

Merav Opher
Professor
Department of Astronomy
Boston University
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Education

University of Sao Paulo: Ph.D., Physics & Astronomy, 1998
Doctoral Thesis: “Plasma Effects in the Early Universe”; Advisor: Prof. Reuven Opher

University of Sao Paulo: B.S., Physics, 1992

Academic positions

2021 – 2022 William Bentinck-Smith Fellow, Harvard Radcliffe Institute
2020 – Professor, Astronomy Department, Boston University
2017 – 2018 Sabbatical Professor, Institute for Theory and Computation, Harvard University
2014 – 2015 Acting Director, Center for Space Physics, Boston University
2013 – 2020 Associate Professor, Astronomy Department, Boston University
2010 – 2013 Assistant Professor, Astronomy Department, Boston University
2011 – 2012 Affiliate Professor, Department of Physics and Astronomy, George Mason University
2009 – 2010 Associate Professor, Department of Physics and Astronomy, George Mason University
2005 – 2009 Assistant Professor, Department of Physics and Astronomy, George Mason University
2004 – 2005 Research Scientist, Jet Propulsion Laboratory
2001 – 2004 Caltech Postdoctoral Scholar, Jet Propulsion Laboratory
1999 – 2001 Postdoctoral Associate, Physics and Astronomy Department, Plasma Physics Group, UCLA

Honors and Awards

- PECASE - Presidential Early Career Award for Scientists and Engineers (2008)
- NSF Young Investigator CAREER award (2008)
- Kavli Fellow, National Academy of Science (2008)
- Mason Emerging Researcher/Scholar/Creator Award (2008)
- Marie Curie Fellowship (declined) (2001)
- *Top 10 most cited and read paper from Physics of Plasmas DPP Special Issues in the last 5 years* (Opher, M. et al., Physics of Plasmas 2016)

Merav Opher

- Harvard Radcliffe Fellowship (2021-2022)

Selected Society Leadership and Community Service

- Editor, Geophysical Research Letters (2017-2022)
- Member, Committee on Solar and Space Physics (CSSP) of the National Academies of Sciences, Engineering, and Medicine (NASEM) (2021-2023)
- Member, Heliophysics 2050 Workshop Science Organizing Committee
- Member, NRC Committee to Assess the 2012 Solar and Space Physics Decadal Survey (2019)
- Chair-Elect, American Physical Society (APS) Topical Group in Plasma Astrophysics (2017-2018)
- Member, NASA Heliophysics Mission Senior Review Panel, 2015, 2017, 2020, 2023
- Member, Living with a Star (LWS) Heliophysics Summer School (HSS) Steering Committee, 2015
- Member, Decadal Survey in Space Physics of Solar and Heliospheric Panel (2010-2011) – *chaired the Outer Heliosphere sub-panel*
- Member, Decadal Survey in Space Physics of the Theory and Modeling Group (2010-)
- Collaborator/Member – New Horizon Team (2020-)
- P.I DRIVE NASA SHIELD Phase I (2020-2022), <https://shielddrivecenter.com>
- Co-I SHILA Phase II (2020)
- Co-I New Horizons (2022-)
- **P.I DRIVE NASA SHIELD Phase II (2022-2027), 15M\$ in budget**

Selected Service at Boston University (from 2012)

University Level

- Appointed to University-wide task force focused on improving the workplace experience of employees who are LGBTQIA+ 2018-2019;
<http://www.bu.edu/lgbtqiataaskforce/>
- Search committee for the new Q-BU director at the new LGTQIA+ Center, 2020

College Level

- Academic Policy Committee (2013-2015).

Department Level

- Graduate Admission Committee – member (2018 –2019)
- Graduate Program Review Committee – member (2017–2018)
- Director of Graduate Studies (2015–2017)
- Director, REU Program in the Astronomy Dept. (2016 – 2018)
- Co-Director, REU Program in the Astronomy Dept. (2015 – 2016)

A professor in the Department of Astronomy at Boston University, Merav Opher is interested in understanding the cocoons around stars, called astrospheres and generated by the stellar winds as they move through the interstellar medium that

surrounds them. In particular, her research focuses on understanding the heliosphere, the cocoon around the solar system, and creates the foundation to predict habitable astrospheres.

In 2022 at Radcliffe, Professor Opher continued her groundbreaking heliospheric research. She is tackling questions such as: what is the shape of the heliosphere—is it a long-tail comet-like shape as described in the classic view, or is it a croissant-like shape as her recent work suggests? And what is the physical mechanism driving the shape? Understanding the shape of the heliosphere is the first step to grasping the shielding properties of the heliosphere. The outcomes will provide foundational knowledge for the broader astronomical community to apply understanding of the only known habitable astrosphere to other stars. Through this work, Professor Opher dares to ask and search for the answer to the question, “are we alone in the Universe?” Her results will allow scientists to predict which other stellar systems have the potential to harbor habitable Earth-like planets.

Journal Publications:

graduate students are underlined; postdocs are designated by *; previous graduate students are designated with ♦

Citations: <https://scholar.google.com/citations?user=KyPxq6sAAAAJ&hl=en>

Publication in Review or in Preparation

1. **Opher, M.**, Peek, J. and Loeb, A., “Evidence that Earth was exposed to Cold Dense Interstellar Medium 2 Myrs Ago as a result of the Encounter with Local Lynx Cold Clouds”, 2022 in review <https://www.researchsquare.com/article/rs-1855846/v1>
2. **Opher, M.**, Loeb, A., Zucker, C., Goodman, A. et al. Effect of the Passage of the Sun through the Local Bubble, in preparation 2023
3. Turner, D., Michael, A., Provornikova, E., Kornbleuth, M., **Opher, M.**, et al. Evidence of a Thick Heliopause Boundary Layer Resulting from Active Magnetic Reconnection with the Interstellar Medium, *Astrophysical Journal*, in review (2023).
4. Florinski, V., Alonso Guzman, J. G., Giacalone, J., Le Roux, J. A., **Opher, M.**, Turbulence and diffusive transport of cosmic rays in the Very Local Interstellar Medium, *Astrophysical Journal*, in review (2023).

Publications

5. Dialynas, K., et al. including **Opher, M.**, A future Interstellar Probe on the dynamic heliosphere and its interaction with the very local interstellar medium: In-situ particle and fields measurements and remotely sensed ENAs, *Frontiers in Astronomy and Space Sciences*, in press (2023).

6. Kornbleuth, M., **Opher, M**, Dialynas, K, Zank, G., Wang, B. B., Baliukin, I., Gkioulidou, M., Giacalone, J., Izmodenov, V., Sokol, J. M., Dayeh, M. Probing the Length of the Heliospheric Tail with ENAs from 0.52-, *Astrophysical J. Lett.*, in press (2023).
7. Kornbleuth, M., **Opher, M**, Zank, G., Wang, B. B., Giacalone, J., Gkioulidou, M., Dialynas, K., An Anomalous Cosmic Ray Mediated Termination Shock: Implications for Energetic Neutral Atoms, *Astrophysical J. Lett.*, in press (2023).
8. Lavraud, B., **Opher, M.**, Dialynas, K., et al., What is the heliopause? Importance of magnetic reconnection and measurements requirements, *Frontiers in Astronomy and Space Sciences*, 10 (2023).
9. Wang, B., Zank, G. P., Sherestha, B., Kornbleuth, M., **Opher, M.**, Relating energetic ion spectra to energetic neutral atoms (ENAs), *Astrophysical J.*, in press (2023).
10. Pontus, B. C., et al. including **Opher, M.**, Interstellar Probe: Humanity's exploration of the Galaxy Begins, *Acta. Astronautica*, 199, 364 (2022).
11. Kleiman, J. et al. including **Opher, M.**, The structure of the large-scale heliosphere as seen by current models, *Space Science Reviews*, 218, 36 (2022).
12. Galli, A. Baliukin, I., Bzowski, M. et al. including Opher, M. The Heliosphere and Local Interstellar Medium from Neutral Atom Observations at Energies Below 10 keV *Space Science Reviews*, 218, 31 (2022).
13. Sokol, J. M. et al. including **Opher, M.**, Interstellar Neutrals, Pickup Ions, and Energetic Neutral Atoms Throughout the Heliosphere: Present Theory and Modeling Overview, *Space Science Reviews*, 218: 18 (2022).
14. Keebler, T. B., Toth, G., Zieger, B., **Opher, M.**, MSWIM2D: Two-Dimensional Outer Heliosphere Solar Wind Modeling, *Astrophysical Journal Supplements*, 260, 43 (2022).
15. Gkioulidou, M., **Opher, M.**, Kornbleuth, M., et al. First Comparison of composite 0.52-55keV ENA spectra observed by IBEX and Cassini/INCA with simulated ENAs inferred by proton hybrid simulations downstream of the termination shock, *The Astrophysical Journal Letters*, 931, 21 (2022).
16. Nikoukar, R., Hill, M. et al. (including **Opher, M.**) On the Energy Dependence of Galactic Cosmic Ray Anisotropies in the Very Local Interstellar Medium, *The Astrophysical Journal* 934, 41(2022).
17. Michael, A. T. ♦, **Opher, M.**, Toth, M., Tenishev, V., Borovikov, D. The Solar-wind with Hydrogen Ion Exchange and Large-Scale Dynamics (SHIELD) code: A Self-Consistent Kinetic-MHD Model of the Outer Heliosphere, *The Astrophysical Journal*, 924, Number 2, 105 (2022).
18. Kornbleuth, M.* , **M. Opher**, I. Baliukin, M. Gkioulidou, J. Richardson, G. Zank, A. Michael, G. Toth, V. Tenishev, V. Izmodenov, D. Alexashov, S. Fuselier, "The development of a split-tail heliosphere and the role of non-ideal processes: a comparison of the BU and Moscow models", *The Astrophysical Journal*, 923, Issue 2 id. 179, 13pp. (2021).
19. **Opher, M.**, Drake, J. F., Zank., et al. A Turbulent Heliosheath Driven by Rayleigh Taylor Instability, *The Astrophysical Journal*, 922, 181 (2021).
20. Richardson, J. D. et al. including **Opher, M.** Using Magnetic Flux Conservation to Determine Heliosheath Speeds, *The Astrophysical Journal Letter*, 919, L28 (2021).

