

# Orlando M. Romeo

oromeo@berkeley.edu || (410) 900-6893 || www.omromeo.com

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## EDUCATION

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- 12/2024 **University of California, Berkeley, CA**  
*Doctor of Philosophy, Earth and Planetary Science*
- 05/2020 **University of Maryland, College Park, MD**  
*Bachelor of Science (Honors), Physics - Magna Cum Laude*  
*Bachelor of Science (Honors), Astronomy - Magna Cum Laude*

## RESEARCH INTERESTS

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- Heliophysics:** Solar wind dynamics, Coronal mass ejections, Wave-particle interactions  
**Planetary Science:** Crustal magnetization, Planetary magnetospheres  
**Geospace:** Space physics, Space weather prediction  
**Instrumentation:** Electrostatic analyzers, X-ray optics, Magnetometers, Space mission design

## RESEARCH EXPERIENCE

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- 08/2020 **Graduate Student Researcher**, University of California Berkeley/SSL  
– Present **Parker Solar Probe (PSP) SWEAP Team**, *Advisor: Dr. Davin Larson*
- Calibrating the SPAN-E ESA on PSP to produce solar wind electron parameters
  - Studying electron strahl scattering under varying solar wind conditions
  - Collaborating with other instrument teams to produce additional data products
- FOXSI-4 Sounding Rocket Mission**, *Advisor: Dr. Juan Camilo Buitrago-Casas*
- Assembled, tested, and integrated the Solar Aspect and Alignment System (SAAS)
  - Performed laser and X-ray alignment tests and simulations for the optics modules
  - Supported multiple stages of rocket integration at SSL, WSMR, & PFRR
  - Monitored solar conditions to capture real-time observations of an M-class solar flare
- InSight & Zhurong Surface Magnetometers**, *Advisor: Dr. Michael Manga*
- Conducted Monte Carlo simulations of crustal magnetic fields on Mars
  - Determined probable magnetic coherence scales and depths below each landing site
  - Developed geological magnetization models to study the Martian geodynamo history
- SWFO-L1 STIS Team**, *Advisor: Dr. Davin Larson*
- Characterized magnetic field emission from the STIS solid-state telescope
  - Tested Amptek pre-amps on the electronics board for each detector channel
  - Performed detector calibration tests with high-energy ion beams and radioactive sources to validate instrument performance
  - Monitored STIS conditions during spacecraft Thermal Vacuum Chamber testing
- 05/2019 **Planetary Science Intern**, NASA Goddard Space Flight Center  
– 09/2020 **MAVEN Proton Cyclotron Waves (PCWs)**, *Advisor: Dr. Norberto Romanelli*
- Identified PCWs near Mars using Fourier and minimum variance analysis on MAVEN magnetometer data
  - Characterized PCWs and shock processes upstream of the Martian bow shock based on solar wind and planetary properties derived from the MAG and SWIA instruments

