Savvas Raptis

Curriculum Vitae

PERSONAL DETAILS

8/7/1991
Stockholm, Sweden
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EDUCATION

2022 **PhD. Space and Plasma Physics (240 ECTS)**
KTH Royal Institute of Technology, School of Electrical Engineering, Division of Space and Plasma Physics (SPP) - Alfvénlaboratoriet
Topic: "High-speed jets and related phenomena at Earth's bow shock and magnetosheath"
Download (English):

2018 **MSc. Astronomy and Astrophysics (120 ECTS)**
KU Leuven, Department of Physics and Astronomy, The Institute of Astronomy (IVS), Department of Mathematics, Centre for mathematical Plasma Astrophysics (CmPA)
Thesis: "Processing Solar Images to Forecast Coronal Mass Ejections using Artificial Intelligence"
Download (English):

2016 **BSc. (Hons.) Physics (240 ECTS)**
National and Kapodistrian University of Athens, Faculty of Physics
Thesis: "Solar Energetic Particles: A study of their properties through measurements from ESA's SREM instrument."
Download (Greek):

TEACHING EXPERIENCE

Full Description & Examples:

2019 – Now **Teaching Assistant (TA) & Lecturer**
KTH, Royal Institute of Technology
2021 - 2022: Guest Lecturer & TA | Space Physics I Master course (EF2240)
2020 - 2022: TA | Electrical Circuit Analysis, Extended course (EI1110)
2020 - 2021: TA | Space Physics I Master course (EF2240)
2019 - 2022: TA | LaTeXworkshop
2019 - 2019: TA | Electrodynamics course (EI2405)

2013 – 2015 **Teacher - Mechanics/Oscillations/Waves (High School)**
City of Athens, Social Tuition Center of City of Athens

Assisting High school students with their studies in school and preparing them for the Panhellenic National examinations to proceed to higher education.

SCIENTIFIC REVIEWING, EDITING & SERVICE

2021 – Now **MMS Scientist In The Loop (SITL)**
SITL service work for the NASA MMS team for orbits: 1181 - 1183, 1204 - 1206, 1248 - 1250, 1284 - 1285 , 1314 - 1315, 1364 - 1365

2021 – Now **Journal Reviewer**

- Journal of Geophysical Research (JGR) : Space Physics
- Geophysical Research Letters (GRL)
- The Astrophysical Journal (ApJ)
- Radio Science
- Astrophysics and Space Science
- Remote Sensing

More information: Web of Science Profile

PUBLICATIONS

= Abstract | = PDF | = Powerpoint | = Video

2022 [15] Trollvik, H., Karlsson, T, & **Raptis, S.** (2022). Velocity of magnetic holes in the solar wind from cluster multipoint measurements., **(Under Preperation)**

[14] Karlsson, T., Trollvik, H., **Raptis, S.**, Nilsson, H., & Hadi Madanian (2022). Solar wind magnetic holes can cross the bow shock and enter the magnetosheath. Ann. Geophys., 40, 687–699, doi:10.5194/angeo-40-687-2022 |

[13] Pollock, C., Chen, L-J., Schwartz, S., Wang, S., Avanov, L. A., Burch, J. L., Gershman, D. J., Giles, B. L., **Raptis, S.**, & Russell, C. T. (2022). Dynamics of Earth's bow shock under near-radial interplanetary magnetic field conditions. Physics of Plasmas 29, 112902 (2022) https://doi.org/10.1063/5.0089937 |

[12] **Raptis, S.**, Karlsson, T., Vaivads, A., Lindberg, M., Johlander, A., & Trollvik, H. (2022). On magnetosheath jet kinetic structure and plasma properties. Geophysical Research Letters, 49, e2022GL100678. https://doi.org/10.1029/2022GL100678 |

[11] Lindberg, M., Vaivads, A., **Raptis, S.**, Lindqvist, P.-A., Giles, B. L., & Gershman, D. J. (2022). Electron kinetic entropy across quasi-perpendicular shocks. Entropy 24, 745. https://doi.org/10.3390/e24060745 |

[10] **Raptis. S.**, Karlsson, T., Vaivads, A., Pollock, C., Plaschke, F., Johlander, A., Trollvik, H., & Lindqvist, P.-A. (2022). Downstream high-speed plasma jet generation as a direct consequence of shock reformation. Nature Communications. 13, 598 https://doi.org/10.1038/s41467-022-28110-4 |