21. Kornbleuth, M.*, **Opher, M.**, I. Baliukin, Dayeh, M. A., Zirnstein, E., Gkioulidou, M., Dialynas, K., Galli, A., Richardson, J. D., Izmodenov, V., Zank, G. P., Fuselier, S., Drake, J. F., “Signature of a heliotail organized by the solar magnetic field and the role of non-ideal processes in modeled IBEX ENA maps: a comparison of the BU and Moscow MHD models”, *The Astrophysical Journal*, 921, 164 (2021).
22. Fuselier, S. A., Galli, A., Richardson, J. D., Reisenfeld, D. B., et al. with **Opher, M.**, “ENA fluxes from the Heliosheath: Constraints from in situ measurements and models”, *The Astrophysical Journal Letters*, 915, Issue 2, id. L26 (2021).
23. Giacalone, J., Nakanotani, M., Zank, G. P., Kota, J., **Opher, M.**, and Richardson, J. D., Hybrid simulations of Interstellar Pickup Protons Accelerated at the Solar-Wind Termination Shock at Multiple Location, *The Astrophysical Journal*, v. 911, Issue 1, id. 27, 8pp (2021).
24. Michael, A. T., **Opher, M.**, Toth, G., Tenishev, V., Drake, J. F., “The Impact of Kinetic Neutrals on the Heliotail” *The Astrophysical Journal*, Vol. 906, 37 (2021).
25. Dialynas, K., Galli, A., Dayeh, M., Cummings, A., Decker, R. B., et al with **Opher, M.**, “Combined $\sim 10\text{eV}$ to $\sim 344\text{ MeV}$ particle spectra and pressures in the Heliosheath along the Voyager 2 trajectory”, *The Astrophysical Journal*, 905, L24 (2020).
26. Zieger, B., **Opher, M.**, Toth, G., Florinski, V., Richardson, J., “Dispersive Fast Magnetosonic Waves and Shock-Driven Compressible Turbulence in the Inner Heliosheath”, *Journal of Geophys. Res.*, Vol. 125, Issue 10, article id. e28393 (2020).
27. Nakanotani, M, Zank, G. P., Adhikari, L., Zhao, L.-L., Giacalone, J., **Opher, M.**, “Downwind Solar Wind and Pioneer 10 Observations”, *The Astrophysical Journal Letters*, Vol. 901, Issue 2, id. L23, 5pp. (2020).
28. Kornbleuth, M., **Opher, M.**, Michael, A., T., Sokol, J., Toth, G., Tenishev, V., and Drake, J. F., “The Confinement of the Heliosheath Plasma by the Solar Magnetic Field as Revealed by Energetic Neutral Atom Simulations”, *The Astrophysical Journal Letters*, Vol. 895, Number 2 (2020).
29. **Opher, M.**, Loeb, A. Drake, J., Gabor, T. “A Predicted Small and Round Heliosphere suggested by magnetohydrodynamic modelling of pick-up ions”, *Nature Astronomy*, Vol. 4, 675 (2020). (cover)
<https://www.nature.com/natastron/volumes/4/issues/7>
30. Paez, A., Jatenco-Pereira, V., Falceta-Goncalvez, D., **Opher, M.**, “Corrugated features in coronal mass ejections-driven shocks: a discussion on the predisposition to particle acceleration”, *The Astrophysical Journal* 879, Issue 2 (2019).
31. Kornbleuth, M., **Opher, M.**, Michael, A. T., Drake, J. F., “Globally Distributed Energetic Neutral Atom Maps for the “Croissant” Heliosphere”, *The Astrophysical Journal*, Vol. 865, 84 (2018).
32. Michael, A. T., **Opher, M.**, Toth, G., “Consequences of Treating the Solar Magnetic Field as a Dipole on the Global Structure of the Heliosphere and Heliosheath”, *The Astrophysical Journal*, Vol. 860, 171 (2018).
33. Paez, A., Jatenco-Pereira, V., Falceta-Goncalvez, D., **Opher, M.**, “Kelvin-Helmholtz instability at CME-Sheath and sheath-solar winds interfaces”, *The Astrophysical Journal*, Vol. 851, Issue 2, article id. 112 (9 pages) (2017).
34. Moore, L., O’Donoghue, J., Melin, H., et al. “Variability of Jupiter’s IR H₃ aurorae

- during Juno approach”, *Geophysics Research Letter*, Vol. 44, Issue 10, 4513 (2017).
35. Capannolo, L., **Opher, M.**, Kay, C.♦, Landi, E., “The deflection of the Cartwheel CME: ForeCAT results”, *The Astrophysical Journal*, Vol. 839, Issue 1, article id. 37, 7pp (2017).
 36. **Opher, M.**, Drake, J. F., Swisdak, M., Zieger, B.♦, Toth, G., “The Twist of the Draped Interstellar Magnetic Field Ahead of the Heliopause: A Magnetic Reconnection Driven Rotational Discontinuity”, *The Astrophysical Journal Letters*, Vol. 839, L12 (2017).
 37. Drake, J. F., Swisdak, M., **Opher M.**, Richardson, J. D., “The formation of magnetic depletions and flux annihilation due to reconnection in the heliosheath”, *The Astrophysical Journal*, Vol. 837, Issue 2, article id. 159, 9pp (2017).
 38. Kay, C., Gopalswamy, N., Reinard, A. **Opher, M.**, “Predicting the Magnetic Field of Earth-impacting CMEs”, *The Astrophysical Journal*, Vol. 835, article id. 117 (2017).
 39. Richardson, J. D., Burlaga, L. F., Drake, J. F., Hill, M. E., **Opher, M.**, “Voyager Observations of Magnetic Sectors and Heliospheric Current Sheet Crossings in the Outer Heliosphere”, *The Astrophysical Journal*, Vol. 831, Issue 2, article id. 115, 6 pp. (2016).
 40. Kay, C., **Opher, M.**, Colaninno, R. C., Vourilidas, A., “Using ForeCAT Deflections and Rotations to Constrain the Early Evolution of CMEs”, *The Astrophysical Journal*, Vol. 827, 1 (2016).
 41. Gallana, L., Fraternale, F., Fosson, S. M., Magli, E., **Opher, M.**, Richardson, H. D., Iovieno, M., Tordella, D., “Power and helicity spectra of solar wind at 5AU”, *Journal of Geophys. Res.*, Vol. 121, 3905 (2016).
 42. Kay, C., **Opher, M.**, Kornbleuth, M. “Probability of CME Impact on Exoplanets Orbiting M Dwarfs and Solar-Like Stars”, *The Astrophysical Journal*, Vol. 826, Issue 2, article id. 195 (2016).
 43. Fraternale, F., Gallana, L., Iovieno, M., **Opher, M.**, Richardson, J. D., Tordella, D., “Turbulence in the solar wind: spectra from Voyager 2 data at 5AU”, *Physica Scripta*, Vol. 91, Issue 2, article id. 023011 (2016).
 44. Iovieno, M., Gallana, L., Fraternale, F., Richardson, J. D., **Opher, M.**, Tordella, D., “Cross and magnetic helicity in the outer heliosphere from Voyager 2 observations”, *European Journal of Mechanic B-Fluids*, Vol. 55, 394 (2016).
 45. **Opher, M.**, Drake, J. F., Zieger, B., Swisdak, M. and Toth, G., “Magnetized Jets Driven by the Sun: The Structure of the Heliosphere Revisited – Updates”, *Physics of Plasmas*, Vol. 23, 056501 (2016). *this paper was considered one of the 10 most cited and most read from *Physics of Plasmas DPP Special Issues in the last 5 years*
 46. Kay, C. and **Opher, M.**, “The Heliocentric Distance where the deflections and rotation of Solar coronal mass ejections occur”, *The Astrophysical Journal Letters*, Vol. 811, Issue 2, article id. L36, 6pp (2015).
 47. Zieger, B.*, **Opher, M.**, Toth, G., Decker, R., Richardson, J. “Constraining the pick-up ion abundance and temperature through the multi-fluid reconstruction of the Voyager 2 termination shock crossing”, *Journal of Geophys. Res.*, Vol. 120, 7130 (2015).
 48. Drake, J. F, Swisdak, M., **Opher, M.**, A Model of the Heliosphere with Jets, *The Astrophysical Journal Letters*, Vol. 808, Issue 2, article id. L44 (2015).

