



Dr. Elena Popova

Head of Astronomy Research Center, Bernardo O'Higgins University, General Gana 1760, Santiago, Chile.

Education

2009 Master and 2012 PhD in physics from Lomonosov Moscow State University, Department of Physics, Chair of Applied Mathematics

Research interests and activities

Modeling of magnetic field generation processes in the Sun and stars, estimation of the magnetic activity of red dwarfs, assessment of the radiation situation in outer space and on the surface of exoplanets, modeling of processes in space plasma, modeling of the effect of radiation on neural connections (modeling of neural activity based on the Hodgkin-Huxley equations), development of neural networks, machine learning for big data analysis.

Current project

Unsteadiness and fractality of dynamics in the evolution of complex systems: applications to the physics of the Earth and the Sun, PI of the Grant of the Russian Science Foundation 17-11-01052.

Previous projects

PI, RFBR (Russian Foundation for Basic Research) 12-02-31128 MOL_A, Modeling cyclic magnetic activity of the Sun and other stars with help of latest observational data, 2012-2013,

RFBR (Russian Foundation for Basic Research): 07-02-00127-a, 08-02-92881-HHIO_a, 09-02-01010-a, 09-05-00076-a, 10-02-00960-a, 12-02-00170-a, 12-02-00884-a, 12-02-31128-a, 14-01-20348-a, 16-05-00507-a, 17-29-01022-a; RSF (Russian Science Foundation): 16-17-10097

Visiting scientist, Royal Society International Exchanges 2015/R3, United Kingdom, 2016.

List of papers

1. Kondrateva E., Pominova M., **Popova E.**, Sharaev M., Bernstein A., Burnaev E., Domain shift in computer vision models for MRI data analysis: an overview, Proc. SPIE 11605, Thirteenth

International Conference on Machine Vision, 116050H (4 January 2021); <https://doi.org/10.1117/12.2587872> (peer-reviewed paper)

