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# ATHANASIOS KOULOUMVAKOS

The Johns Hopkins University Applied Physics Laboratory  
11101 Johns Hopkins Road Bldg200-E278, Laurel, Maryland 20723  
Email: [Athanasios.Kouloumvakos@jhuapl.edu](mailto:Athanasios.Kouloumvakos@jhuapl.edu)  
site: <https://www.akouloumvakos.spaceweather.gr>  
Tel: +1 (240) 234-3572

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## EDUCATION/POSITIONS

- The Johns Hopkins University - Applied Physics Laboratory Laurel, MD, USA  
**Senior Professional Staff I** (Jun. 2023 - now)  
**Post Doctoral Researcher** (Mar. 2022 - Jun. 2023)
  - Institut de Recherche en Astrophysique et Planétologie (IRAP) Toulouse, France  
/Université Toulouse III - Paul Sabatier, CNRS, CNES (Feb. 2018 - Feb. 2022)  
**Post Doctoral Researcher**
  - University of Ioannina Ioannina, Greece  
**Ph.D. in Physics** (Apr. 2013 - Jan. 2018)  
Dissertation: “Study of Shock Waves in the Solar Corona and Interplanetary Space”.  
Supervisor: A. Nindos, Associate Professor
  - National and Kapodistrian University of Athens Athens, Greece  
**M.Sc. in Physics**, Specialization in “Astrophysics, Astronomy & Mechanics” (Oct. 2010 - Feb. 2013)  
Thesis: “Study of coronal Shock Waves evolution from combined recordings of ARTEMIS-IV radiospectrograph and observations of STEREO mission.”  
Supervisor: P. Preka, Assistant Professor
  - University of Patras Patra, Greece  
**Bachelor in Physics** (Sep. 2004 - March 2010)  
Thesis: “Photometric study, of Solar Sunspots during the 23rd solar cycle from So.H.O. images”  
Supervisors: X. Moussas, Emeritus Professor and V. Zafeiropoulos, Emeritus Professor.
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## RESEARCH EXPERIENCE

- The Johns Hopkins University - Applied Physics Laboratory Laurel, MD, USA  
–**Research scientist for the IS $\odot$ IS Energetic Particle Instrument (EPI) - Lo instrument onboard Parker Solar Probe** (Apr. 2023 - now)  
–**Research scientist for the Suprathermal Ion Spectrograph (SIS) instrument onboard Solar Orbiter** (Mar. 2022 - now)
- Institut de Recherche en Astrophysique et Planétologie Toulouse, France  
/Université Toulouse III - Paul Sabatier, CNRS, CNES (Feb. 2018 - Feb. 2022)  
Position: **Post Doctoral Researcher**  
Research Project: “[The COROSHOCK project](#)” funded from the ANR  
Advisor: Dr. A. Rouillard, Permanent Researcher, CNRS, IRAP, Toulouse, France
- National Observatory of Athens Athens, Greece  
Position: **Research Assistant** (Aug. 2015 - Jan 2016)  
Research Project: “[FORcasting Solar Particle Events and Flares \(FORSPeF\)](#)” funded from the ESA.  
Advisor: Dr. Anastasios Anastasiadis, Research Director, Institute for Astronomy, Astrophysics, Space Applications & Remote Sensing of the National Observatory of Athens.
- University of Ioannina Ioannina, Greece  
Position: **Research Assistant** (July 2013 - Nov. 2015)  
Research Project: “[Hellenic National Space Weather Research Network](#)”, funded by the European Union and Greek national funds.  
Advisor: A. Nindos, Associate Professor, S. Patsourakos, Assistant Professor

Position: **Graduate Researcher**

(Febr. 2011 - June 2013)

Research Project: "[SEPServer: Data Services and Analysis Tools for Solar Energetic Particle Events and Related Electromagnetic Emissions](#)", funded from the European Union's Seventh Framework Programme.