49. **Opher, M.** “The Heliosphere: What did we learn in recent years and the current challenges”, *Space Science Reviews* (invited review by the editors) Vol. 200, 475 (2015).
50. Kay, C., **Opher, M.**, Evans, R. ♦, “Global Trends of CME Deflections Based on CME and Solar Parameters”, *The Astrophysical Journal*, Vol. 805, Issue 2, article id. 168, 20 pp. (2015).
51. Michael, A., T., **Opher, M.**, Provornikova, E. ♦, Richardson, J., Toth, G. “Magnetic Flux Conservation in the Heliosheath including Solar Cycle Variations of Magnetic Field Intensity”, *The Astrophysical Journal Letters*, Vol. 803, L6 (2015).
52. Kay, C., dos Santos, L., **Opher, M.** “Constraining the Masses and the Non-Radial Drag Coefficient of a Solar Coronal Mass Ejection”, *The Astrophysical Journal Letters*, Vol. 801, L21 (2015).
53. **Opher, M.**, Drake, J. F., Zieger, B., Gombosi, T. I. “Magnetized Jets Driven by the Sun: The Structure of the Heliosphere Revisited”, *The Astrophysical Journal Letters*, Vol. 800, L28 (2015).
54. Provornikova, E., **Opher, M.**, Izmodenov, V., Richardson, J., Toth, G. “Plasma Flows in the Heliosheath Along the Voyager 2 and 1 Trajectories due to 11-Year Solar Cycle Effects”, *The Astrophysical Journal*, Vol. 794, Issue 1, article id. 29 (2014).
55. Fermo, R. *, **Opher, M.**, Drake, J., “Magnetic reconnection in the interior of interplanetary coronal mass Ejections”, *Phys. Rev. Lett.*, Vol. 113, 031101 (2014).
56. Hill, M. E., Decker, R. B., Brown, L. E., Drake, J. F., Hamilton, D. C., Krimigis, S. M., **Opher, M.** “Dependence of energetic ion and electron intensities on proximity to the magnetically sectored heliosheath: Voyager 1 and 2 Observations”, *The Astrophysical Journal*, Vol. 781, 94 (2014).
57. Vidotto, A. ♦, Jardine, M., Morin, J., Donati, J.F., **Opher, M.**, Gombosi, T. I., “M-dwarf stellar winds: the effects of realistic magnetic geometry on rotational evolution and planets”, *Mon. Not. R. Astron.*, Vol. 438, 1162 (2014).
58. **Opher, M.** and Drake, J. F., “On the Rotation of the Magnetic Field Across the Heliopause”, *The Astrophysical Journal Letters*, Vol. 778, L26 (2013).
59. Kozarev, K., Evans, R. M. ♦, Schwadron, N.A., Dayeh, M. A., **Opher, M.**, Korreck, K. E., van de Holst, B., “Global Numerical Modeling of Energetic Proton Acceleration in a CME Traveling Through the Solar Corona”, *The Astrophysical Journal*, Vol. 778, Issue 1, article id. 43 (2013).
60. **Opher, M.**, Prested, C. *, McComas, D., Schwadron, N., Drake, J., “Probing the Nature of the Heliosheath with the Neutral Atom Spectra Measured by IBEX in the Voyager 1 Direction”, *The Astrophysical Journal Letters*, Vol. 776, L32 (2013).
61. Kay, C., **Opher, M.**, Evans, R. ♦, “Forecasting a Coronal Mass Ejection's Altered Trajectory: ForeCAT”, *The Astrophysical Journal*, Vol. 775, 5 (2013).
62. Swisdak, M., Drake, J., **Opher, M.**, “Porous Heliopause”, *The Astrophysical Journal Letters*, Vol. 774, L8 (2013).
63. Zieger, B. *, **Opher, M.**, Schwadron, N. A., McComas, D. J., and Toth, G., “A slow bow shock ahead of the heliosphere”, *Geophysics Research Letters*, Vol. 40, Issue 12, 2923 (2013).
64. Provornikova, E., **Opher, M.**, Izmodenov, V., and Toth, G., “Propagation into the heliosheath of a -scale disturbance bounded by a pair of shocks” *Astronomy and*

- Astrophysics*, Vol. 552, id. A99 (2013).
65. Richardson, J. D., Burlaga, L. F., Decker, R. B., Drake, J. F., Ness, N. F., and **Opher, M.**, “Magnetic flux conservation in the heliosheath”, *The Astrophysical Journal Letters*, Vol. 762, L14 (2013).
 66. Provornikova, E., **Opher, M.**, Izmodenov, V., and Toth, G., “Do CIR associated shocks survive when they propagate into the heliosheath?” *The Astrophysical Journal Letters*, Vol. 756, L37 (2012).
 67. Evans, R., **Opher, M.**, Oran, R., van der Holst, B., Sokolov, I. V., Frazin, R., Gombosi, T. I., and Vasquez, A. M., “Coronal Heating by Surface Alfvén Wave Damping: Implementation in a Global Magnetohydrodynamics Model of the Solar Wind”, *The Astrophysical Journal*, Vol. 756, Issue 2, article id. 155 (2012).
 68. Vidotto, A. A. ♦, Fares, T., Jardine, M., Fonati, J.F., **Opher, M.**, Moutou, C., Catala, C., Gombosi, T. I., “The stellar wind cycles and planetary radio emission of the Tau Boo system”, *Mon. Not. R. Astron. Soc.*, Vol. 423, 3285 (2012).
 69. **Opher, M.**, Drake, J. F., Velli, M., Toth, G., and Decker, R., “Near the boundary of the heliosphere: a Flow Transition Region”, *The Astrophysical Journal*, Vol. 751, 80 (2012).
 70. Toth, G., *et al.* (including **M. Opher**), “Adaptive Numerical Algorithms in Space Weather Modeling”, *Journal of Computational Science*, Vol. 231, 870 (2012).
 71. **Opher, M.**, The heliosheath: the ultimate solar system frontier, *Astronomical Reviews*, Vol. 7, no.1, 68 (2012).
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 74. Liu, Y. C. ♦, **Opher, M.**, Wang, Y., and Gombosi, T. I., “Downstream structure and evolution of a simulated CME-driven sheath in the solar corona”, *Astronomy and Astrophysics*, Vol. 527, id. A46 (2011).
 75. Loesch, C., **Opher, M.**, Alves, M. V., Evans, R., Manchester, W., and Gombosi, T. I., “Signatures of Two Distinct Driving Mechanisms in the Evolution of CMEs in the Lower Corona”, *J. Geophys. Res.*, Vol. 116, Issue A4, CiteID A04106 (2011).
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 78. Vidotto, A. A. ♦, Jardine, M., **Opher, M.**, Donati, J. F., and Gombosi, T. I., “Powerful Winds from Low-Mass Stars: V374 Peg”, *Mon. Not. R. Astron. Soc.*, Vol. 412, 351 (2011).
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80. Prested, C. *, **Opher, M.**, and Schwadron, N., “The Imprint of the Very Local Interstellar Magnetic Field on Simulated Energetic Neutral Atom Maps”, *The Astrophysical Journal*, Vol. 716, 550 (2010).
81. Swisdak, M., **Opher, M.**, Drake, J., and Alouani-Bibi, F., “The Vector Direction of the Interstellar Magnetic Field Near the Heliopause”, *The Astrophysical Journal*, Vol. 710, 1769 (2010).
82. Drake, J., **Opher, M.**, Swisdak, M., and Chamoun, J., N., “A magnetic reconnection mechanism for the generation of anomalous cosmic rays”, *The Astrophysical Journal*, Vol. 709, 963 (2010).
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92. Evans, R., **Opher, M.**, Manchester, W. B., Velli, M., and Gombosi, T. I., “Alfvén Profile in the Lower Corona: Implications for Shock Formation”, *The Astrophysical Journal*, Vol. 687, 1355 (2008).
93. Liu, Y. C. *, **Opher, M.**, Cohen, O., Liewer, P. C., and Gombosi, T. I., “A simulation of a CME propagation and shock evolution in the lower solar corona”, *The Astrophysical Journal*, Vol. 680, L757 (2008).
94. Manchester, W. B., Vourilidas, A., Toth, G., Lugaz, N., **Opher, M.**, Gombosi, T. I., Sokolov, I., DeZeeuw, D., and Roussev, I., “Three-dimensional MHD simulation of the 2003 October 28 Coronal Mass Ejection: Comparison with Coronagraph Observations”, *The Astrophysical Journal*, Vol. 684, 1448 (2008).