2. Tsareva O.O., Popov V.Yu., Malova H.V., **Popova E.P.**, Podzolko M.V., Zeleny L.M., Radiation hazard on the earth and in near-earth space during magnetic field inversion, *Oceanological Research*, 2019, Volume 47, No. 1, p. 129-131
3. Sadovnichy V.A., Panasyuk M.I., Lipunov V.M., Belov A.A., Bogomolov V.V., Garipov G.K., Gorbovskaya E.S., Iudin A.F., Kalegaev V.V., Klimov P.A., Kornilov V.G., Mit S.K., Settlement V.I., Petrov V.L., Podzolko M.V., **Popova E.P.**, Rubinstein I.A., Svertilov S.I., Tulupov V.I., Chepurnov A.S., Yashin I.V., Universat-Sokrat small satellite constellation for monitoring technological and natural space threats, *Bulletin of Samara University. Aerospace Engineering, Technology and Engineering*, 2019, 18, No. 1, p. 94-108.
4. **Popova E.P.**, Gabitov I.R., Breakthrough Starshot” Project, 2019, *Earth and the Universe*, 3 (326), 42-50
5. A. Bugay, E. Dushanov, **E. Popova**, Computer simulation of radiation-induced dysfunction of the neural networks of the prefrontal cortex, *Astronomical Journal of Azerbaijan*, Vol14, No1, 2020.
6. Samedov A.S., Panasyuk M.I., Abdullaev P.Sh., Bogomolov V.V., Hasanov R.A., Ibragimov R.A., Iudin A.F., Mammadzada T.G., Musaev A.A., Saddle V.I., Petrov V.L., Podzolko M.V., **Popova E.P.**, Rustamov R., Svertilov S.I., Seyidov H., Yashin I.V., Russian-Azerbaijani Small Satellite Space Project for scientific and technological experiments, *Bulletin of Samarsky University. Aerospace Engineering, Technology, and Engineering*, 2019, Volume 18, No. 1, p. 128-139
7. Sadovnichii V.A., Panasyuk M.I., Lipunov V.M., Bogomolov A.V., Bogomolov V.V., Garipov G.K., Gorbovskoy E.S., Zimnukhov D.S., Iyudin A.F., Kaznacheeva M.A., Kalegaev V.V., Klimov P.A., Kovtikh A.S., Kornilov V.G., Kuznetsov N.V., Maksimov I.A., Mit S.K., Osedlo V.I., Petrov V.L., Podzolko M.V., **Popova E.P.**, Poroykov A.Yu, Rubinstein I.A., Saleev K.Yu, Svertilov S.I., Tulupov V.I., Khrenov B.A., Chazov V.V., Chepurnov A.S., Shtunder Ya A., Shustova A.N., Yashin I.V., Monitoring of natural and technogenic space hazards: results of the Lomonosov mission and Universat-SOCRAT project, *Cosmic Research (English translation of Kosimicheskije Issledovaniya)*, 2018, 56, № 6, 488-497
8. O.O. Tsareva, L.M. Zelenyi, H.V. Malova, M.V. Podzolko, **E.P. Popova**, V.Yu Popov, What expects humanity at the inversion of the Earth’s magnetic field: threats imaginary and genuine, *Physics Uspekhi*, 2018, V. 60, 191-202, DOI: 10.3367/UFNe.2017.07.038190.
9. Osedlo V.I., Sadovnichii V.A., Panasyuk M.I., Lipunov V.M., Bogomolov V.V., Gorbovskoi E.S., Iyudin A.F., Kalegaev V.V., Klimov P.A., Kornilov V.G., Petrov V.L., Podsolko M.V., **Popova E.P.**, Svertilov S.I., Yashin I.V., Makridenko L.A., Terehov S.I., Salihov R.S., Grafodatskii O.S., Lemeshevskii S.A., Kubankin A.S., Barthelemy M., Escudier B., Stepanov M., Park I., Ogly Samedov A.S., Multi-satellite project “universat-socrat” for natural and artificial hazards monitoring, *Advances in the Astronautical sciences*, 2018, V. 163, P. 45-52

10. Sadovnichiy V.A., Panasyuk M.I., Lipunov V.M., Bogomolov A.V., Bogomolov V.V., Garipov G.K., Gorbovskoi E.S., Iyudin A.F., Kaznacheeva M.A., Kalegaev V.V., Klimov P.A., Kovtyh A.S., Kornilov V.G., Kuznetsov N.V., Maksimov I.A., Podzolko M.V., **Popova E.P.**, Poroykov A.Y., Rezaeva A.A., Rubinshtein I.A., Saleev K.Y., Svertilov S.I., Troitskaya D.Y., Tulupov V.I., Chazov V.V., Chepurinov A.S., Shtunder Y.A., Shustova A.N., Yashin I.V., Project "Universat-SOCRAT" of Multiple Small Satellites for Monitoring of Natural and Technogenic Space Hazards, *Open Astronomy*, 2018, V. 27, № 1, P. 126-131.
11. Panasyuk M.I., Podzolko M.V., Kalegaev V.V., Kovtyukh A.S., Kuznetsov N.V., Osedlo V.I., Petrov V.L., **Popova E.P.**, Poroikov A. Yu., Rubinstein I.A., Svertilov S.I., Tulupov V.I., Yashin I.V., Multi-satellite operational monitoring of near-earth radiation in the framework of the Universat-Sokrat project, *Moscow University Bulletin. Series 3: Physics, Astronomy*, 2018, , No. 6, p. 104-111
12. Tsareva O.O., Popov V.Yu., Malova Kh.V., Zelenyi, L. M., **Popova E.P.**, Podzolko M.V., Modeling the interaction of galactic and solar cosmic rays with the Earth's magnetic field during the inversion process, *Uchenye zapiski Physics Faculty of Moscow University*, 2018, № 5, p. 1850305-1-1850305-8
13. N.V. Kuznetsov, **H. Popova**, M.I. Panasyuk, Empirical model of long-time variations of galactic cosmic ray particle fluxes, *Journal of Geophysical Research: Space Physics*, 2017, V. 122, № 2, p. 1463-1472.
14. **E.P. Popova**, V. Zharkova, S. Shepherd, S. Zharkov, On a role of quadruple component of magnetic field in defining solar activity in grand cycles, *Journal of Atmospheric and Solar-Terrestrial Physics*, Pergamon Press Ltd. (United Kingdom), 2017, doi.org/10.1016/j.jastp.2017.05.006.
15. **E. Popova**, M. Efendiev, I. Gabitov, On the stability of a space vehicle riding on an intense laser beam, *Mathematical Methods in the Applied Sciences*, John Wiley & Sons Inc. (United States), 2017, V. 40, № 4, c. 1346-1354.
16. **E.P. Popova**, N.V. Kuznetsov, M.I. Panasyuk, Predicting GCR Fluxes for Future Space Missions, *Bulletin of the Russian Academy of Sciences: Physics*, Allerton Press Inc. (United States), 2017, V. 81, № 2, c. 173-176.
17. **E. Popova**, Generation of magnetic field waves in celestial bodies by spatially separated dynamo sources, *Doklady Akademii Nauk: Doklady Physics*, 2017, V. 475, № 5, 371-373.
18. **H.P. Popova**, K.V. Stepanyantz, Equation for one-loop divergences in two dimensions and its application to higher spin fields, 2016, *Theoretical and Mathematical Physics*, (IF 0.831), Vol. 187, № 3, p. 888-898.
19. **E. Popova**, Current results on the asymptotics of dynamo models, 2016, *Physics Uspekhi*, (IF 2,606), Vol. 186, № 6, p. 577-596.