- **Highlighted:** Focus - Astronomy and planetary science:
- **Press Coverage**: KTH, phys.org, spacedaily.com
- **Behind The Paper**: Nature Portfolio

2021 [9] Sigiava, A-G., **Raptis, S.**, Anastasiadis, A. A., Tsigkanos, A., Sandberg, I., Papaioannou,

A., Papadimitrioy, C., Jiggens, P., Aran, A., & Daglis, I.A. (2021). Solar Energetic Particle Event occurrence prediction using Solar Flare Soft X-ray measurements with Machine Learning. Journal of Space Weather and Space Climate (JSWSC), 11, 59 https://doi.org/10.1051/swsc/2021043 |

[8] Karlsson, T., **Raptis, S.**, Trollvik, H., & Nilsson, H. (2021). Classifying the magnetosheath behind the quasi-parallel and quasi-perpendicular bow shock by local measurements. Journal of Geophysical Research: Space Physics, 126, e2021JA029269. doi: 10.1029/2021JA029269 |

[7] Katsavrias, C., **Raptis, S**., Daglis, I. A., Karlsson, T., Georgiou, M., & Balasis, G. (2021). On the generation of Pi2 pulsations due to plasma flow patterns around magnetosheath jets. Geophysical Research Letters, 48, e2021GL093611. doi:10.1029/2021GL093611 |

[6] Kajdič, P., **Raptis, S.**, Blanco-Cano, X., & Karlsson, T. (2021). Causes of jets in the quasi-perpendicular magnetosheath. Geophysical Research Letters, 48, e2021GL093173. doi:10.1029/2021GL093173 |

[5] Palmroth, M., **Raptis, S.**, Suni, J., Karlsson, T., Turc, L., et al., (2020). Magnetosheath jet evolution as a function of lifetime: global hybrid-Vlasov simulations compared to MMS observations. Ann. Geophys , doi: 10.5194/angeo-2020-49 |

2020 [4] Battarbee, M., Blanco-Cano, X., Turc, L., Kajdič, P., Johlander, A., Tarvus, V., Fuselier, S., Trattner, K., Alho, M., Brito, T., Ganse, U., Pfau-Kempf, Y., Akhavan-Tafti, M., Karlsson, T., **Raptis, S.**, Dubart, M., Grandin, M., Suni, J., and Palmroth, M. (2020), Helium in the Earth's foreshock: a global Vlasiator survey. Ann. Geophys., 38, 1081–1099, doi: 10.5194/angeo-38-1081-2020 |

[3] **Raptis, S.**, Karlsson, T., Plaschke, F., Kullen, A., & Lindqvist, P.-A. (2020). Classifying magnetosheath jets using MMS: Statistical properties. Journal of Geophysical Research: Space Physics, 125, e2019JA027754. doi:10.1029/2019JA027754 |

[2] **Raptis, S.**, Aminalragia-Giamini, S., Karlsson, T., & Lindberg, M. (2020). Classification of Magnetosheath Jets using Neural Networks and High Resolution OMNI (HRO) data. *Machine Learning in Heliophysics* Front. Astron. Space Sci. - Space Physics, doi: 10.3389/fspas.2020.00024 |

[1] Yordanova, E., Vörös, Z., **Raptis, S.**, & Karlsson T. (2020). Current Sheet Statistics in the Magnetosheath. Front. Astron. Space Sci. - Space Physics, doi: 10.3389/fspas.2020.00002 |

SEMINARS

High-speed jets and related phenomena in Earth's bow shock and magnetosheath, Johns Hopkins University Applied Physics Laboratory (JHU/APL), Online, 19 Aughust 2022.

Downstream high-speed plasma jet generation as a direct consequence of shock reformation, *IRF Uppsala Seminars* Uppsala University, Uppsala, Sweden, 16 March 2022.

Magnetosheath Jets: Simulations, Data Analysis & Machine Learning, *SpaceCoffee Meetings* National and Kapodistrian University of Athens, Athens, Greece, 29 January 2020.

Classifying Magnetosheath Jets Using MMS: Quasi parallel & Quasi perpendicular Jets, *Third International Vlasiator Science Hackathon* University of Helsinki, Helsinki, Finland, 21 August 2019.

Forecasting CMEs using Image Processing & Neural Networks, *SpaceCoffee Meetings* National and Kapodistrian University of Athens, Athens, Greece, 19 December 2018.