Advisor: A. Nindos, Associate Professor

## AWARDED RESEARCH PROJECTS

### Primary-Investigator:

- PyThea: A software package to reconstruct shock waves and coronal mass ejections (FY2023 - 1Y)  
NASA's Grant in Research Opportunities in Space and Earth Science (ROSES)-2022  
Program element: Heliophysics Tools And Methods Program (NNH22ZDA001N-HTM)

### Co-Investigator:

- How do CMEs influence their near-space environment? (FY2023 - 3Y)  
NASA's Grant in Research Opportunities in Space and Earth Science (ROSES)-2022  
Program element: Heliophysics Guest Investigators - Open (NNH22ZDA001N-HGIO)  
PI: Carlos Braga (George Mason University)
- Understanding the role of shocks for solar energetic electron events (FY2023 - 5Y)  
with the new-generation heliospheric fleet (SHOCKSEE)  
Academy of Finland Research Fellow grant.  
PI: Nina Dresing (University of Turku)

## OTHER PROFESSIONAL EXPERIENCE

- Assistant for the "Geometrical Processing of Satellite Images" Department, at the Ground Satellite Station of Tanagra Military Airport, during the compulsory military service (Mar. 2017 - Sep. 2017).
- Editing services for the production of three Greek academic textbooks (in astronomy, astrophysics and solar physics) for "Kallipos" program (<http://www.kallipos.gr/>) of the National Technical University of Athens (May 2015 - Dec. 2015).
- Mentoring: one student from the United States Military Academy of West Point, two students (Poirier N. and Valette E.) from ISAE-SUPAERO (Institut Supérieur de l'Aéronautique et de l'Espace) of Toulouse at the Institut de Recherche en Astrophysique et Planétologie (IRAP), and one Ph.D. student (Jebaraj I.) at Katholieke Universiteit Leuven of Leuven.

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## PUBLICATIONS

I have co-authored 55+ publications in peer-reviewed journals, with a total number of citations >1100 and an H-Index 20. I have 12 publications as a first author, with total number of citations >200, five of which in *The Astrophysical Journal* with impact factor 5.75 and three in *Astronomy & Astrophysics* with an impact factor 6.24. I have co-authored one publication in *Nature* with an impact factor 69.5. Details in my [ADS library](#)

Published Articles (in refereed journals):

1. **Kouloumvakos A.**, Mason G. M., Ho G. C., Allen R. C., Wimmer-Schweingruber R. F., et al. "Extended <sup>3</sup>He-rich Time Periods Observed by Solar Orbiter: Magnetic Connectivity and Sources", [The Astrophysical Journal \(2023\)](#).
2. Paouris E., Vourlidas A., **Kouloumvakos A.**, Papaioannou A., Jagarlamudi V. K., et al. "The Space Weather Context of the First Extreme Event of Solar Cycle 25, on 2022 September 5", [The Astrophysical Journal \(2023\)](#).
3. Wimmer-Schweingruber R. F., Berger L., Kollhoff A., Kühl P., Heber B., et al. "Unusually long path length for a nearly scatter-free solar particle event observed by Solar Orbiter at 0.43 au", [Astronomy and Astrophysics \(2023\)](#).