- 08/2017 **Plasma Physics Undergraduate Researcher**, University of Maryland
- 06/2020 **Machine Learning Space Weather Forecasting**, *Advisor: Dr. Surjalal Sharma*
- Adapted detrending fluctuation analysis on Advanced Composition Explorer (ACE) space weather data to detect long-range correlations over several days
  - Forecasted space weather parameters using nonlinear and data-derived techniques (delay embedding, singular value decomposition, and nearest neighbor tree search)
- Magnetic Nanoparticle Antennas**, *Advisor: Dr. Dennis Papadopoulos*
- Simulated magnetization dynamics for nanoparticles in ferro-fluid antennas from the Stoner-Wohlfarth Model, including effects of magnetization precession, hysteresis, and quantum tunneling
  - Calculated nanoparticle magnetization states to determine energy efficient materials for CubeSat antennas in plasma environments
- 05/2017 **Space Physics Intern**, Johns Hopkins University APL
- 08/2018 **RBSP Data-Driven Forecasting**, *Advisor: Dr. Aleksandr Ukhorskiy*
- Modeled radiation belt electron energy flux (eflux) from Dst index using particle diffusion theory
  - Filtered eflux measurements based on adiabatic invariants from the MagEIS and REPT instruments on the Van Allen Probes (RBSP) to calculate electron Phase Space Density (PSD)
  - Forecasted PSD from geomagnetic parameters and geosynchronous satellite observations, implementing nonlinear and data-derived techniques, such as delay embedding, singular value decomposition, and nearest neighbor tree search
- 01/2017 **Seismology Undergraduate Researcher**, University of Maryland
- 06/2017 **Seismic Wave Travel Times of Varying Frequencies**, *Advisor: Dr. Vedan Lekic*
- Cross-correlated observed travel times of seismic waves during the 2013 Sea of Okhotsk Earthquake with seismograms from the Preliminary Reference Earth Model (PREM) and Generalized Seismological Data Functionals (GSDF) method
  - Adapted Fourier and Gaussian wavelet analysis to filter the correlograms based on varying levels of frequency to calculate phase arrival times
  - Developed new framework for earthquake predictions with error bound estimation using significant deviations from PREM to characterize Earth's interior structure
- 09/2015 **Space Physics Intern (DMSP)**, Johns Hopkins University APL
- 12/2016 **Solar Wind and IMF Activity on SAA Intensity**, *Advisor: Dr. Robert Schaefer*
- Filtered UV spectrographic imaging from the Defense Meteorological Satellite (DMSP) based on photon counts, and geographical, lunar and solar positions
  - Fitted photon counts in the South Atlantic Anomaly (SAA) region of Earth to a spherical harmonics model for daily SAA intensity
  - Correlated SAA intensity with solar wind speed and IMF activity from ACE

## TEACHING & MENTORING EXPERIENCE

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### University of California Berkeley, SSL

- 06/2024 **FOXSI-5 SAAS/Optics Mentor**, *Student: Danny Sun*
- 08/2024 • Graduate student improved the SAAS instrument and performed optical alignment tests for the FOXSI-5 sounding rocket mission

- 06/2023 **ASSURE REU Mentor**, *Student: Elyas Ahmed*  
 – 08/2023
  - Sophomore undergraduate student utilized machine learning techniques (PySR) to characterize solar wind electron strahl scattering observed by PSP
  - Ahmed, E. *et al.* (2023). Machine Learning for Electron Distributions Observed by PSP. *AGU Fall Meeting Abstracts*, SH31D-3005.
- 06/2022 **ASSURE REU Mentor**, *Student: Kyla Giron*  
 – 08/2022
  - Sophomore undergraduate student investigated a potential Earth to Sun connection by looking for asymmetries in Flare and CME production on the Sun
  - Giron, K. *et al.* (2022). Investigating a Possible Earth to Sun Connection - Can the Earth Affect the Sun. *AGU Fall Meeting Abstracts*, ED35D-0579.

### University of California Berkeley, Department of Earth & Planetary Science (EPS)

- 08/2023 **EPS Graduate Student Mentor**, *EPS Graduate Mentoring Program*  
 – 05/2024
  - Mentored three first-year graduate students in the EPS department
  - Established and tracked short and long term goals for students over academic year
  - Provided advice on navigating graduate school, conducting research, and networking
- 08/2021 **EPS Graduate Student Grader**, *EPS150 – Case Studies in Earth Systems*  
 – 12/2021
  - Reviewed weekly manuscripts related to Earth's carbon cycle and Martian hydrology
  - Graded weekly student abstracts summarizing each research paper
- 01/2021 **EPS Graduate Student Instructor**, *EPS50 – The Planet Earth*  
 – 05/2021
  - Instructed students during weekly three-hour lab sections on the study of minerals, rocks, geologic maps, and geological processes
  - Designed weekly lab assignments and created questions for midterm and final exams
  - Assisted students during weekly three-hour office hours and exam review sessions

### University of Maryland, College Park, Department of Astronomy

- 08/2019 **Astronomy Teaching Assistant**, *ASTR310 – Observational Astronomy*  
 – 12/2019
  - Directed weekly two-hour research labs on image processing and data analysis
  - Aided students during two-hour office hours with programming troubleshooting
  - Graded weekly quizzes, lab activities, exams, and research projects