20. **E. Popova**, Dynamical systems for modeling the evolution of the magnetic field of stars and Earth, 2016, Journal of Physics: Conference Series, Vol. 681, p. 012021.
21. P.A. Otkidychev, **E.P. Popova**, New Characteristics of the Solar Cycle and Dynamo Theory, Astronomy Letters (IF 1.091), 2015, V 41, № 6, p. 299-306, DOI: 10.7868/S0320010815060066.
22. Zharkova V., Shepherd S., **Popova E**, Zharkov S., Heartbeat of the Sun from Principal Component Analysis and prediction of solar activity on millennium scale, Scientific reports (IF 5.578), 2015, Vol. 5, p. 15689 doi:10.1038/srep15689.
23. P.A. Otkidychev, **E. Popova**, Solar Cycle Characteristics and Their Relationship with Dynamo Theory, Journal of Physics: Conference Series, 2015, № 661, p. 012009-012009.
24. **E.P. Popova**, Two-Dimensional Model for an $\alpha\Omega$ -Dynamo with Meridional Circulation and an Associated Hamilton–Jacobi Equation, 2015, Astronomy Reports, Vol. 59, № 8, p. 772-775.
25. **E.P. Popova**, K.A. Potemina, N.A. Yukhina, Double cycle of solar activity in two-layer medium, 2014, Geomagnetism and Aeronomy, (IF 0.39), Vol. 54, № 7, p. 877-881.
26. **H. Popova**, A Double Magnetic Solar Cycle and Dynamical Systems, Magnetohydrodynamics (IF 0.55), Vol. 49 (2013), No. 1-2, pp. 59-68.
27. **E. P. Popova**, N.A. Yukhina, The quasi-biennial cycle of solar activity and dynamo theory, Astronomy Letters (IF 1.091), 2013, vol. 39, №10, p. 810–816, DOI: 10.7868/S0320010813100045.
28. **H. Popova**, S. Zharkov, V. Zharkova, Probing latitudinal variations of the solar magnetic field in cycles 21-23 by Parker's two-layer dynamo model with meridional circulation, Annales Geophysicae (IF 1.518), 31, 2023-2038, 2013, DOI 10.5194/angeo-31-2023-2013.
29. **E.P. Popova**, A dynamical system for the parker dynamo in the case of quadrupole symmetry of the magnetic field, 2013, Astronomy Reports, (IF 0.756), Vol. 57, № 4, p. 310-315.
30. **E. P. Popova** and K. A. Potemina, Modeling of the Solar Activity Double Cycle Using Dynamical Systems, Geomagnetism and Aeronomy, (IF 0.39), 2013, Vol. 53, No. 8, pp. 941–944, DOI 10.1134/S0016793213080203.
31. **E. P. Popova**, Low-mode model of dynamo with the meridional circulation in the case of a dipole in the symmetry of the magnetic field, Astronomy Reports (IF 0.756), 2012, vol. 89, №10, p. 866-871, DOI 10.1134/S1063772912100046.
32. **E. Popova**, Configuration of the dynamo waves in a two-layer medium and 11-year cycle of solar activity, Astronomy Letters, 2011, Vol. 37, No. 1, pp. 233–240. (IF 1.091), DOI 10.1134/S106377371101004X.
33. **E.P. Popova**, S.N. Nefedov, Investigation of the helicity of magnetic fields on the Sun within the Parker dynamo model, Moscow University Physics Bulletin, 2010, V 65, № 2, p. 86-90.

