


PERSONAL INFORMATION

Kamen Kozarev

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Gender Male | Date of birth 3 February, 1983

Nationality Bulgarian



EDUCATION AND TRAINING

02/2008 - 05/2013 **Doctor of Philosophy (PhD) degree in Astronomy**

Boston University, Boston, MA, USA

Dissertation title: "Coronal Shock Acceleration and Heliospheric Transport of Solar Energetic Protons"

Advisor: Nathan A. Schwadron

- Developed skills for numerical modeling of physical systems via solving systems of differential equations
- Developed skills for statistical analysis of data time series
- Developed skills for digital image processing and feature detection
- Developed skills for analysis and storage of big data structures

08/2006 - 01/2008 **Master's degree in Astronomy**

Boston University, Boston, MA, USA

- General Astrophysics
- Introduction to Space Physics
- Plasma Physics
- Fluid Physics
- Observational and Statistical Methods in Astrophysics
- Gravitational Astrophysics
- Heliophysics

09/2001 - 06/2005 **Bachelor's degree in Astrophysics**

Williams College, Williamstown, MA, USA

Honors thesis title: "New Observations of Ultraviolet and H-alpha Solar Limb Spicules with the Transition Region and Coronal Explorer and the Swedish Solar Telescope."

Thesis research supervised by Jay M. Pasachoff

- Developed skills for software analysis and processing of astronomical observations
- Developed skills working with professional telescopes
- Linear Algebra and Calculus
- Differential Equations
- Electricity and Magnetism
- Quantum Mechanics
- Astrophysics of Interstellar Space
- Gravitation

09/1996 - 07/2001 **High School Diploma**

English Language School "Plovdiv", Plovdiv, Bulgaria

WORK EXPERIENCE

10/2012 - Postdoc – Solar Physics Research

Harvard-Smithsonian Center for Astrophysics,
Cambridge, Massachusetts, USA

- Creation, validation and application of numerical models for the acceleration of energetic charged particles in magnetised shock waves
- Processing of high-resolution digital images – ultraviolet and radio observations of the Sun by space-borne telescopes
- Analysis of satellite-based observations of the Sun and characterisation of the relevant parameters of solar eruptions
- Comparison between results from numerical models and solar eruption observations
- Creation and maintenance of an automated system for analysis of solar eruption, including an online catalog with results

Type of the activity Solar Physics research

09/2005 – 06/2006 Physics and Mathematics Teacher

English International School of Padua, Padua, Italy

- Teaching Physics and Mathematics in English to grades 6-10
- Preparation of teaching materials and laboratory experiments
- Work in a large team, flexibility with changing deadlines

Type of the activity High school teaching

PERSONAL SKILLS

Mother tongue Bulgarian

Other languages	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2
Italian	C1	C1	B2	B2	C1

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user
[Common European Framework of Reference \(CEF\) level](#)

Communication skills – Communication skills, developed through multiple conferences, scientific presentations, workshops
 – Communication skills, developed during my work as a high school teacher
 – Communication skills, developed during my work as a teaching assistant for astronomy courses (both as an undergraduate and as graduate student)
 – Communication skills, developed through public lectures on Astronomy, as well as many presentations in front of students

Organisational / Managerial skills – Co-organizer of an international scientific team, working on problems of solar eruptions at the International Space Science Institute, Bern, in 2015-2016
 – Chief curriculum coordinator of the informal educational program Space Challenges during 2014-2015
 – Co-organizer of two workshops for PhD students in heliophysics in 2010 and 2011 - part of the international SHINE workshop, USA
 – Project manager of an interdisciplinary team of over 20 scientists working on the EMMREM project, funded by NASA, 2007-2011 work.