95. Prested, C., et al. (including **Opher, M.**) “Implications of universal kappa distributions for IBEX ENA flux maps”, *Journal of Geophysical Research*, Vol. 113, Issue A6, A06102 (2008).
96. **Opher, M.**, Stone, E. C., and Gombosi, T. I., “The Orientation of the Local Interstellar Magnetic Field”, *Science*, Vol. 316, 875 (2007).
97. **Opher, M.**, Stone, E. C., and Liewer, P. C., “Effects of a Local Interstellar Magnetic Field on Voyager 1 and 2 Observations”, *The Astrophysical Journal*, Vol. 640, L71 (2006).
98. Bettarini, L., Velli, M., Landi, S., and **Opher, M.**, “Tearing and Kelvin-Helmholtz instabilities in the heliospheric plasma”, *Astronomy and Astrophysics*, Vol. 452, 321 (2006).
99. **Opher, M.**, Liewer, P. C., Velli, M., Bettarini, L., Gombosi, T. I., Manchester, W. B., DeZeeuw, D. L., Toth, G., and Sokolov, I., “Magnetic Effects at the Edge of the Solar System: MHD Instabilities, the de Laval nozzle Effect and an Extended Jet”, *The Astrophysical Journal*, Vol. 611, 575 (2004).
100. **Opher, M.**, Liewer, P. C., Gombosi, T. I., Manchester, W. B., DeZeeuw, D. L., Sokolov, I., and Toth, G., “Probing the Edge of the Solar System: Formation of an Unstable Jet-Sheet”, *The Astrophysical Journal*, Vol. 591, L61 (2003).
101. Manchester, W., **Opher, M.**, Gombosi, T. I., Roussev, I., DeZeeuw, D. L., Sokolov, I. V., Powell, K. G., and Toth, G., “Three-dimensional MHD simulation of a flux rope driven CME”, *Journal of Geophysical Research*, Vol. 109, A01102 (2004).
102. **Opher, M.**, Morales, G. J., and Leuboff, J. N., “Krook Collisional Models of the Kinetic Susceptibility”, *Physics Review E*, Vol. 66, 016407 (2002).
103. **Opher, M.**, Silva, L. O., Dager, D. E., Decyk, V. K., and Dawson, J. M., “Nuclear Reaction Rates and Energy in Stellar Plasmas: The effect of Highly Damped Modes”, *Physics of Plasmas* Vol. 8, 2454 (2001).
104. **Opher, M.** and Opher, R., “Dynamic Screening in Thermonuclear Reactions”, *The Astrophysical Journal*, Vol. 535, 473 (2000).
105. **Opher, M.** and Opher, R., “Energy of a Plasma in the Classical Limit”, *Physics Review Letters*, Vol. 82, 4835 (1999).
106. Miranda, O. D., **Opher, M.** and Opher, R., “Generation of Seed Magnetic Fields by Primordial Supernovae”, *Monthly Notices of the Royal Astronomical Society*, Vol. 301, 547 (1998).
107. **Opher, M.** and Opher, R., “Was The Electromagnetic Spectrum a Blackbody Spectrum in The Early Universe?”, *Physical Review Letters*, Vol. 79, 2628 (1997).
108. **Opher, M.** and Opher, R., “The Magnetic Field Spectrum in a Plasma in Thermal Equilibrium in the Epoch of Primordial Nucleosynthesis”, *Physical Review D*, Vol. 56, 3296 (1997).
109. Revzen, M., Opher, R., **Opher, M.** and Mann, A., “Kirchhoff's theorem and the Casimir Effect”, *Europhysics Letters*, Vol. 38, 245 (1997).
110. Revzen, M., Opher, R., **Opher, M.** and Mann, A., “Casimir's Entropy”, *Journal of Physics A*, Vol. 30, 7783 (1997).

Journal Publications – Peer reviewed Conference Proceedings

111. Richardson, J., Belcher, J. W., Burlaga, L. F., Cummings, A. C., Decker, R., **Opher, M.**, Stone, E. C., “Voyager 2 Observations Near the Heliopause”, *ICNS Book*, (2020).
112. Schwadron, N., **Opher, M.**, Kasper, J., Mewaldt, D. Moebius, E., Spence, H., Zurbuchen, T., “Interstellar Mapping and Acceleration Probe (IMAP)”, *Journal of Physics: Conference Series (JPCS)*, Vol. 767, Issue 1. Article id. 012025 (2016).
113. Vidotto, A. A., **Opher, M.**, Jatenco-Pereira, V., and Gombosi, T. I., “3D Simulations of Tilted Magnetospheres of Weak-Lines T-Tauri Stars”, *Revista Mexicana de Astronomia y Astrofisica*, Vol. 40, 133 (2011).
114. **Opher, M.**, “Shocks and Magnetized Winds: Learning from the Interaction of the Solar System with the Interstellar Medium”, *Revista Mexicana de Astronomia y Astrofisica*, Vol. 36, 60 (2009).
115. **Opher, M.**, “Pinning Down the Intensity and Direction of the Local Interstellar Magnetic Field”, *AIP Conference Proceedings*, Vol. 1156, 153 (2009).
116. **Opher, M.**, Stone, E. C., Liewer, P. C., and Gombosi, T. I., “Global Asymmetry of the Heliosphere” *American Institute of Physics (AIP) Conference Proceedings*, Vol. 858, 45 (2006).
117. **Opher, M.**, Liewer, P. C., Velli, M., Bettarini, L., Gombosi, T. I., Manchester, W. B., DeZeeuw, D. L., Sokolov, I., and Toth, G., “Magnetic Effects Change Our View of the Heliosheath”, *AIP Conference Proceedings*, Vol. 719, 105 (2004).

Abstracts of Conferences – at the end of CV

Book Chapters:

1. **Opher, M.**, “Shocks in Heliophysics”, *Heliophysics, Space Storms and Radiation: Causes and Effects*, 192, Cambridge University Press, *Editors: Karel Schriver, George Siscoe* (2009).
2. **Opher, M.**, “Effect of the Interstellar Magnetic Field on the Heliosphere”, *Local Bubble and Beyond II, American Institute of Physics*, *Editor: K. D. Kuntz* (2009).
3. Heike Rauer¹, Michel Blanc, et al. (including **Opher, M.**) Chapter 1 and 2 in report of the “Solar System/Exoplanet Science Synergies in a multi-decadal Perspective”, *Planetary exploration, Horizon 2061* (2020).

Professional Activities

Selected Society Leadership and Community Service

- Member of Board of Visitor for Space Science Department, University of Alabama Huntsville (November 2022).
- Member of the review board of Kiepenheuer-Institut für Sonnenphysik, Freiburg, Germany (September 2022).
- Editor, *Geophysical Research Letters* (2017-2023).
- Chair-Elect of American Physical Society (APS) Topical Group in Plasma Astrophysics (2017-2018).

- Member of Science Advisory Board for ULA, 2022-
- Member of the Climate and Space Sciences and Engineering (CLaSP) National Advisory Board Charge, Dept. of Climate and Space Sciences & Engineering Advisory, University of Michigan (2016 – 2018).
- Member of the Living with a Star (LWS) Heliophysics Summer School (HSS) Steering Committee, 2015.
- Member of the NASA Heliophysics Mission Senior Review Panel, 2015, 2017
- Member of the review board of Kiepenheuer-Institut für Sonnenphysik, Freiburg, Germany (September 2015).
- Associate Editor of Journal of Geophysics Research (2014-2017).
- International Space Science Institute (ISSI) Team Leader (with Dr. Matt Hill) of “Facing the Most Pressing Challenges to Our Understanding of the Heliosheath and its Outer Boundaries” (2015-2016).
- Member of the Steering Committee for the Jack Eddy Postdoctoral Fellowship Program (2014-2017).
- Member of the Space Physics and Aeronomy (SPA) American Geophysical Union (AGU) Fellows Committee (2015-2017).
- Director of the Research Experiences for Undergraduates (REU) Program at Boston University (2016-2018).
- Co-Director of the Research Experiences for Undergraduates (REU) Program at Boston University (2015-2016).
- Co-author of the Senior Review for Voyager (2013, 2016, 2019).
- Co-author of the Senior Review for Interstellar Boundary Explorer (IBEX) (2013).
- Member of the Decadal Survey in Space Physics of Solar and Heliospheric Panel (2010-2011) –*chaired the Outer Heliosphere sub-panel*
- Member of the Decadal Survey in Space Physics of the Theory and Modeling Group (2010-2011).
- Member of the Committee on Solar and Space Physics (CSSP) of the National Academy of Science (2008-2011).
- NASA-Living with a Star Steering Committee (2006, 2007).
- Chair, American Geophysical Union of Student Committee Award (2006, 2007).
- Co-author of the Senior Review for Voyager (2008, 2009, 2012).
- Co-author of the Senior Review for Interstellar Boundary Explorer (IBEX) (2012).
- Co-author of Senior Review for New Horizons (2021).

Conference Organization

1. Main organizer (with Dr. Kostas Diyalinas as Deputy) of Session “Large scale structure of heliosphere and its physical drivers”, Cospar South Korea, 2024
2. Member of ISSI-Team (Pawel Swaczyna: Team leader) “Distribution of Interstellar Neutral Hydrogen in the Sun’s Neighborhood”, ISSI, Bern, Switzerland (2020-2023)
3. SOC-Heliophysics 2050, May 2021
4. Co-Organizer of “Near-term Exploration of the Interstellar Medium”, COSPAR, Sydney, Australia 2020