34. M.A. Sever'yanova, **E.P. Popova**, D.D. Sokoloff, Parker's dynamo near the excitation threshold, *Astronomy Reports*, 2010, V 54, p. 762-766.
35. **H. Popova**, M.E. Arthuskova, D. Sokoloff, The WKB approximation for the interface dynamo, *Geophysical and Astrophysical Fluid Dynamics*, 2010, V 104, № 5, p. 631-641.
36. **E.P. Popova**, The effect of meridional circulation on dynamo waves approaching the solar poles, *Astronomy Reports*, 2010, V 54, p. 756-761.
37. **E.P. Popova**, The properties of a dynamo wave in the case of intense meridional circulation, *Moscow University Physics Bulletin*, 2010, V 65, p. 432-437.
38. **E.P. Popova**, D.D. Sokoloff, The solar cycle from data on the large-scale surface magnetic field and solar-dynamo theory, *Astronomy Reports*, 2010, V 54, p. 1042-1046.
39. **E.P. Popova**, Effects of various types of solar meridional circulation on the propagation of dynamo waves, *Astronomy Reports*, 2009, V 53, p. 863-868.
40. H. Xu, Y. Gao, **E.P. Popova**, S.N. Nefedov, H. Zhang, D.D. Sokoloff, Magnetic and electric-current helicities in very simple models of the solar dynamo, *Astronomy Reports*, 2009, V 53, p. 160-165.
41. **H. Popova**, D. Sokoloff, Meridional circulation and dynamo waves, *Astronomische Nachrichten*, 2008, V 329, № 7, p. 766-768.
42. **E.P. Popova**, M.Yu. Reshetnyak, D.D. Sokoloff, Meridional circulation and dynamo-wave propagation, *Astronomy Reports*, 2008, V 52, p. 157-163.
43. E.V. Levichkina, A.A. Loshkarev, E.I. Rodionova, **E. Popova**, I.N. Pigarev, Whether radial receptive field organization of the fourth extrastriate crescent (area V4A) gives special advantage for analysis of the optic flow. Comparison with the first crescent (area V2), *Experimental Brain Research*, 2007, V 182, № 2, p. 215-222.

Book

Extreme Events in Geospace, Editor: Natalia Buzulukova, 2018, Elsevier, ISBN 9780128127001, 625 c.

Chapter 28. "Near-Earth Radiation Environment for Extreme Solar and Geomagnetic Conditions", Nymmik R., Miroshnichenko L., Kuznetsov N., **Popova E.**, Panasyuk M., Kalegaev V., Yushkov B., Benghin V.

Awards

2017 The international Alexander Chizhevsky medal for Space Weather and Space Climate
ESA, ESWW Medal Committee, Belgium

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