### University of Maryland, College Park, Department of Physics

- 01/2020 **Physics Teaching Assistant**, *PHYS121 – Fundamentals of Physics I*  
 – 05/2020
  - Graded weekly quizzes/exams for 120 students focused on introductory physics
  - Held weekly one-hour discussion classes and two-hour office hours
  - Led two-hour lab sections using Microsoft Excel, Logger Pro, and physics demos
- 08/2019 **Physics Teaching Assistant**, *PHYS161– General Physics*  
 – 12/2019
  - Graded quizzes/exams for 120 students focused on mechanics and particle dynamics
  - Assisted students during weekly two-hour office hours and exam review sessions
- 02/2019 **Python Class Session Instructor**, *PHYS205: Developing Essential Research Skills*
  - Instructed Python coding sessions over two weeks to undergraduate freshmen
  - Provided an overall introduction to Python with basics of coding syntax and logic
  - Presented data science methods to visualize and analyze cosmic ray counts from the Bartol Research Institute Neutron Monitor Program
- 07/2018 **Arduino Workshop Instructor**, *UMD Physics Summer Girls Outreach Program*  
 – 08/2018
  - Led Arduino programming workshop for 60 female high school students
  - Introduced Arduino code, sensors, and circuits to monitor plant growth over 1 week
  - Presented methods to extract and visualize data for plant sustainability statistics

## AWARDS & CERTIFICATIONS

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2024	<b>Certification of Heliophysics Mission Design School – NASA/JPL</b>
2023	<b>Group Achievement Award for Parker Solar Probe Team – NASA</b>
2023	<b>Certification of Heliophysics Summer School – NASA/UCAR</b>
2022	<b>FINESST Fellowship Award (Heliophysics Division) – NASA</b>
2022	<b>Certification of Solar Orbiter Summer School – ESA/CNES</b>
2022	<b>SSL Robert P. Lin Graduate Fellowship – University of California, Berkeley</b>
2022	<b>Travel Award for SHINE 2022 Workshop – SHINE</b>
2019	<b>William M. MacDonald Physics Scholarship – University of Maryland</b>
2017 – 2020	<b>Group Award for SPS Outstanding Chapter (Annual) – AIS SPS</b>
2016 – 2020	<b>JHU APL Academic Merit Scholarship (Annual) – JHU APL</b>
2016 – 2020	<b>Angelo Bardasis Physics Scholarship (Annual) – University of Maryland</b>

## PUBLICATIONS

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23. Shaver, S. R., ..., **Romeo, O. M. et al.** (2024). Exploring Observational Heliophysics Across All Scales: Reflections and Insights From the 2023 NASA Heliophysics Summer School. *Perspectives of Earth and Space Scientists*, 5(1), e2023CN000217.
22. Ervin, T., ..., **Romeo, O. M. et al.** (2024). Near Subsonic Solar Wind Outflow from an Active Region. *The Astrophysical Journal*, 972(1), 129.
21. Phan, T. D., ..., **Romeo, O. M. et al.** (2024). Multiple Subscale Magnetic Reconnection Embedded inside a Heliospheric Current Sheet Reconnection Exhaust: Evidence for Flux Rope Merging. *The Astrophysical Journal Letters*, 971(2), L42.
20. Ervin, T., ..., **Romeo, O. M. et al.** (2024). Compositional Metrics of Fast and Slow Alfvénic Solar Wind Emerging from Coronal Holes and Their Boundaries. *The Astrophysical Journal*, 969(2), 83.
19. Cohen, C. M. S., ..., **Romeo, O. M. et al.** (2024). Observations of the 2022 September 5 Solar Energetic Particle Event at 15 Solar Radii. *The Astrophysical Journal*, 966(2), 148.
18. Zaslavsky, A., ..., **Romeo, O. M. et al.** (2024). Probing Turbulent Scattering Effects on Suprathermal Electrons in the Solar Wind: Modeling, Observations, and Implications. *The Astrophysical Journal*, 966(1), 60.
17. Eriksson, S., ..., **Romeo, O. M. et al.** (2024). Parker Solar Probe Observations of Magnetic Reconnection Exhausts in Quiescent Plasmas near the Sun. *The Astrophysical Journal*, 965(1), 76.
16. Palmerio, E., ..., **Romeo, O. M. et al.** (2024). On the Mesoscale Structure of Coronal Mass Ejections at Mercury’s Orbit: BepiColombo and Parker Solar Probe Observations. *The Astrophysical Journal*, 963(2), 108.
15. McManus, M. D., ..., **Romeo, O. M. et al.** (2024). Proton- and Alpha-driven Instabilities in an Ion Cyclotron Wave Event. *The Astrophysical Journal*, 961(1), 142.
14. Mozer, F. S., ..., **Romeo, O. M. et al.** (2023). Density Enhancement Streams in The Solar Wind. *The Astrophysical Journal Letters*, 957(2), L33.
13. Alnussirat, S. T., ..., **Romeo, O. M. et al.** (2023). Dispersive Suprathermal Ion Events Observed by the Parker Solar Probe Mission. *The Astrophysical Journal Letters*, 954(1), L32.
12. **Romeo, O. M. et al.** (2023). Near-Sun in situ and remote-sensing observations of a Coronal Mass Ejection and its effect on the Heliospheric Current Sheet. *The Astrophysical Journal*, 954(2), 168.
11. Huang, J., ..., **Romeo, O. M. et al.** (2023). The Temperature, Electron, and Pressure Characteristics of Switchbacks: Parker Solar Probe Observations. *The Astrophysical Journal*, 954(2), 133.
10. Huang, J., ..., **Romeo, O. M. et al.** (2023). The Structure and Origin of Switchbacks: Parker Solar Probe Observations. *The Astrophysical Journal*, 952(1), 33.
9. Bowen, T. A., ..., **Romeo, O. M.** (2023). Constraining Collisionless Processes in Planetary Magnetospheres. *Uranus Flagship: Investigations and Instruments for Cross-Discipline Science Workshop*, 2808, 8170.
8. Mozer, F. S., Bale, S. D., Kellogg, P., **Romeo, O. M. et al.** (2023). Arguments for the physical nature of the triggered ion-acoustic waves observed on the Parker Solar Probe. *Physics of Plasmas*, 30(6), 062111.
7. Mozer, F. S., ..., **Romeo, O. M. et al.** (2023). Direct observation of solar wind proton heating from in situ plasma measurements. *Astronomy & Astrophysics*, 673, L3.