4. Poirier N., Réville V., Rouillard A. P., **Kouloumvakos A.**, Valette E. "Variability of the slow solar wind: New insights from modelling and PSP-WISPR observations", [Astronomy and Astrophysics \(2023\)](#).
5. Jebaraj I. C., **Kouloumvakos A.**, Dresing N., Warmuth A., Wijsen N., et al. "Multiple injections of energetic electrons associated with the flare and CME event on 9 October 2021", [Astronomy and Astrophysics \(2023\)](#).
6. Wijsen N., Lario D., Sánchez-Cano B., Jebaraj I. C., Dresing N., et al. "The Effect of the Ambient Solar Wind Medium on a CME-driven Shock and the Associated Gradual Solar Energetic Particle Event", [The Astrophysical Journal \(2023\)](#).
7. Dresing N., Rodríguez-García L., Jebaraj I. C., Warmuth A., Wallace S., et al. "The 17 April 2021 widespread solar energetic particle event", [Astronomy and Astrophysics \(2023\)](#).
8. Rodríguez-García L., Balmaceda L. A., Gómez-Herrero R., **Kouloumvakos A.**, Dresing N., et al. "Solar activity relations in energetic electron events measured by the MESSENGER mission", [Astronomy and Astrophysics \(2023\)](#).
9. Mason G. M., Ho G. C., Allen R. C., **Kouloumvakos A.**, Wimmer-Schweingruber R. F., et al. "Quiet-time suprathermal ions in the inner heliosphere during the rising phase of solar cycle 25", [Astronomy and Astrophysics \(2023\)](#).
10. Jarry M., Rouillard A. P., Plotnikov I., **Kouloumvakos A.**, Warmuth A. "Parametric study of the kinematic evolution of coronal mass ejection shock waves and their relation to flaring activity", [Astronomy and Astrophysics \(2023\)](#).
11. Réville V., Poirier N., **Kouloumvakos A.**, Rouillard A. P., Ferreira Pinto R., et al. "HelioCast: heliospheric forecasting based on white-light observations of the solar corona", [Journal of Space Weather and Space Climate \(2023\)](#).
12. Gieseler J., Dresing N., Palmroos C., Freiherr von Forstner J. L., Price D. J., et al. "Solar-MACH: An open-source tool to analyze solar magnetic connection configurations", [Frontiers in Astronomy and Space Sciences \(2023\)](#).
13. Rodríguez-García L., Gómez-Herrero R., Dresing N., Lario D., Zouganelis I., et al. "Solar energetic electron events measured by MESSENGER and Solar Orbiter. Peak intensity and energy spectrum radial dependences: Statistical analysis", [Astronomy and Astrophysics \(2023\)](#).
14. Mason G. M., Nitta N. V., Bučik R., Gómez-Herrero R., Krupar V., et al. "The 18-19 March 2022 series of  $\langle \text{SUP} \rangle 3 \langle / \text{SUP} \rangle$  He-rich events observed by Solar Orbiter at 0.36 au compared with EUV, X-ray, and radio observations", [Astronomy and Astrophysics \(2023\)](#).
15. **Kouloumvakos A.**, Vainio R., Gieseler J., Price D. J. "The effect of shock wave properties on the release timings of solar energetic particles", [Astronomy and Astrophysics \(2023\)](#).
16. Trotta D., Vuorinen L., Hietala H., Horbury T., Dresing N., et al. "Single-spacecraft techniques for shock parameters estimation: A systematic approach", [Frontiers in Astronomy and Space Sciences \(2022\)](#).
17. **Kouloumvakos A.**, Rodríguez-García L., Gieseler J., Price D. J., Vourlidas A., et al. "PyThea: An open-source software package to perform 3D reconstruction of coronal mass ejections and shock waves", [Frontiers in Astronomy and Space Sciences \(2022\)](#).
18. Badman S. T., Brooks D. H., Poirier N., Warren H. P., Petrie G., et al. "Constraining Global Coronal Models with Multiple Independent Observables", [The Astrophysical Journal \(2022\)](#).
19. **Kouloumvakos A.**, Kwon R. Y., Rodríguez-García L., Lario D., Dresing N., et al. "The first widespread solar energetic particle event of solar cycle 25 on 2020 November 29. Shock wave properties and the wide distribution of solar energetic particles", [Astronomy and Astrophysics \(2022\)](#).