5. Co-Organizer of Session for the 2019 Fall Meeting of the American Geophysical Union (AGU) with Dr. Heather Elliot and Dr. John Richardson
6. Co-Organizer of a session on “Interstellar Probe: science, mission designs, opportunities and challenges”, EPSC-DPS (European Planetary Science Congress-Division of Planetary Sciences), 2019
7. Co-Organizer of Session for the 2018 Fall Meeting of the American Geophysical Union (AGU) with Dr. John Richardson.
8. Co-Organizer of Session for 2016 European Geophysical Union (EGU): Physics of the Outer Heliosphere, Particle Acceleration, and Solar Wind Disturbances: Preparation for Interstellar Mapping and Acceleration Probe (IMAP).
9. Co-Chair of the session “Voyager Interstellar Mission: Its Scientific Discoveries and Their Relation to Remote Observations”, Fall Meeting of American Geophysical Union 2016.
10. Co-Chair of Space Physics at XXVI IUPAP Conference on Computational Physics (CCP2014), Boston, Aug. 11-14, 2014.
11. Co-Chair of the Session “Magnetic reconnection and flux redistribution: 3D dynamics at multiple scales”, Fall Meeting of American Geophysical Union, December 2014.
12. Spring Meeting of American Geophysical Union, Meeting of the America, co-chair session “Our Evolving Understanding of the Heliosheath”, May 2013.
13. Chair, Fall Meeting of American Geophysical Union, Outer Heliosphere session, December 2012.
14. Session Leader, Chair, “Outer Heliosphere” at the Solar Heliospheric & Interplanetary Environment (SHINE), August 2012.
15. SOC of the Astronomical Union Union (IAU) Solar-Stellar Connection, China, August 2012.
16. SOC for IRIS/AIA workshop, California, May 2012.
17. Fall Meeting of American Geophysical Union, two sessions (Outer Heliosphere and Heliosphere Modeling), San Francisco, December 2010.
18. Spring Meeting of American Geophysical Union, Meeting of the Americas, Foz de Iguacu, Brazil, Special session on shocks and acceleration of particles; and the session about Voyager and IBEX, August 2010.
19. SOC of SOHO-23, St. Andrew, September 2009.
20. SOC of the Heliophysics session, Committee on Space Research of the International Council for Science (ICSU) (Cospar) 2010.
21. Co-Chair, “Physics of the Solar Wind - Interstellar Medium Interaction: Theory, Modeling, and Observations”, Fall Meeting of American Geophysical Union, December 2008.
22. Co-Chair, “Shocks in the Lower Corona”, Solar Heliospheric & Interplanetary Environment (SHINE), July 2008, July 2009.
23. Co-Chair, “A Stereo View of the Final Frontiers: Voyager 1 and 2 in the Heliosheath”, Spring Meeting of American Geophysical Union, Acapulco, May 2007.
24. Chair, “Do We Understand Our Heliosheath? Implications for Three-Dimensional Heliosphere and Astrosphere”, Spring Meeting of American Geophysical Union, Baltimore, 23-26 May 2006.

25. Co-Chair, “Voyager in the Heliosheath I”, Fall Meeting of American Geophysical Union, 5-9 December, San Francisco 2005.
26. Co-Chair, “Voyager and Beyond: Physics of the Outer Heliosphere II”, Fall Meeting of American Geophysical Union (AGU), 13-17 December, San Francisco 2004.
27. Chair, “Novel Ideas in Space Physics”, Spring Meeting of American Geophysical Union, May 2003.

Reviewer

- Science Advisory Board for ULA, 2022-
- Reviewer for Austrian Science Foundation (FWF).
- Reviewer for the Deutsche Forschungsgemeinschaft (DFG) (German Science Foundation).
- Reviewer for the BASIS (Russian Science Foundation).
- Reviewer for National Science Academy.
- Reviewer for W.W. Norton, chapters of Kay et al.’s *21st Century Astronomy*.
- Member of the NSF Site Visit to Center for Integrated Space Weather Modeling (CISM), University of Boston Space Weather Group.
- Reviewer for NASA (SR&T and LWS – panels and mail-in reviewer), NSF.
- Reviewer for Science, The Astrophysical Journal Letters, Monthly Notices of Royal Astronomical Society, Nature Astronomy, Astronomy & Astrophysics, Journal of Geophysical Research, Space Science Reviews, Review of Space Science and Physical Review Letters, Solar Wind X, IEEE, EOS, Geophysical Research Letters, Brazilian Agency FAPESP.

Invited Lectures

General

1. “SHIELD Overview Presentation”, HPD staff Meeting, NASA HQ, April 12, 2023
2. Scene Setting Talk “The end of the Solar Wind”, Solar Wind 16, Monterey, CA, June 12-16, 2023
3. Plenary Talk in the Session “Ion/Neutral Coupling Throughout the Heliospheric System”; 2018 Triennial Earth-Sun Summit (AGU/TESS) meeting, Leesburg, VA, May 20-24, 2018.
4. NASA Science Update on Voyager at NASA HQ (with Edward Stone and Ann Druyan widow of Carl Sagan), March 7-8, 2011.
5. “The Vision Lecture Series” at George Mason University, <http://cfa.gmu.edu/vision/>, January 31, 2011.
6. “Thirteenth Annual Chinese-American Kavli Frontiers of Sciences”, www.nasonline.org/kfos, September 23-25, 2010.
7. Parker Lecture at the SPD/AAS meeting, “Surprises from the Edge of the Solar System: Voyager at the Final Frontier”, Solar Physics Division, June 2006.

Conferences

8. “Outer Heliosphere”, SWMF User Meeting, Ann Arbor, MI, March 03, 2023

9. “Science at the NASA Drive Center SHIELD”, 28th IUGG General Assembly, IAGA, Berlin, Germany July 11-20, 2023
10. Fall AGU, 2022 , [SH030 - Toward understanding the nature and structure of our Heliospheric shield](#)
11. August TESS 2022 (declined)
12. August 2022 Zank Annual Meeting EpsCor (declined)
13. Speaker, Conference in Celebration of Avi Loeb, Martha Vinyard, May 8-10 2022
14. Speaker, “Seeing the Future” Conference in homage of Alyssa Goodman, New Hampshire, May 2-4 2022
15. Guest Speaker, 4th Interstellar Probe Workshop (Sep 27-Oct 21), 2021 (remote)
16. “Heliospheric Models”, 2021 IAGA-IASPEI Joint Scientific Assembly "Advances and Upcoming Developments in Solar and Heliospheric Physics”, 2021 August 21-27, 2021
17. Structure of the Heliosphere, NASA Living with a Star, <https://cpaess.ucar.edu/heliophysics/summer-school>), June 18, 2021
18. Structure of Heliotail, Cospar, February 02, 2021
19. Panelist for Physical Processes Affecting the Topology and Structure of Discontinuities in the Outer Heliosphere and the Very Local Interstellar Medium, Fall AGU, December 10, 2010
20. Talk: Structures Structure of the Heliosphere and Heliotail from different MHD models as Probed by ENA maps, Fall AGU, December 10, 2020
21. Panelist for 4th SWMF Users Meeting, Nov 4-6, 2020 (webinar)
22. Panel for Strategies for Securing Large-Scale Federal Awards, Boston University, October 27, 2020
23. “Our Boundary to Interstellar Space: A New Regime of Space Physics”, Webinar, zoom June 11, 2020, Johns Hopkins Applied Physics Laboratory
24. “DRIVE Outer Heliospheric SHIELD Data Center”, Observatory for the Outer Heliosphere, Heliosheath, and Interstellar Space, Fri 21-22 May 2020 at LASP-SPSC, University of Colorado, Boulder
25. Advanced Sao Paulo School on Solar Activity and Space Weather, Sao Paulo, Brazil, 03-14 August 2020
26. Workshop (by invitation only) “The Heliosphere in the Local Interstellar Medium”, at International Space Science Institute (ISSI) in Bern, Switzerland, 23 to 27 March 2020.
27. International Space Science Institute in Beijing, ISSI-BJ Forum on "Exploration of Outer Heliosphere and Nearby Interstellar Medium" (by invitation only), November 7-8, 2019
28. *Invited talk*, Interstellar Probe Science Workshop, NYC, October 16-18, 2019, about “The outstanding questions about the nature of the heliosphere and heliosheath
29. Plenary talk in Horizon 2061 Planetary Exploration synthesis workshop, Toulouse, France, September 11-13, 2019; <https://h2061-tlse.sciencesconf.org> [given by Skype]
30. Team Member of Brainstorm Workshops on “Perspective of the global heliospheric studies: open questions and future space missions (including

- Interstellar Probe)”, Moscow, May 28-31 2019
31. Invited Talk at Session ST05: From the Heliosphere to Interstellar Exploration, AOGS 16th Annual Meeting in Singapore, on July 28 – August 2, 2019.
 32. Invited Talk at European Geophysical Union (EGU) in session ST 1.6 entitled “Dynamical processes and particle acceleration associated with current sheets, magnetic islands and turbulence-borne structures in different plasmas”, Vienna Austria, 7-12, 2019.
 33. 3rd SWMF Users Meeting, Ann Arbor between March 4-6, 2019.
 34. 18th Annual International Astrophysics Conference, Sheraton, Pasadena, Pasadena, California, <https://www.icnsmeetings.com/conference/18thannual/index.html>, February 18-22, 2019.
 35. Interstellar Probe Exploration Workshop, The Explorers Club, 46 East 70th Street, New York, NY, October 10-12, 2018.
 36. Fifty years at Applied Physics Laboratory - A Celebration of the Career and Contributions of Tom Krimigis, <http://civspace.jhuapl.edu/SMK80/>, September 10, 2018.
 37. IBEX/IMAP Science Working team meeting (SWT #22), Princeton University, August 28-29, 2018.
 38. Committee on Space Research of the International Council for Science (ICSU) (Cospar), Pasadena, July 16-20, 2018.
 39. New Horizon-Voyager-IBEX Meeting, Applied Physics Laboratory, John Hopkins, January 16, 2018.
 40. 8th Isradynamics “Dynamical Processes in Space Plasmas”, Israel, 22-29 April, 2018.
 41. “New perspectives on heliosphere's interaction with the LISM” at the Cosmic Ray Anisotropy Workshop (CRA 2017) to be held in Guadalajara, Jalisco (Mexico), October 10-13, 2017.
 42. 35th International Cosmic Ray Conference, ICRC 2017, Korea, July 12-14, 2017.
 43. Fall AGU 2017, “Kappa Distributions: Theory and Applications in Space Plasmas”, December 2017.
 44. 16th Annual International Astrophysics Conference, Santa Fe, NM, March 6-10, 2017.
 45. 41st COSPAR Scientific Assembly, “Models of the heliotail”, Istanbul/Turkey, 30 July - 07 Aug 2016.
 46. 15th Annual International Astrophysics Conference: “The Science of Ed Stone: Celebrating his 80th Birthday”, Cape Coral, Florida, April 4-8, 2016.
 47. 57th American Physical Society (APS) DPP Annual Meeting, “Magnetized jets driven by the sun: The structure of the heliosphere revisited”, Savannah, Georgia, November 16-20, 2015.
 48. The Solar-Stellar Connection: Influence of Stars in their astrospheres, Michigan, Ann Arbor, May 18-19, 2015.
 49. 14th Annual International Astrophysics Conference: “Linear and Nonlinear Particle Energization throughout the Heliosphere and Beyond”, Tampa Bay, Florida, April 20 - 24, 2015.
 50. “Cosmic Ray Anisotropies”, Cosmic Ray Workshop, Bad Honnef, Germany 26-