6. Huang, J., ..., **Romeo, O. M.** *et al.* (2023). Parker Solar Probe Observations of High Plasma  $\beta$  Solar Wind from the Streamer Belt. *The Astrophysical Journal Supplement Series*, 265(2), 47.
5. Short, B., Malaspina, D. M., Halekas, J., **Romeo, O. M.** *et al.* (2022). Observations of Quiescent Solar Wind Regions with Near- $f_{ce}$  Wave Activity. *The Astrophysical Journal*, 940(1), 45.
4. McManus, M. D., ..., **Romeo, O. M.** *et al.* (2022). Density and Velocity Fluctuations of Alpha Particles in Magnetic Switchbacks. *The Astrophysical Journal*, 933(1), 43.
3. Mozer, F. S., ..., **Romeo, O. M.** (2022). An Improved Technique for Measuring Plasma Density to High Frequencies on the Parker Solar Probe. *The Astrophysical Journal*, 926(2), 220.
2. Bandyopadhyay, R., ..., **Romeo, O. M.** *et al.* (2022). Sub-Alfvénic Solar Wind Observed by the Parker Solar Probe: Characterization of Turbulence, Anisotropy, Intermittency, and Switchback. *The Astrophysical Journal*, 926(1), L1.
1. **Romeo, O. M.** *et al.* (2021). Variability of Upstream Proton Cyclotron Wave Properties and Occurrence at Mars Observed by MAVEN. *Journal of Geophysical Research (Space Physics)*, 126(2), e28616.

## PRESENTATIONS

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### International – Oral

- 2024 45th COSPAR Scientific Assembly, *Near-Sun In Situ & Remote Sensing Observations of a CME and its Effect on the HCS*, Busan, Korea

### International – Poster

- 2023 American Geophysical Union Fall Meeting, *Determination and Calibration of Solar Wind Electron Moments Observed by PSP*, San Francisco CA, United States
- 2023 16th Solar Wind Conference, *Determining the Anatomy of an ICME by Relating Remote Sensing and In Situ Observations Within 13 Rs*, Pacific Grove CA, United States
- 2022 American Geophysical Union Fall Meeting, *Characterization of Solar Wind Strahl Electron Scattering Observed by PSP*, Chicago IL, United States
- 2022 Solar Orbiter Summer Conference, *Solar Wind Electron Distributions as Observed by PSP*, Sète, France
- 2021 American Geophysical Union Fall Meeting, *Characterization of Strahl Electron Scattering in the Solar Wind Observed by PSP*, New Orleans LA, United States
- 2019 American Geophysical Union Fall Meeting, *Solar Longitudinal Variability of Waves at the Local Proton Cyclotron Frequency*, San Francisco CA, United States