20. Papaioannou A., **Kouloumvakos A.**, Mishev A., Vainio R., Usoskin I., et al. "The first ground-level enhancement of solar cycle 25 on 28 October 2021", [Astronomy and Astrophysics \(2022\)](#).
21. Réville V., Fargette N., Rouillard A. P., Lavraud B., Velli M., et al. "Flux rope and dynamics of the heliospheric current sheet. Study of the Parker Solar Probe and Solar Orbiter conjunction of June 2020", [Astronomy and Astrophysics \(2022\)](#).
22. Dresing N., **Kouloumvakos A.**, Vainio R., Rouillard A. "On the Role of Coronal Shocks for Accelerating Solar Energetic Electrons", [The Astrophysical Journal \(2022\)](#).
23. Kollhoff A., **Kouloumvakos A.**, Lario D., Dresing N., Gómez-Herrero R., et al. "The first widespread solar energetic particle event observed by Solar Orbiter on 2020 November 29", [Astronomy and Astrophysics \(2021\)](#).
24. Jebaraj I. C., **Kouloumvakos A.**, Magdalenic J., Rouillard A. P., Mann G., et al. "Generation of interplanetary type II radio emission", [Astronomy and Astrophysics \(2021\)](#).
25. Pinto R. F., Poirier N., Rouillard A. P., **Kouloumvakos A.**, Griton L., et al. "Solar wind rotation rate and shear at coronal hole boundaries. Possible consequences for magnetic field inversions", [Astronomy and Astrophysics \(2021\)](#).
26. **Kouloumvakos A.**, Rouillard A., Warmuth A., Magdalenic J., Jebaraj I. C., et al. "Coronal Conditions for the Occurrence of Type II Radio Bursts", [The Astrophysical Journal \(2021\)](#).
27. Poirier N., Rouillard A. P., **Kouloumvakos A.**, Przybylak A., Fargette N., et al. "Exploiting White-Light Observations to Improve Estimates of Magnetic Connectivity", [Frontiers in Astronomy and Space Sciences \(2021\)](#).
28. Wu Y., Rouillard A. P., **Kouloumvakos A.**, Vainio R., Afanasiev A. N., et al. "On the Origin of Hard X-Ray Emissions from the Behind-the-limb Flare on 2014 September 1", [The Astrophysical Journal \(2021\)](#).
29. Rouillard A. P., Pinto R. F., Vourlidas A., De Groof A., Thompson W. T., et al. "Models and data analysis tools for the Solar Orbiter mission", [Astronomy and Astrophysics \(2020\)](#).
30. Poedts S., Lani A., Scolini C., Verbeke C., Wijzen N., et al. "European Heliospheric FORecasting Information Asset 2.0", [Journal of Space Weather and Space Climate \(2020\)](#).
31. **Kouloumvakos A.**, Vourlidas A., Rouillard A. P., Roelof E. C., Leske R., et al. "The Solar Origin of Particle Events Measured by Parker Solar Probe", [The Astrophysical Journal \(2020\)](#).
32. Lavraud B., Fargette N., Réville V., Szabo A., Huang J., et al. "The Heliospheric Current Sheet and Plasma Sheet during Parker Solar Probe's First Orbit", [The Astrophysical Journal \(2020\)](#).
33. **Kouloumvakos A.**, Rouillard A. P., Share G. H., Plotnikov I., Murphy R., et al. "Evidence for a Coronal Shock Wave Origin for Relativistic Protons Producing Solar Gamma-Rays and Observed by Neutron Monitors at Earth", [The Astrophysical Journal \(2020\)](#).
34. Griton L., Pinto R. F., Poirier N., **Kouloumvakos A.**, Lavarra M., et al. "Coronal Bright Points as Possible Sources of Density Variations in the Solar Corona", [The Astrophysical Journal \(2020\)](#).
35. Giacalone J., Mitchell D. G., Allen R. C., Hill M. E., McNutt R. L., et al. "Solar Energetic Particles Produced by a Slow Coronal Mass Ejection at  $\sim 0.25$  au", [The Astrophysical Journal Supplement Series \(2020\)](#).
36. Korreck K. E., Szabo A., Nieves Chinchilla T., Lavraud B., Luhmann J., et al. "Source and Propagation of a Streamer Blowout Coronal Mass Ejection Observed by the Parker Solar Probe", [The Astrophysical Journal Supplement Series \(2020\)](#).
37. Poirier N., **Kouloumvakos A.**, Rouillard A. P., Pinto R. F., Vourlidas A., et al. "Detailed Imaging of Coronal Rays with the Parker Solar Probe", [The Astrophysical Journal Supplement Series \(2020\)](#).