- 30 January 2015.
51. KISS Workshop, *Science and Enabling Technologies to Explore the Interstellar Medium*, September 8, 2014.
 52. COSPAR Scientific Assembly, “Global Structure of the Heliosphere: Observations, Theory, and Modeling”, D1.1 Session, Moscow, Russia, 2-10 August 2014.
 53. 13th Annual International Astrophysics Conference, Myrtle Beach, March 10-14, 2014.
 54. “Magnetic Flux Ropes Workshop”, The Basic Plasma Science Facility (BaPSF) UCLA, February 10-12, 2014.
 55. Invited talk “The New heliosphere”, 15th Latin American Workshop on Plasma Physics (LAWPP), San Jose, Costa Rica, January 29, 2014.
 56. Plenary talk on the “The new heliosphere”, 14th ICATPP conference, Como, Italy, September 24, 2013.
 57. International Association of Geomagnetism and Aeronomy (IAGA), XIIth Scientific Assembly, Outer Heliosphere session, Merida, Yucatan, Mexico, August 26-31, 2013.
 58. “Recent development in CME Simulations”, American Geophysical Union (AGU) Meeting of the Americas, Cancun, Mexico, May 14-17, 2013.
 59. ISSI (International Space Science Institute) Cosmic Plasmas “Structure formation and dynamics in cosmic plasmas”, Switzerland, 15-19, April, 2013.
 60. IAU (International Astronomical Union) IXXVIII, SpS10 (Invited) “Space Weather at Small Distances from the Sun and in Extra Solar Planets Environment”, Special Session on Dynamics of the Star-Planet Relations Beijing, China, August 20-31, 2012.
 61. Joint IAU-WISER Advanced School on Space Environment (ASSE), “ISM-heliosphere coupling”, China, August, 2012.
 62. 39th COSPAR Scientific Assembly, session D2.6, Mysore, India, talk “Physics in the Out-of the Ecliptic-Plane Orbits”, July, 2012.
 63. International Space Science Institute (ISSI) Team Meeting on the Heliopause, Bern, April, 2012.
 64. American Geophysical Union, San Francisco, session “Extended Solar Minima”, December, 2011.
 65. Cosmic Rays Conference, Madison-Wisconsin, October, 2011.
 66. International School/Symposium for Space Simulations (ISSS10), Banff, CA, invited review on “The Interaction of Solar System with the Interstellar Medium: MHD models”, July 24-27, 2011.
 67. International Workshop on the Interrelationship between Plasma Experiments in the Laboratory and Space (IPELS), Whistler, Vancouver, July, 2011.
 68. “X Nova Fisica no Espaco”, Campos do Jordao, Brazil, June, 2011.
 69. Invited Tutorial Lecture of Interstellar Medium-Heliosphere Coupling for the School of Space Environment (ASSE) session during IX COLAGE, April 09, 2011.
 70. Heliophysics School, Boulder, CO, “Shocks in the Heliophysics”, August, 2010.
 71. American Astronomical Society, special session, “Magnetic fields in the Local ISM and the Local Bubble”, May, 2010.

72. Voyager/IBEX Joint Meeting, SWRI, San Antonio, March, 2010.
73. International Living with the Star, ILWS, Ubatuba, “Flows in the Heliosheath and in CMEs”, October, 2009.
74. The University of Alabama in Huntsville Conference, Kauai, Hawaii, “Voyagers in the Heliosheath: Observations, models, and plasma physics”, January 9-14 2009.
75. International Heliospheric Year Chapman Conference on Universal Heliophysical Processes, Savannah, Georgia, “Comparative shock studies”, November 10-14, 2008.
76. 2nd International Heliophysical Year Conference, International Space Science Institute, “Flows in Shocks”, November 10-14, 2008.
77. Living with a Star Heliophysics Summer School, Invited Faculty Lectures, July 23-July 30, 2008.
78. Heliophysics Science Division Seminar, Goddard Space Flight Center, “When Magnetized Winds Collide: The Role of Interstellar Magnetic Field in the Interaction of the Solar System and the Interstellar Medium”, April 16, 2008.
79. The Local Bubble And Beyond II, “Interstellar Magnetic Field Orientation”, Philadelphia, April 21-24, 2008.
80. 37th COSPAR Scientific Assembly, “Modeling the three dimensional heliosphere”, Montreal, July 13-20, 2008.
81. Magnetic Fields in the Universe II: from Laboratory and Stars to the Primordial Universe, Cozumel, Mexico, January 28-Feb 1, 2008.
82. High Energy Phenomena in Relativistic Outflows, Dublin, Ireland, September 24-28, 2007.
83. International Space Science Institute (ISSI), “From the Outer Heliosphere to the Local Bubble: Comparison of New Observations with Theory”, Bern, Switzerland, October 15-19, 2007.
84. Sixth Annual International Astrophysics Conference IGPP, “3D Simulations of global heliosphere: The Turbulence of Heliospheric Current Sheet”, Oahu, Hawaii, March, 2007.
85. Parker Lecture at the SPD/AAS meeting June, Solar Physics Division, “Surprises from the Edge of the Solar System: Voyager at the Final Frontier”, University of New Hampshire, June, 2006.
86. Heliospheric Workshop, Oxnard, “Living in an Asymmetric Heliosphere: What the Voyagers are telling us”, November, 2006.
87. American Geophysical Union, “Global Asymmetry of the Heliosphere: The Effects of a Local Interstellar Magnetic Field on Voyager 1 and 2 Observations”, Baltimore, May 23, 2006.
88. 5th IGPP: The Physics of the Inner Heliosheath, “The Effects of a Local Interstellar Magnetic Field on Voyager 1 and 2 Observations”, Hawaii, March 04, 2006.
89. Symposium in Honor of Ed Stone’s 70th Birthday, “Effects of the Interstellar Magnetic Field on the Heliosphere”, Caltech, February 10-11, 2006.
90. American Geophysical Union, “Effects of a Local Interstellar Magnetic Field on Voyager 1 and 2 Observations”, San Francisco, December, 2005.
91. Workshop on Outer Heliosphere, Committee on Solar and Space Physics, UC

Irvine, May 6-7, 2003.

92. 42nd Annual APS Division of the Plasma Physics, “Nuclear Reaction Rates and Energy in the Plasma: The Effect of Highly Damped Modes”, Quebec, Canada, October 23-27, 2000.

Invited Seminars/Colloquiums

1. Colloquium, UCLA, Astronomy Department, ? 2023
2. Colloquium, Harvard University, Astronomy Department, October 25, 2022
3. Colloquium Columbia University, Astronomy Department, April 27, 2022
4. Colloquium Tufts; January 28th 2022;
5. Colloquium SSL, Berkeley, 16 November 2021;
6. Colloquium LASP, April 22, 2021
7. Colloquium, Climate and Space Sciences and Engineering, Michigan University, February 18, 2021
8. Princeton Physics Laboratory, Colloquium, October 23, 2020
9. Physics Dept, University of Sao Paulo, Colloquium, October 22, 2020
10. Centro de Rádio Astronomia e Astrofísica Mackenzie (CRAAM), Colloquium, October 20, 2020
11. Physics and Astronomy Department, Dartmouth College, “New View of Heliosphere: recent lessons learned from Voyager, Cassini, IBEX about our home in the galaxy”, May 15, 2018.
12. Institute for Theory and Computation, Harvard-Smithsonian Center for Astrophysics, September 2017.
13. Department of Astrophysical and Planetary Sciences, University of Colorado, March 14, 2016.
14. Jet Propulsion Laboratory, February 11, 2016.
15. Department of Physics, University of Massachusetts Lowell, December 4, 2015.
16. Space and Cosmic Ray Physics Seminar, University of Maryland, March 30, 2015. “Magnetized Jets Driven by the Sun: The Structure of the Heliosphere Revisited”
17. Harvard University, ITC Lunch Seminar, March 24, 2015.
18. Astronomy Department, Wesleyan University, February 11, 2015.
19. Physics Department, University of New Hampshire, September 14, 2014.
20. Harvard University, ITC Colloquium, November 7, 2013.
21. Cornell University, Astronomy Department, March 14, 2013.
22. Michigan Institute for Plasma Science and Engineering (MIPSE) Seminar, University of Michigan, Spring 2013.
23. MIT Plasma Science and Fusion Center (PSFC), MIT, May 2012.
24. “The Heliosheath as a Reconnection Laboratory”, Princeton Plasma Physics Laboratory (PPPL) PS&T Seminar, Wednesday, February 22, 2012.
25. Physics Department, University of New Hampshire, November 14, 2011.
26. Physics Department, Dartmouth College, April 5th, 2011.
27. Physics Department, University of Maryland, November 2010.
28. Physics Department, Montana University, Bozeman, October 22, 2010.
29. The Center for Scientific Computation and Mathematical Modeling (CSCAMM),