- Computer skills**
- Excellent working knowledge of Microsoft Office, Google Drive, Open Office
 - Excellent working knowledge of Linux-based operating systems, including Mac OS
 - Excellent working knowledge and free use of programming languages: Python, IDL, C, JavaScript, Bashscript, Fortran
 - Excellent working knowledge of version control software: git, subversion
 - Excellent working knowledge of photographer and videographer software: Adobe Photoshop & Lightroom, GIMP, Camtasia
- Other skills**
- professional photographer
 - licensed radio amateur, callsign LZ1BGA
 - licensed open water scuba diver
- Driving license** A, B

ADDITIONAL INFORMATION

- Project work**
- NASA Guest Investigator grant – “CASHew – Coronal Analysis of Shocks and Waves”
Project period – 2015-2017
Goal: Development of a database and an online catalog of solar eruptions observed in EUV light
Team position and responsibilities: Science Primary Investigator, responsible for the design of the system and the database, for implementation of the models and connections between them.
Total budget: 200 000 USD
- Grant by “America for Bulgaria” Foundation – “Space Challenges” Educational Program
Project period – 2014-2015
Goal: Development and implementation of an informal educational program for space science and technologies
Team position and responsibilities: Chief curriculum coordinator, responsible for running the overall program, curriculum development, participant evaluation.
Total budget: 120 000 BGN
- US Air Force Office of Scientific Research Проект – “Constraining ICME Magnetic Field Orientations Using Low Frequency Radio Polarimetric Observations”
Project period – 2014-2017
Goal: Analysis and modeling of solar radio observations with the Australian radio telescope Murchison Widefield Array; investigation of the capability for direct observations of the orientation and strength of coronal mass ejections’ magnetic fields in interplanetary space.
Team position and responsibilities: Researcher, analysis of radio imaging observations and optical EUV observations, modeling of interplanetary magnetic fields.
Total budget: 450 000 USD
- NASA-funded project – “C-SWEPA – Acceleration of Energetic Charged Particles in the Solar Corona and the Solar Wind”
Project period – 2014-2018
Goal: Development and validation of a platform for numerical modeling of the acceleration of solar energetic particles from the Sun to interplanetary space.
Team position and responsibilities: PhD student-researcher, analysis of telescopic observations of solar eruptions, integration of satellite observations into models, scientific study of the acceleration of particles in the solar corona.
Total budget: 1 500 000 USD
- NASA-funded project – “EMMREM – Earth-Moon-Mars Radiation Environment Modules”
Project period – 2006-2010
Goal: Development of an integrated framework for modeling and forecasting the levels of space radiation in interplanetary space and in the atmospheres of solar system planets, based on physics-based numerical simulations and satellite data integration.
Team position and responsibilities: PhD student-researcher, development of a numerical model for the acceleration of highly energetic protons by interplanetary shock waves, integration of satellite observations into the models, design and implementation of a system for integrated modular running of the various models.
Total budget: 2 500 000 USD
- Referee**
- Proposal Reviewer for NASA (ROSES)
 - Proposal Reviewer for the Polish National Science Center
 - Article referee for The Astrophysical Journal; Space Weather: The International Journal of Research and Applications; Astronomy and Astrophysics; Scientific Reports; Current Applied Physics
- Awards**
- Awarded the NASA LWS Jack Eddy Postdoctoral Fellowship, 2012-2014 r.
 - Received B.A. with Honors, Williams College, 2005

- Science Community Service
- Co-chair of a session for the European Space Weather Week, Belgium, 2016 - “Flares, coronal mass ejections and solar energetic particles: Space Weather Impact”.
 - Member of the Local Organizing Committee for the conference “International Symposium on Recent Observations and Simulations of the Sun-Earth System III”, Golden Sands, Bulgaria, 2016.
 - Co-chair of a session for the Solar, Heliospheric, and Interplanetary Environment (SHINE) workshop - “Particle Acceleration and Wave Generation Across Scales: From Reconnection to Shocks”, Santa Fe, NM, USA, 2016.
 - Co-chair of a session for the American Geophysical Union’s Fall Meeting - “SH013. Seed Populations, Acceleration, and Transport of Solar Energetic Particles from the Low Corona”, San Francisco, CA, 2013.
 - Co-chair of a session for the American Geophysical Union’s Fall Meeting - “SH53C. Specification, Prediction, and Observation of the Inner Solar System’s Radiation Environment II”, San Francisco, CA, 2010.
 - Mentor of three undergraduate students as part of SAO’s summer Solar Research Experience for Undergraduates (REU) internship - 2013, 2014, 2016 r.
- Membership in Professional Societies
- European Geophysical Union
 - American Geophysical Union
 - American Astrophysical Society, Solar Physics Division