38. Hess P., Rouillard A. P., **Kouloumvakos A.**, Liewer P. C., Zhang J., et al. "WISPR Imaging of a Pristine CME", [The Astrophysical Journal Supplement Series \(2020\)](#).
39. Rouillard A. P., Poirier N., Lavarra M., Bourdelle A., Dalmasse K., et al. "Modeling the Early Evolution of a Slow Coronal Mass Ejection Imaged by the Parker Solar Probe", [The Astrophysical Journal Supplement Series \(2020\)](#).
40. Rouillard A. P., **Kouloumvakos A.**, Vourlidas A., Kasper J., Bale S., et al. "Relating Streamer Flows to Density and Magnetic Structures at the Parker Solar Probe", [The Astrophysical Journal Supplement Series \(2020\)](#).
41. Howard R. A., Vourlidas A., Bothmer V., Colaninno R. C., DeForest C. E., et al. "Near-Sun observations of an F-corona decrease and K-corona fine structure", [Nature \(2019\)](#).
42. Anastasiadis A., Lario D., Papaioannou A., **Kouloumvakos A.**, Vourlidas A. "Solar energetic particles in the inner heliosphere: status and open questions", [Philosophical Transactions of the Royal Society of London Series A \(2019\)](#).
43. Vlahos L., Anastasiadis A., Papaioannou A., **Kouloumvakos A.**, Isliker H. "Sources of solar energetic particles", [Philosophical Transactions of the Royal Society of London Series A \(2019\)](#).
44. **Kouloumvakos A.**, Rouillard A. P., Wu Y., Vainio R., Vourlidas A., et al. "Connecting the Properties of Coronal Shock Waves with Those of Solar Energetic Particles", [The Astrophysical Journal \(2019\)](#).
45. Papaioannou A., Anastasiadis A., **Kouloumvakos A.**, Paassilta M., Vainio R., et al. "Nowcasting Solar Energetic Particle Events Using Principal Component Analysis", [Solar Physics \(2018\)](#).
46. Anastasiadis A., Papaioannou A., Sandberg I., Georgoulis M., Tziotziou K., et al. "Predicting Flares and Solar Energetic Particle Events: The FORSPEF Tool", [Solar Physics \(2017\)](#).
47. **Kouloumvakos A.** "Study of shock waves in the solar corona and interplanetary space", [Ph.D. Thesis \(2017\)](#).
48. Papaioannou A., Sandberg I., Anastasiadis A., **Kouloumvakos A.**, Georgoulis M. K., et al. "Solar flares, coronal mass ejections and solar energetic particle event characteristics", [Journal of Space Weather and Space Climate \(2016\)](#).
49. **Kouloumvakos A.**, Patsourakos S., Nindos A., Vourlidas A., Anastasiadis A., et al. "Multi-viewpoint Observations of a Widely distributed Solar Energetic Particle Event: The Role of EUV Waves and White-light Shock Signatures", [The Astrophysical Journal \(2016\)](#).
50. Patsourakos S., Georgoulis M. K., Vourlidas A., Nindos A., Sarris T., et al. "The Major Geoeffective Solar Eruptions of 2012 March 7: Comprehensive Sun-to-Earth Analysis", [The Astrophysical Journal \(2016\)](#).
51. **Kouloumvakos A.**, Nindos A., Valtonen E., Alissandrakis C. E., Malandraki O., et al. "Properties of solar energetic particle events inferred from their associated radio emission", [Astronomy and Astrophysics \(2015\)](#).
52. Papaioannou A., Malandraki O. E., Dresing N., Heber B., Klein K.-L., et al. "SEPServer catalogues of solar energetic particle events at 1 AU based on STEREO recordings: 2007-2012", [Astronomy and Astrophysics \(2014\)](#).
53. **Kouloumvakos A.**, Patsourakos S., Hillaris A., Vourlidas A., Preka-Papadema P., et al. "CME Expansion as the Driver of Metric Type II Shock Emission as Revealed by Self-consistent Analysis of High-Cadence EUV Images and Radio Spectrograms", [Solar Physics \(2014\)](#).
54. Vainio R., Valtonen E., Heber B., Malandraki O. E., Papaioannou A., et al. "The first SEPServer event catalogue  $\sim 68$ -MeV solar proton events observed at 1 AU in 1996-2010", [Journal of Space Weather and Space Climate \(2013\)](#).

