High Energy Research (SPHERE) Workshop, College Park. Talk: Particle acceleration in reconnecting current sheets: from the solar corona to the heliosphere.
- February 2023 – Confronting numerical models of the solar chromosphere and corona with high resolution observations - a RoCS/MUSE/IRIS workshop (RoCMI 2023), Svalbard. Talk: Role of chromospheric partial ionization on the dynamics of kink unstable flux ropes.
- November 2022 – 20th Annual International Astrophysics Conference, Santa Fe. Poster: Plasmoid-driven reconnection in chromospheric partially ionized plasma.
- June 2022 – Partially Ionised Plasmas in Astrophysics (PIPA2022), Budapest. Talk: Kink Instability in Chromospheric Partially Ionised Plasmas.
- October 2021 – European Space Weather Week (ESWW17/ESWW2021). Talk: SunDish Project: Single-Dish Solar Imaging with INAF Radio Telescopes. Plenary talk.
- September 2021 – European Solar Physics Meetings (ESPM-16). Talk: Ionisation and recombination effects on current sheet dynamics in chromospheric partially ionised plasmas.
- July 2021 – National Astronomy Meeting (NAM2021), Bath. Talk: Ionisation and recombination effects on current sheet dynamics in partially ionised plasmas.
- May 2021 – UKMHD 2021. Talk: Plasmoid formation in partially ionised plasmas.
- November 2020 – RAS Specialist Discussion Meeting (Modelling and observing the lower solar atmosphere: new solutions to old problems). Talk: Coalescence instability in chromospheric partially ionised plasmas.
- September 2020 – RAS Early Career Poster Exhibition. Poster: Coalescence instability in chromospheric partially ionised plasmas.
- July 2020 – UKSP Specialist Discussion Meeting Talk: Coalescence instability in chromospheric partially ionised plasmas.

- November 2019 – XXXI Canary Islands Winter School of Astrophysics, Tenerife. Poster: Study of Coalescence Instability in Chromospheric Partially Ionised Plasmas.
- July 2019 – National Astronomy Meeting (NAM2019), Lancaster. Talk: Study of Coalescence Instability in Chromospheric Partially Ionised Plasmas.
- June 2019 – Partially Ionised Plasmas in Astrophysics (PIPA2019), Palma de Mallorca. Poster: Study of Coalescence Instability in Chromospheric Partially Ionised Plasmas.
- January 2019 – ESPOS seminar. Talk: Imaging of the solar atmosphere in the centimetre-millimeter band through Single-Dish observations.

PUBLICATIONS

- **Murtas G**, et al., Mapping of the fast solar wind and the impact of plasma processes on the radio coronal holes emission: full-disk coordinated observations with IRIS, in prep.
- **Murtas G** et al., The Role of Magnetic Reconnection in Energizing Protons and Heavier Ions at the Heliospheric Current Sheet, in prep.
- Marongiu M et al. + **Murtas G**, Exploring Coronal Holes through K-band radio
- observations (18 – 26 GHz) with INAF radio telescopes, in prep.
- Mulas S et al. + **Murtas G** (2025), Correlation between Active Regions' Spectra at
- high radio frequencies and Solar flare occurrences, accepted in Scientific Reports.
- Haggerty C et al. + **Murtas G** (2025), The Enhancement of Ion Heating in Kinetic, Anti-Parallel Reconnection in the Presence of a Flow Shear, accepted by ApJ.
- **Murtas G**, Hillier A, Snow B. (2024), Kink instability of flux ropes in partially-ionised plasmas, The Astrophysical Journal, Volume 977, 1, DOI: 10.3847/1538-4357/ad79f6
- **Murtas G**, Li X, Guo F. (2024), Compression Acceleration of Protons and Heavier Ions at the Heliospheric Current Sheet, The Astrophysical Journal, Volume 974, 28, DOI: 10.3847/1538-4357/ad6e80.
- Marongiu M et al. + **Murtas G** (2024), Study of solar brightness profiles in the 18-26 GHz frequency range with INAF radio telescopes I: solar radius, accepted by A&A.
- Marongiu M et al. + **Murtas G** (2024), Study of solar brightness profiles in the 18-26 GHz frequency range with INAF radio telescopes II: evidence for coronal emission, accepted by A&A.
- **Murtas G**, Hillier A, Snow B. (2022) Collisional Ionisation and Recombination Effects on Coalescence Instability in Chromospheric Partially Ionised Plasmas, Physics of Plasmas, volume 29, DOI: 10.1063/5.0087667.
- **Murtas G**, Hillier A, Snow B. (2021) Coalescence Instability in Chromospheric Partially Ionised Plasmas, Physics of Plasmas, volume 28, DOI:10.1063/5.0032236. Selected as Editor's Pick.
- Pellizzoni A et al. + **Murtas G** (2022), Solar Observations with Single-Dish INAF Radio Telescopes: Continuum Imaging in the 18 - 26 GHz Range, Solar Physics, volume 297, DOI: 10.1007/s11207-022-02013-5.
- Snow B, Hillier A, **Murtas G**, Botha G. J. J. (2021) Shock identification and classification in 2D MHD compressible turbulence - Orszag-Tang vortex, Experimental Results, volume 2, DOI: 10.1017/exp.2021.28.
- Marongiu M, Pellizzoni A, Mulas S, **Murtas G**, A Python approach for solar data analysis: SUNDARA (SUNDish Active Region Analyser), preliminary development, INAF Technical Reports, 2021.
- Pellizzoni A, Righini S, **Murtas G**, et al., Imaging of the solar atmosphere in the centimetre-millimetre band through single-dish observations, Il Nuovo Cimento C, Volume 42, Issue 1, article id. 9, pp., January 2019.

- Pellizzoni A, Righini S, **Murtas G**, et al., High-Resolution Imaging of the Solar Chromosphere in the Centimetre-Millimetre Band through Single-Dish Observations (summary paper for 2nd URSI AT-RASC, Gran Canaria, 28 May – 1 June 2018).
- **Murtas G**, Profir M, Moreau V, CFD simulation of a simplified model of the Sardinia Radio Telescope, CRS4, UNICA, 2017. Technical report.

AWARDS

- Awarded a NERSC Allocation Year 2025 DOE Mission Science Award (ERCAP0033871).
- LANL SPOT Award (2024), awarded for outstading achievements in research in heliophysics.
- Coalescence Instability in Chromospheric Partially Ionised Plasmas paper selected as Editor's Pick by Physics of Plasmas (2021).
- Best Student Talk at UKMHD 2021 for my research on ionisation and recombination effects in partially ionised plasmas: Awarded £100.
- RAS Travel Grant 2019: Awarded £425 to attend PIPA2019 (Palma de Mallorca).