SCIENTIFIC PUBLICATIONS

Refereed Publications

- N. A. Schwadron, M. A. Lee, M. Gorby, N. Lugaz, H. E. Spence, M. Desai, T. Török, C. Downs, J. Linker, R. Lionello, Z. Miki, P. Riley, J. Giacalone, J. R. Jokipii, J. Kota, K. A. Kozarev. "Particle Acceleration at Low Coronal Compression Regions and Shocks", 2015, *Astrophys. J.*, 810, 97
- K. A. Kozarev, J. C. Raymond, V. V. Lobzin, M. Hammer. "Properties of a Coronal Shock Wave as A Driver of Early SEP Acceleration", 2015, *Astrophys. J.*, 799, 167
- K. A. Kozarev, R. M. Evans, N. A. Schwadron, M. A. Dayeh, M. Opher, K. E. Korreck, B. van der Holst. "Global Numerical Modeling of Energetic Proton Acceleration in a CME Traveling Through the Solar Corona." 2013, *Astrophys. J.*, 778, 43
- V. Sheel, S. A. Haider, P. Withers, K. Kozarev, I. Jun, S. Kang, G. Gronoff, S. C. Wedlund. "Numerical simulation of the effects of a solar energetic particle event on the ionosphere of Mars", 2012, *J. Geophys. Res.*, 117, 05312
- K. A. Kozarev, K. E. Korreck, V. V. Lobzin, M. A. Weber, and N. A. Schwadron. "Off-limb Solar Coronal Wavefronts From SDO/AIA EUV Observations – Implications For Particle Production." 2011, *Astrophys. J. Lett.*, 733, 25
- F. A. Cucinotta, S. Hu, N. A. Schwadron, K. Kozarev, L. W. Townsend, and M.-H. Y. Kim. "Space radiation risk limits and Earth-Moon-Mars environmental models." 2010, *J. Space Weather*, 8, 9
- K. A. Kozarev, N. A. Schwadron, M. A. Dayeh, L. W. Townsend, M. I. Desai, and M. PourArsalan. "Modeling the 2003 Halloween events with EMMREM: Energetic particles, radial gradients, and coupling to MHD." 2010, *J. Space Weather*, 8, 8
- M. A. Dayeh, M. I. Desai, K. A. Kozarev, N. A. Schwadron, L. W. Townsend, M. PourArsalan, C. Zeitlin, and R. B. Hatcher. "Modeling proton intensity gradients and radiation dose equivalents in the inner heliosphere using EMMREM: May 2003 solar events." 2010, *J. Space Weather*, 8, 7
- C. Zeitlin, W. Boynton, I. Mitrofanov, D. Hassler, W. Atwell, T. F. Cleghorn, F. A. Cucinotta, M. Dayeh, M. Desai, S. B. Guetersloh, K. Kozarev, K. T. Lee, L. Pinsky, P. Saganti, N. A. Schwadron, and R. Turner. "Mars Odyssey measurements of galactic cosmic rays and solar particles in Mars orbit, 2002-2008." 2010, *J. Space Weather*, 8, 6
- M. PourArsalan, L. W. Townsend, N. A. Schwadron, K. Kozarev, M. A. Dayeh, and M. I. Desai. "Time-dependent estimates of organ dose and dose equivalent rates for human crews in deep space from the 26 October 2003 solar energetic particle event (Halloween event) using the Earth-Moon-Mars Radiation Environment Module." 2010, *J. Space Weather*, 8, 5
- N. A. Schwadron, A. J. Boyd, K. Kozarev, M. Golightly, H. Spence, L. W. Townsend, and M. Owens. "Galactic cosmic ray radiation hazard in the unusual extended solar minimum between solar cycles 23 and 24." 2010, *J. Space Weather*, 8, 4
- N. A. Schwadron, L. Townsend, K. Kozarev, M. A. Dayeh, F. Cucinotta, M. Desai, M. Golightly, D. Hassler, R. Hatcher, M.-Y. Kim, A. Posner, M. PourArsalan, H. E. Spence, and R. K. Squier. "Earth-Moon-Mars Radiation Environment Module framework." 2010, *J. Space Weather*, 8, 2