### National – Oral

- 2023 16th PSP Science Working Group Meeting, *CME Anatomy from Remote Sensing Observations and In-situ Measurements near 13 Rs*, Pasadena CA, United States

### National – Poster

- 2022 JHU/APL Parker Two Meeting (PSP), *Characterization of Strahl Electron Scattering in the Solar Wind Observed by PSP*, Laurel MD, United States
- 2019 Sigma Pi Sigma Physics Congress, *Seasonal Variability of Waves near the Proton Cyclotron Frequency Upstream from Mars*, Providence RI, United States
- 2019 MAVEN Project Science Group Meeting, *Seasonal Variability of Waves near the Proton Cyclotron Frequency Upstream from Mars*, Boulder CO, United States

### Institutional – Oral

- 2022 Space Sciences Lab Robert P. Lin Fellowship Seminar, *Electron Distribution Evolution near the Sun Observed by PSP*, Berkeley CA, United States
- 2018 University of Maryland Astronomical Observatory Open House, *Changes in Brightness for Cataclysmic Variables in Different Galactic Regions*, College Park MD, United States
- 2018 Johns Hopkins University APL Student Expo, *Data Driven Forecasting Model of Radiation Belt Intensities*, Laurel MD, United States

**Institutional – Poster**

- 2019 NASA Goddard Space Flight Center Student Poster Expo, *Seasonal Variability of Waves near the Proton Cyclotron Frequency Upstream from Mars*, Providence RI, United States
- 2017 University of Maryland Physics Research Showcase, *Seismic Wave Travel Times at Varying Frequencies*, College Park MD, United States
- 2016 Science and Math Academy Symposium, *Correlation of Solar Wind and IMF Activity on SAA Intensity*, Aberdeen MD, United States

**SERVICE & OUTREACH**

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**Professional**

- 2024 NASA ROSES Solicitation, *Executive Secretary*
- 2024 The Astrophysical Journal, *Reviewer of 1 manuscript*
- 2024 Geophysical Research Letters, *Reviewer of 1 manuscript*
- 2022 The Astrophysical Journal, *Reviewer of 1 manuscript*
- 2022 Heliophysics 2050 Workshop: Space Physics, *Executive Secretary*
- 2021 AGU Fall Meeting Parker Solar Probe Session, *Volunteer Chair*
- 2020 Intersect: The Stanford Journal of STS, *Reviewer of 1 manuscript*

**Community**

- 2023 UCB ASSURE REU Program, *Guest Speaker on Planetary Environments*
- 2022 UCB ASSURE REU Program, *Reviewer of student applications*
- 2022 – 2024 California Academy of Sciences, *Volunteer*
- 2019 UMD Society of Physics Students, *President*
- 2018 UMD SPS National Zone 4 Meeting, *Lead Python Workshop Instructor*
- 2018 UMD SPS National Zone 4 Meeting, *Lead Arduino Workshop Instructor*
- 2017 – 2018 UMD Society of Physics Students, *Vice President*

**Media Outreach**

- 2023 Press Release, *Article on Romeo et al. 2023*

**PROFESSIONAL SKILLS**

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**Programming & Software**

- Python
- IDL
- MATLAB
- Julia
- Arduino
- Java
- UNIX
- pyGSEOS
- HTML

**Instrumentation & Lab Experience**

- Electrostatic Analyzers
- Magnetometers
- Solid State Telescopes
- Observatory telescopes
- Raspberry Pi
- Oscilloscopes
- Vacuum chambers
- Circuit design & testing
- Soldering
- 3D printing
- Optics Alignment
- Magnetic Characterization
- Carbon Foil Floating
- Data Acquisition Processor (DAP) testing

**Languages**

- English (Native)
- Italian (Proficient)
- Spanish (Beginner)