55. Miteva R., Klein K.-L., Samwel S. W., Nindos A., **Kouloumvakos A.**, et al. "Radio Signatures of Solar Energetic Particles During the 23rd Solar Cycle", [Central European Astrophysical Bulletin](#) (2013).
  56. Malandraki O. E., Agueda N., Papaioannou A., Klein K.-L., Valtonen E., et al. "Scientific Analysis within SEPServer - New Perspectives in Solar Energetic Particle Research: The Case Study of the 13 July 2005 Event", [Solar Physics](#) (2012).
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## SERVICE AND ACTIVITIES

### Reviewing/Refering/Panels:

- Member of the editorial board for [Frontiers in Astronomy and Space Sciences](#) journal as a Review Editor.
- Review panelist for NASA's Heliophysics Supporting Research program.
- Reviewer for [The Astrophysical Journal](#), [Astronomy and Astrophysics](#), [Solar Physics](#), [Journal of Space Weather and Space Climate](#) journals.

### Other Project Participation:

- International Expert Advisory Group for [SERPENTINE](#) project.
- Participation in the following research projects:
  - EUropean Heliospheric FORecasting Information Asset ([EUHFORIA2.0](#)) funded by EU's Horizon 2020,
  - Solar EneRgetic ParticLE aNalysis plaTform for the INner hEliosphere project ([SERPENTINE](#)) funded by EU's Horizon 2020,
  - [SLOW\\_SOURCE](#) project funded by the European Research Council

### Working Groups Participation/Invited contributions:

- Team member of the [Modelling and Data Analysis Working Group \(MADAWG\)](#) for the Solar Orbiter (ESA/NASA) mission.
- Invited co-researcher in "*The Solar Sources of GeV Gamma-Rays*" working group and the workshop hosted by the Lorentz center (Leiden Netherlands, 2018).
- Invited co-researcher in "*High EneRgy sOlar particLe events analysis (HEROIC)*" international team led by Dr. A. Papaioannou and the workshop hosted by the International Space Science Institute (ISSI, Bern, Switzerland, 2018).
- Research visitor in Johns Hopkins University Applied Physics Laboratory (one week in 2018 and two weeks in 2019) in preparation for first Parker Solar Probe observations.
- Participation and invited talk to the Parker Solar Probe Theory Group meetings.

### Conference committee:

- Organizing committee member of the "Multi-Wavelength Studies of the Solar Atmosphere: Celebrating the Career of Costas Alissandrakis", International Solar Physics Conference, Ioannina, Greece 2015.
  - Organizing committee member of the 5th Hellenic Conference for Amateur Astronomy, Patras, October 2007.
  - Organizing committee of the Antikythera Mechanism exhibition, Patras, April 2009.
  - Member of the governing board (2005-2009) of the Astronomical Association of Patras "Orion".
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## PROFESSIONAL ASSOCIATIONS

- Member of the American Geophysical Union (AGU).
- Member of the Société Française des Spécialistes d'Astronomie (SFSA).
- Ordinary member of the Hellenic Astronomical Society (Hel.A.S).
- Member of the Community of European Solar Radio Astronomers (CESRA).
- Associate member of the Committee on Space Research (COSPAR).

## SKILLS

- Languages: Greek (Native), English
  - Programming: Matlab, python, IDL
  - Science software development:
    - PyThea (<https://www.pythea.org/>): An open-source software package and application that can be used to reconstruct the 3D structure of CMEs and shock waves.
    - HDPmt ([Heliospheric Disturbance Propagation Model & Tool](#)): A geometrical model to describe the propagation and longitudinal extension of a disturbance in the heliosphere and a tool that can be used to visualize the results and perform case studies.
  - Web Development: Wordpress, HTML, css
    - Founder and administrator of <https://www.spaceweather.gr/>
    - My personal web-page: <https://www.akouloumvakos.spaceweather.gr/>
    - Former administrator of [www.space.phys.uoa.gr/](http://www.space.phys.uoa.gr/)
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