Talks and Seminars

- K. A. Kozarev. "Solar Mass Ejections, Coronal Shock Waves, And Energetic Particle Acceleration" [Invited] 2014, Space Science Seminar, University of New Hampshire
- K. A. Kozarev. "Solar Mass Ejections, Coronal Shock Waves, And Energetic Particle Acceleration" [Invited] 2014, Physics and Astronomy Colloquium, Williams College
- K. A. Kozarev. "More Than A Star: How Does Solar Activity Impact The Heliosphere?" [Invited] 2013, Bashfest Postdoctoral Symposium, University of Texas at Austin
- [Invited] K. A. Kozarev, N. A. Schwadron, M. A. Dayeh, A. Fuegi, L. W. Townsend, M. I. Desai, M. PourArsalan. "Earth-Moon-Mars Radiation Environment Module(EMMREM): A Tool For Energetic Particle Fluxes and Radiation Doses Prediction In the Inner Heliosphere." [Invited] 2010, 5th Community Coordinated Modeling Center Workshop

- Conference Presentations [Invited] K. A. Kozarev, N. Schwadron, C. Keith, A. Kendrick and A. R. Davey. "Early-Stage Acceleration of SEPs by CME-Driven Shocks and Compressions." 2016, American Geophysical Union Fall Meeting, SH32A-01
- K. A. Kozarev, D. Oberoi, J. Morgan et al. "Direct Radio Synchrotron Emission Imaging of a CME with the Murchison Widefield Array", 2016, American Geophysical Union Fall Meeting, SH22B-01
- [Invited] K. A. Kozarev, N. Schwadron. "A Data-Driven Model for Proton Acceleration by Remotely Observed Low Coronal Shocks" 2016, Solar, Heliospheric, and Interplanetary Environment Workshop (SHINE), Santa Fe, New Mexico, USA
- K. A. Kozarev, A. Kendrick, A. Davey. "The Coronal automated Analysis of SHocks and Waves (CASHeW) framework." 2015, First Joint Solar Probe Plus-Solar Orbiter Science Workshop, Florence, Italy
- [Invited] K. A. Kozarev, A. Kendrick. "Characterisation of Off-Limb Coronal Bright Fronts Observed with SDO/AIA" 2014, European Geophysical Union General Assembly, EGU2015-664
- [Invited] K. A. Kozarev, A. Kendrick, J. C. Raymond. "From EUV Waves to Low Coronal Shocks and Particle Acceleration" 2014, 14th European Solar Physics Meeting, Dublin, Ireland
- K. A. Kozarev, R. M. Evans, N. A. Schwadron, M. A. Dayeh, M. Opher, K. E. Korreck. "Global Numerical Modeling of SEP Acceleration by a CME Shock in the Solar Corona and Subsequent Transport to 1 AU." 2012, American Geophysical Union Fall Meeting, SH23B-04
- K. A. Kozarev, K. E. Korreck, V. V. Lobzin, M. A. Dayeh, R. Ebert, M. A. Weber, N. A. Schwadron. "High-Cadence EUV Imaging, Radio, and In-Situ Observations of Coronal Shocks and Energetic Particles: Implications for Particle Acceleration." 2011, European Geophysical Union General Assembly, EGU2011-532
- [Invited] K. Kozarev, N. Schwadron, M. A. Dayeh, A. Fuegi, L. W. Townsend, M. Desai, M. PourArsalan. "Predicting Energetic Particle Radiation Doses Throughout the Inner Heliosphere With the EMMREM Framework." 2009, European Space Weather Week, Bruges, Belgium
- [Invited] K. Kozarev, N. A. Schwadron, L. Townsend, M. Desai, M. A. Dayeh, F. Cucinotta, M. H. Kim, D. Hassler, and H. Spence. "Earth-Moon-Mars Radiation Environment Module: System Overview and Model Validation." 2009, IEEE Aerospace Conference