SCIENTIFIC PRESENTATIONS

2022

"Investigation of magnetosheath jet kinetic structure and plasma moment derivation" *AGU 2021 Fall meeting (AGU2021)* Chicago, US, December 12 - 16, 2021. (*poster*) |

"On the discrepancies of magnetosheath jet identification and statistical properties due to different temporal resolution and plasma moment derivation" *44th COSPAR Scientific Assembly (COSPAR2022)* Athens, Greece, July 16 - 24, 2022. (*talk*) |

"Magnetosheath Jets using MMS" *Swedish Space Plasma Meeting 2019* Umeå, Sweden, June 8 - 9, 2022. (*talk*) |

"High-speed plasma jets generated by the cyclic behavior of the Earth's bow shock" *Solar Orbiter School 2022* Sete, France, May 30 - June 3, 2022. (*poster*) |

"Shock Reformation Generating High-speed Magnetosheath Jets" *EGU2022* Vienna, Austria, May 23 - 27, 2022. (*talk*) |

"High-speed Downstream Plasma Jet Generated due to Shock Reformation" *8th MMS Community Workshop* Daytona Beach, FL, US, May 9-13, 2022. (*talk*) |

2021

"Super-magnetosonic Downstream Jet Formation as a Direct Consequence of Shock Reformation" *AGU 2020 Fall meeting (AGU2020)* New Orleans, US, December 13 - 17, 2021. (*poster*) |

"Characterization of the Earth's Magnetosheath and its Fast Plasma Flows Using Upstream Measurements and Machine Learning" *Asia Oceania Geosciences Society (AOGS) 18th Anual Meeting* Online, August 1-8, 2021. (*virtual talk*) |

"Magnetosheath Jets Close to the Bow Shock: Generation Mechanisms Using MMS" *The 15th Hellenic Astronomical Conference* Patras, Greece, July 5 - 8 , 2021. (talk) |

"Fast Plasma Flows Downstream of the Bow Shock Using MMS: Correlations and Generation Mechanisms" *EGU2021* Vienna, Austria, April 19 - 30, 2021. (*Virtual* PICO) |

"Differentiating Between Convective and Nested Structures With a Single Spacecraft" *Swedish Space Plasma Meeting 2021* Kiruna, Sweden, February 1 - 2, 2021. (talk) |

"Magnetosheath jets using MMS: classification and generation mechanisms" *43rd COSPAR Scientific Assembly (COSPAR2021)* Sydney, Australia, January 28 - February 04, 2021. (talk) |

"Magnetosheath Jets Close to the Bow Shock | Generation Scenarios using MMS" *mini-GEM - Collisionless Shock Group* Online January 19, 2021. (***Virtual* invited talk**) |

2020

"Investigation of Different Types of Magnetosheath Jets and their Origin using MMS" *AGU 2020 Fall meeting (AGU2020)* San Francisco, US, December 01-12, 2020. (*Virtual* talk) |

"Jets Downstream of Quasi-parallel and Quasi-perpendicular Bow Shock" *MMS FALL SWT 2020* Online October 08, 2020. (*Virtual* talk) |

2019

"Classification of Magnetosheath Jets using Neural Networks, Solar Wind Observations and High-resolution IMF Measurements" *Sixteenth European Space Weather Week (ESWW16)* Liege, Belgium, November 18-22, 2019. (poster) |

"Creation & Classification of Magnetosheath Jet Database using Magnetospheric Multiscale (MMS) mission" *Sixteenth European Space Weather Week (ESWW16)* Liege, Belgium, November 18-22, 2019. (poster) |

"Classification of Magnetosheath Jets using Neural Networks and High Resolution OMNI (HRO) data" *Machine Learning in Heliophysics* Amsterdam, Netherlands, September 16-20, 2019. (talk) |

"Deep Learning Applications in Space & Solar Physics" *Solar Physics Summer School at Raman Science Center* Leh, India, June 10-16, 2019. (poster) |

"Investigation of Quasi-parallel & Quasi-perpendicular Magnetosheath Jets Using Magnetospheric Multiscale (MMS)" *EGU General Assembly 2019* Vienna, Austria, April 7-12, 2019. (talk) |

"Difference between Quasi-parallel & Quasi-perpendicular Magnetosheath Jets Using MMS" *SRS (Svenska Rymdforskares Samarbetsgrupp) 2019* Gothenburg, Sweden, March 14-15, 2019. (poster) |