- University of Maryland, March, 2009.
30. Center for Integrated Plasma Studies (CIPS), Physics Department, University of Colorado, March 07, 2009.
 31. Department of Terrestrial Magnetism, Carnegie Institute of Washington, “Pinning Down the Direction and Magnitude of the Local Interstellar Magnetic Field”, December 05, 2008.
 32. Space and Cosmic Ray Physics Seminar, University of Maryland “Pinning Down the Direction and Magnitude of the Local Interstellar Magnetic Field”, October 27, 2008.
 33. Delaware University Colloquium, October 17, 2008.
 34. MIT Astronomy Colloquium, February 19, 2008.
 35. Astronomy Colloquium, University Madison Wisconsin, November 22, 2007.
 36. EOSS Colloquium, University of Michigan, December, 2007.
 37. E. O. Hulbert Colloquium Series at Naval Research Laboratory “Knocking on the galaxy’s Door: Voyager 1 and 2 at the Edge of the Solar System”, June 15, 2006.
 38. Cornell University “Living in Asymmetric Heliosphere: Magnetic Effects in the Heliosphere”, Plasma Astrophysics Seminar, October 24, 2006.
 39. Space and Cosmic Ray Physics Seminar, University of Maryland “Effect of the Interstellar Magnetic Field on the Termination Shock: Explaining the Voyager Results”, September, 2005.
 40. Goddard Space Flight Center “Effect of the Interstellar Magnetic Field on the Termination Shock: Explaining the Voyager Results”, October 26, 2005.
 41. Jet Propulsion Laboratory, “Effect of the Interstellar Magnetic Field on the Termination Shock: Explaining the Voyager Results”, March, 2005.
 42. Space Science Laboratory, Berkeley “From the Sun to the Edge of the Solar System: Coronal Mass Ejection Driven Shocks and Magnetic Effects in the Heliosheath”, October 19, 2004.
 43. George Mason University “From the Sun to the Edge of the Solar System: Coronal Mass Ejection Driven Shocks and Magnetic Effects in the Heliosheath”, October 09, 2004.
 44. Institute of Geophysics and Planetary Physics (IGPP), Riverside “Magnetic Effects in the Heliosheath”, January 15-20, 2004.
 45. South Research Institute, San Antonio “Probing the Edge of the Solar System: Formation of an Unstable Jet-Sheet”, July 1-2, 2003.
 46. The Kavli Institute for Theoretical Physics (KITP), Santa Barbara “Probing the Edge of the Solar System: Formation of an Unstable Jet-Sheet”, June 27, 2003.
 47. UCLA, “Probing the Edge of the Solar System: Formation of an Unstable Jet-Sheet”, February 27, 2003.
 48. Caltech Space Radiation Laboratory, “Probing the Edge of the Solar System: Formation of an Unstable Jet-Sheet”, December 19, 2002.
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Outreach Talks/Classes

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2. Outer Heliosphere Image for National Geographic Stargazer's Atlas (2022).
3. Wyoming Star Gazing, Jacksown, WY, The Cosmos Place, <https://www.wyomingstargazing.org/the-cosmos-show/>, July 16, 2022.
4. GWISE and the BU chapter of IEEE (Institute of Electrical and Electronic Engineers) are partnering on an exciting upcoming event called "Day of Diversity in STEM" on April 1, 2021
5. RadioLab, March 2021, <https://www.wnycstudios.org/podcasts/radiolab/articles/escapescape>
6. Outreach for Artemis, SHIELD 2020
7. Outreach for SHIELD 2020
8. Weekly Space Hangout, September 16, 2020
9. The Next Step on Humanity's Journey to the Stars, *Panel Discussion* <https://www.eventbrite.com/e/interstellar-probe-the-next-step-on-humanitys-journey-to-the-stars-tickets-51030961981>, The Explorers Club, New York, October 11, 2018.
10. Radio Lab, "Where the Sun Don't Shine", August 23, 2017. <http://www.radiolab.org/story/sun-dont-shine/>
11. Speaker at Boston Athenaeum, October 2015, <https://vimeo.com/album/3310726/video/143914725>
12. Speaker at Berklee College of Music, Class of Prof. Jennifer Beauregard, Spring 2015.
13. Speaker at the Panel for 2014 Path of Professorship workshop, MIT, Microsoft NERD Center, November 14-15, 2014, <http://odg.mit.edu/development/pop/>
14. Speaker at the Panel for Brazilians Abroad at MIT, October 5, 2013, <http://simposio.mit.edu/>
15. Speaker at the "Art and Science: Not quite Parallel Realities" panel at TransCultural Exchange's 4th biennale Conference on International Opportunities in the Arts, Oct. 10-13, 2013, http://www.transculturalexchange.org/conference_2013/overview.htm
16. Speaker at the "Big Ideas for Busy People", Cambridge Science Festival, 2013 - <http://www.youtube.com/watch?v=Np78sHrjAx4>
17. Episode "Escape" on Voyager at "RadioLab" aired February 20th, 2012, <http://www.radiolab.org/people/merav-opher/>
18. Outreach Material for Voyager Poster 2010, http://voyager.jpl.nasa.gov/pdf/VoyagerPoster2010_Back.pdf
19. Part of the training of "NASA Solar System Ambassadors Program", <http://www2.jpl.nasa.gov/ambassador/index.html>
20. Part of the panel for IBEX, NASA press release, September 2010, http://www.nasa.gov/mission_pages/ibex/telecon_20100929.html
21. The Space Place, NASA –cartoon link: <http://spaceplace.nasa.gov/space-place-live/en/>
- 11.. "The Journey to Interstellar Space", six-part series video,

Merav Opher

<http://voyager.jpl.nasa.gov/imagesvideo/#>

Op Ed

- Health risks of space tourism: Is it responsible to send humans to Mars?
Merav Opher & Avi Loeb, The Hill, November 27, 2021
<https://thehill.com/opinion/technology/583245-health-risks-of-space-tourism-is-it-responsible-to-send-humans-to-mars>

Classes/Outreach Talks

Lectures on “Shocks and Particle Acceleration”: Heliophysics Summer School, Boulder Colorado, July, 2016

Professional Society Memberships

- American Geophysical Union
- American Physical Society
- American Association for the Advancement of Science

Selected News Coverage quotes

(see <http://people.bu.edu/mopher/newsoutreach.html>)

General Videos

1. [Where I'm Coming From: Video about Science and Diversity, 2018](#)
2. [“One Art” by Elizabeth Bishop – Favorite Poem Project by Robert Pinsky, 2018](#)

Images in Books/Publications

1. National Geographic, *Stargazer's Atlas*, Image of Shape of the Heliosphere Image, 2022
2. Ulrich von Kusserow, Eckart Marsch, “Magnetic Solar System – Eruptions, Solar Wind and Space Weather” Springer Book, Image of Shape of the Helisphere, 2022

Scientific News Coverage

3. New Scientist, <https://www.newscientist.com/article/2359129-interstellar-space-the-mysterious-realm-beyond-our-heliosphere/>, February 16, 2023
4. Space.com August 25, 2022
<https://www.space.com/voyager-1-marks-10-years-interstellar-space>

5. June 16, Scientific American <https://www.scientificamerican.com/article/record-breaking-voyager-spacecraft-begin-to-power-down/>

3. May 07, 2022 <https://www.forbes.com/sites/jamiecartereurope/2022/05/07/we-might-live-in-a-giant-croissant-shaped-bubble-in-space-say-scientists-now-nasa-wants-to-know-for-sure/?sh=d9d60273a985>
4. <https://science.nasa.gov/science-news/nasa-selects-hubs-for-innovative-research-in-solar-sciences>
5. <https://www.jpost.com/science/neutral-hydrogen-gives-solar-systems-heliosphere-its-croissant-shape-study-687891>
6. <https://www.bu.edu/articles/2021/another-breakthrough-for-team-studying-our-solar-systems-protective-bubble/>
7. Boston Globe, May 2021, <https://www.bostonglobe.com/2021/05/17/metro/voyager-spacecraft-detects-persistent-hum-past-solar-system/?event=event25&fbclid=IwAR15W9PzkcDc211IEaVTLGuK1BbAbjBfgV01qMSJQqhnWVB5F8cc8xjN1ml>
8. NBC News, <https://www.nbcnews.com/science/space/nasa-spacecraft-detects-constant-hum-deep-cosmos-rcna885>
9. Scientific American, March 2021, “Was the Interstellar Object 'Oumuamua a Nitrogen Iceberg?”, <https://www.scientificamerican.com/article/was-the-interstellar-object-oumuamua-a-nitrogen-iceberg/>
10. Newsweek, August 2020, “NASA Says we all live inside a giant “deflated croissant, yes really”
<https://www.newsweek.com/nasa-data-solar-system-deflated-cocoon-1524373>
11. Jerusalem Post, August 2020
<https://www.jpost.com/health-science/solar-systems-heliosphere-may-be-croissant-shaped-study-637997>
12. Sputnik Brazil, https://br.sputniknews.com/ciencia_tecnologia/2020080915929417-nasa-descobre-que-sistema-solar-esta-envolto-em-bolha-em-forma-de-croissant-foto/
13. Space.com, August 2020, “Is our solar system shaped like a deflated croissant?”, <https://www.space.com/solar-system-heliosphere-shape-croissant.html>
14. Universetoday.com, <https://www.universetoday.com/147338/this-is-what-the-solar-system-really-looks-like/>, august 2020
15. Revista Galileu, Brasil,
<https://revistagalileu.globo.com/Ciencia/Espaco/noticia/2020/08/qual-forma-do-sistema-solar-pode-ser-de-um-croissant-amassado.html>
16. NASA.gov , August 2020 <https://www.nasa.gov/feature/goddard/2020/uncovering-our-solar-system-s-shape>,
17. Science & Vie, <http://www.science-et-vie.com/>, 2020
18. <https://www.forbes.com/sites/jamiecartereurope/2020/03/22/we-all-live-in-a-croissant-shaped-giant-bubble-say-astronomers/>
March 2020