"Quasi-parallel & Quasi-perpendicular Magnetosheath Jets Using MMS" *Swedish Space Plasma Meeting 2019* Uppsala, Sweden, February 7-8, 2019. (talk) |

2018

"Processing Solar Images to forecast Coronal Mass Ejections using Artificial Intelligence" *Fifteenth European Space Weather Week (ESWW15)* Leuven, Belgium, November 5-9, 2018. (poster) |

SUMMER SCHOOLS & WORKSHOPS

2022 **Solar Orbiter School**

CCSD, Sète, France
Course - Summer School | 30 May – 03 June 2022.
Presentation topic: *High-speed plasma jets generated by the cyclic behavior of the Earth's bow shock*

2021 **Polar Magnetospheric Substorms**
UNIS, Svalbarad, Norway
Course - Winter School | 26 November – 07 December 2021.
Presentation topic: *Magnetosheath Jets Formation & Basic Properties using MMS*

14s Iberian Space Science Summer School
University of Coimbra, Coimbra, Portugal
Summer school | 26 – 30 July 2021.

2020 **Solar-Stellar Connection STFC Summer School**
University of Warwick, Warwick, UK
Summer school | 14 – 18 September 2020.
Presentation topic: *Magnetosheath Jets*

STFC Introductory Solar System Plasmas Summer School
University of Birmingham, Birmingham, UK
Summer school | 24 – 27 August 2020.

NASA Heliophysics Summer School
UCAR, Boulder, CO, USA
Summer school | 6 - 17 July 2020.
Presentation topic: *Magnetosheath Jets using Magnetospheric Multiscale (MMS) Mission*

2019 **Solar Physics Summer School**
Raman Science Center, Indian Institute of Astrophysics, Leh, India
Summer school | 10 - 16 June 2019.
Presentation topic: *Deep Learning Applications in Space & Solar Physics*

2018 **CESRA Summer School**
Royal Observatory of Belgium, Brussels, Belgium
Summer school | 10 - 14 September 2018.
Presentation topic: *Forecasting Coronal Mass Ejections using Artificial Intelligence*

2017 **Intensive Week on Numerical Modeling in Astrophysics**
University of Cologne, Cologne, Germany
Summer school | 11 - 16 September 2017.

2016 **BCGS Summer School in Physics and Astronomy**
BCGS, Bad Honnef, Germany
Summer school | 22 - 26 Aughust 2016.
Presentation topic: *Is there a quantum computer? The D-Wave controversy*

2015 **Petnica Summer Institute: Astrophysics and Astroparticles**
Petnica Science Center, Valjevo, Serbia
Summer school | 24 July - 2 August 2015.
Presentation topic: *Limb Darkening*

DISTINCTIONS, AWARDS & MERITS

2020 – 2022 **Early Career Scientist – ISSI International Team 465**
International Space Science Institute, Bern, Switzerland

Early-career scientist of ISSI team "Foreshocks Across the Heliosphere: System Specific or Universal Physical Processes?" (2019-2022).

2016 – 2018 **Student Representative – Committee of Msc. Astronomy and Astrophysics**
KU Leuven, Leuven, Belgium
Student representative in the facility committee of the Master of Astronomy and Astrophysics - Permanente Onderwijscommissie (POC).

SKILLS

Languages	Greek (Native) English (Excellent) French (Good)
Programming	Python, MATLAB, R, C++, Wolfram/Mathematica, IDL, JavaScript, SQL
Software	LaTeX, git, Inkcape, ParaView, VisIt
ML tools	Tensorflow, Keras, Scikit-learn, Theano, Pytorch, SciANN
Miscellaneous	OpenMP, MPI
Hobbies	Classical guitar, Fitness, Video games

REFERENCES

PhD supervisor | Tomas Karlsson | Royal Institute of Technology, : tomask@kth.se
PhD co-supervisor | Andris Vaivads | Royal Institute of Technology, : vaivads@kth.se
Collaborator | Ferdinand Plaschke | Technische Universität Braunschweig, : f.plaschke@tu-braunschweig.de
Collaborator | Minna Palmroth | University of Helsinki, : minna.palmroth@helsinki.fi
MSc. supervisor | Giovanni Lapenta | KU Leuven, : giovanni.lapenta@kuleuven.be
BSc. supervisor | Ioannis Daglis | University of Athens, : iadaglis@phys.uoa.gr

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