19. <https://www.bu.edu/articles/2020/visualizing-the-heliosphere-merav-opher/>
February 2020
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<https://physicstoday.scitation.org/doi/10.1063/PT.6.3.20190215a/full/>
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<https://www.bostonglobe.com/news/nation/2018/12/10/nasa-voyager-probe-enters-interstellar-space/o4EB6EIHw8HHdrwdIICWdL/story.html>
23. New York Times Magazine, “The Loyal Engineers Steering NASA’s Voyager Probes Across the Universe”, by Kim Tingley, August 3, 2017.
<https://www.nytimes.com/2017/08/03/magazine/the-loyal-engineers-steering-nasas-voyager-probes-across-the-universe.html?mcubz=0>
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September 12, 2013
<http://www.bostonglobe.com/news/science/2013/09/12/scientists-finally-agree-nasa-era-spacecraft-voyager-has-entered-interstellar-space/OV0Hv0wrSxbEgFUBpE040N/story.html>
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<http://www.usatoday.com/story/news/nation/2013/09/12/voyager-1-visits-space-between-stars/2804007/>
32. Speaker at “This Morning” Seoul, South Korea Radio,
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33. “Tracking Voyager Beyond the Solar System”,
<http://www.bu.edu/cas/2013/09/13/tracking-voyagers-path/>
34. Nature, Voyager: Outward bound, May 22, 2013,
<http://www.nature.com/news/voyager-outward-bound-1.13040>
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58. BU press release [Part of the NASA PANEL on Voyager: April 28, 2011: http://www.bu.edu/phpbin/news/releases/display.php?id=2227](http://www.bu.edu/phpbin/news/releases/display.php?id=2227)
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<http://news.nationalgeographic.com/news/2007/05/070510-solar-system.html>
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<http://discovermagazine.com/2007/aug/the-sun-flies-like-a-bullet>
67. New Scientist, “The kink at the edge of the solar system” (May 2006).
68. CNN.com, “Voyager 2 detects solar system’s edge” (May 2006).
69. Nashua Telegraph, “Unlikely scientist delves deep into space at UNH” (June 2006).
70. “To An Instability and Beyond”, Editor's Choice, Science, Vol. 300, page 2005, (2003).
71. “Did Voyager Crossed the Termination Shock?” NASA Space Science Update (November 05, 2003) (member of the panel with Ed Stone, Tom Krimigis and Frank McDonald)
72. NPR “Science Friday”, November 13, 2003 (commenting on Voyager)
73. L.A. Times article on Voyager November 13, 2003
74. “Past Pluto, Mason physicist’s research looks at the ends of the solar system”, The Mason Spirit, Spring 2008 Issue
75. “Research on the Edge-Of the Solar System”, Think. Learn. Succeed.
<http://www.gmu.edu/thinklearn/opher.html>
76. “Knockin’ on the Galaxy’s Door: Physics Professor Calculates Area at the Edge of the Solar System”, The Mason Gazette, May 30, 2006 by *Tara Laskowski*
77. “Scientist Receives NSF Grant for Space Study”, The Mason Gazette, March 04, 2008 by *Karen Akerlof*
78. “Professor’s Findings Confirmed: Solar System is Asymmetric”, The Mason Gazette, December 21, 2007.
79. “Mason Professor finds Direction of Magnetic Field beyond Solar System”, The Mason Gazette, May 11, 2007.
80. The article Opher et al. 2003 *The Astrophysical Journal*, 591L, 61 (2003).

chosen as highlight for Science Editor's Choice, "To an Instability and Beyond",
Science, 300, 2005 (2003)]

OP-ED

1. "Health risks of Space Tourism: Is it responsible to send humans to Mars?", Merav Opher and Avi Loeb, 11/20/21 The Hill, <https://thehill.com/opinion/technology/583245-health-risks-of-space-tourism-is-it-responsible-to-send-humans-to-mars>

II. Mentoring

Advisees

1. Ethan Bair (2021-), Astronomy Department, Boston University
2. Chika Onobugo (2021-), Astronomy Department, Boston University
3. Xiaohan Ma (2020-), Astronomy Department, Boston University
4. Erick Powell (2020-), Astronomy Department, Boston University
5. Marc Kornbleuth (2015 – 2020), Astronomy Department, Boston University
6. Adam Michaels (2013 – 2019), Astronomy Department, Boston University
7. Luisa Capannolo (2015- 2017), Astronomy Department, Boston University
8. Christina Kay (2011-2015) Astronomy Department, Boston University –
Note: Dr. Kay is presently at NASA Goddard and recently was the 2018 winner of the International Alexander Chizhevsky medal for Space Weather and Space Climate; <https://science.gsfc.nasa.gov/sed/bio/christina.d.kay>
9. Elena Provornikova – co-advisor with Vladislav Izmodenov from Moscow University, (2010-2013) Astronomy Department, Boston University
Note: Dr. Provornikova was the recipient of the Jack Eddy Postdoctoral Fellowship. She is currently a postdoctoral fellow at the Applied Physics Laboratory
10. Rebekah Evans, (2006-2011) Physics and Astronomy, George Mason Univ.
11. Cristiane Loesch de Souza, National Institute for Space Research (INPE) 2007-2009, co-advisor with Prof. Maria Virginia Alves
12. Aline A. Vidotto, Astronomy Dept., University of Sao Paulo 2007-2009, co-advisor with Prof. Vera Jatenco Pereira
Note: Dr. Vidotto is a professor at Trinity College Dublin, www.tcd.ie/Physics/research/groups/vidotto/

Postdoctoral and research scientist supervision

1. Dr. Marc Kornbleuth (2020-), Astronomy Department, Boston University
2. Dr. Bertland Zieger (2012-) Astronomy Department, Boston University.
3. Dr. Christina Prested (2011-2012) Astronomy Department, Boston University.

Merav Opher

4. Dr. Ray Fermo (2011-2013) Astronomy Department, Boston University.
5. Dr. Alouani Bibi (2008-2011) Physics and Astronomy Department,
George Mason University.
6. Dr. Yong Liu (2007-2008) Physics and Astronomy Dept., George Mason Univ.

Undergrad Supervision with whom research was performed (at BU)

1. Shruthi Krishnamurthy shruthik@bu.edu Fall 2019-
2. Mr. Matthew Schuler, Tufts at BU (summer 2017).
3. Mr. Mark Hubbert, REU student (summer 2017) (*now a graduate student at UCLA*); <https://epss.ucla.edu/people/students/926/>
4. Mr. Christopher Bambic, REU student, Boston University (summer 2016).
Won the Churchill Scholarship; <https://umdphysics.umd.edu/about-us/news/department-news/1364-christopher-bambic-awarded-university-medal.html>
5. Mr. Vivek Pisharody, REU student (summer 2015).
6. Mr. Luis F. G. dos Santos (summer 2014), *now a graduate student at Catholic University*, <http://spaceweathercenter.cua.edu/members.cfm>
7. Mr. Marc Kornbleuth, Boston University (2011-2013) (senior thesis).

Service at Boston University (from 2012)

University Level

- Appointed to University-wide task force focused on improving the workplace experience of employees who are LGBTQIA+ 2018-2019,
<http://www.bu.edu/lgbtqiataaskforce/>

College Level

- Academic Policy Committee (2013-2015).

Department Level

- Graduate Admission Committee – member (2018).
- Graduate Program Review Committee – member (2017–2018).
- Director of Graduate Studies (2015–2017).
- Director, REU Program in the Astronomy Dept. (2015 – 2018).
- Faculty Search Committee – member (2016).
- Chair of the Comprehensive Examination (2012–2015).
- Advising Astronomy Undergraduate (2012–).
- Writing problems for the Comprehensive Exam (2012–).

Other

Organizer of the Summer School on Plasma Processes in Space Physics at Boston University, August 5-11 (2012).

Website: <http://people.bu.edu/mopher/PlasmaSummerSchool/Welcome.html>

Organizer of the Summer School on Plasma Processes in Space Physics at Boston

Merav Opher

University, July 28-August 1st (2014).

Website: <http://people.bu.edu/mopher/PlasmaSummerSchool2014/Welcome.html>