EVDOKIYA (EVA) KOSTADINOVA

CURRICULUM VITAE

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EDUCATION

Ph.D. Physics, Dec 2017
Baylor University

Dissertation: Spectral Approach to Transport Problems in Two-Dimensional Disordered Lattices: Physical Interpretation and Applications
Advisor: Dr. T W Hyde; Collaborators: Dr. L S Matthews, Dr. C D Liaw

B.S. Physics, May 2014
Furman University

Thesis: Sensors for Extraterrestrial Robot Land Navigation
Advisor: Dr. D A Moffett; Collaborators: Dr. J R Conrad

B.A. Political Science
May 2014
Furman University

Thesis: "Middle East and Islamic Studies Programs in the US in the Wake of the Arab Spring; Advisor: Dr. A K Yildirim
Minor: Middle East and Islamic Studies

WORK EXPERIENCE

- Assistant Professor, Physics Department, Auburn University, Aug 2021 – present
- Assistant Research Professor at CASPER, Baylor University, Feb 2018 – July 2021
- Graduate Research Assistant at CASPER, Baylor University, May 2016 – Dec 2017
- Graduate Teaching Assistant at Baylor University Physics Department, Sep 2014 –May 2016
- Lab Assistant and Physics Tutor at Furman University Physics Department, Sep 2012 – May 2014
- Library Assistant in Inter Library Loan Department, Furman University, Sep 2010 – May 2014

GRANTS FUNDED [1]

- **PI:** NSF/DOE Onset of Turbulence in Dusty Plasma Liquids, Aug 1, 2019 – July 31, 2022
  Collaborators: J L Padgett (U. Arkansas), C D Liaw (U. Delaware), & L S Matthews (Baylor U.)
- **Co-PI**: DOE-FES Modeling Plasma Response to Non-Axisymmetric Magnetic Field Perturbations in Tokamak Boundaries, Sept 1, 2020 – Aug 31, 2022
  Collaborators: D M Orlov (UCSD), T E Evans (General Atomics), E C Howell (Tech-X Corp.)
- **Co-PI**: DOE-FES Hypervelocity impact in stellar media: heat shielding, formation of shock fronts and ablation clouds (part of the DIII-D tokamak 2020/2021 Frontiers Experiments Program), Sept 1, 2020 – Aug 31, 2021
  Collaborators: D M Orlov (UCSD), I Bykov (General Atomics)
- **Co-PI:** NASA/JPL Dust Charging and Transport in Simulated Lunar Swirl Environments, Dec 1, 2019 – Dec 30, 2020
  Collaborators: T W Hyde (Baylor U), L S Matthews (Baylor U)

RESEARCH EXPERIENCE

***Professional Research*:**

- Topics: Turbulence and anomalous transport in stochastic potentials; Non-local interactions in strongly coupled systems; Lunar dust mitigation and control; Non-equilibrium kinetics of gravity and microgravity dusty plasmas; Statistical mechanics and thermodynamics of driven-dissipative systems; Plasma-material interactions in fusion and space applications; Dust particle techniques for plasma diagnostics;

[1] Summaries of my research projects can be found here: https://sites.baylor.edu/eva_kostadinova/research/

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***Graduate Research*:**

- Topics: Spectral approach to Anderson localization in two-dimensional infinite disordered systems (physical interpretation and application); Long-range attractive and disorder-induced phase transitions in soft matter; Dusty plasma crystals as graphene analogues.

***Undergraduate Research*:**

- Madison Plasma Dynamo Experiment (currently named Big Red Ball), Department of Physics, University of Wisconsin (Madison), May-July 2013 (advisor: Dr. C. Forest, post-doctorate advisor: Dr. C. Cooper); Role: Designed, constructed and programmed a motion control system for robotic insertion of sweep probe used in plasma environment.
- Independent Study on Space Robotics, Department of Physics, Furman University, January-May 2013 (advisor: Dr. J. Conrad); Role: Studied types of sensors used in robot land navigation in extraterrestrial conditions.
- Hydration Status of Collagen as Revealed by Raman Spectroscopy, Department of Physics, Furman University, Jun-Aug 2011 (advisor: Dr. D. Wang); Role: Investigated the capability of Raman spectroscopy in revealing the physiochemical status of collagen through analysis of bovine material samples (Sigma-Aldrich)

JOURNAL PUBLICATIONS AND BOOKS **Undergraduate student co-authors*

- L S Matthews, K Vermillion, P Hartmann, M Rosenberg, S Rostami, **E G Kostadinova**, T W Hyde, Effect of ionization waves on dust chain formation in a DC discharge, (2021), *arXiv preprint arXiv:2107.10367*
- **E G Kostadinova**, R Banka*, J L Padgett, C D Liaw, L S Matthews, & T W Hyde, (2021). (2021). Fractional Laplacian spectral approach to turbulence in a dusty plasma monolayer. Physics of Plasmas, 28(7), 073705.
- DM Orlov, M O Hanson*, J Escalera*, H Taheri*, C N Villareal*, D M Zubovic*, I Bykov, **E G Kostadinova**, D L Rudakov, M Ghazinejad. (2021). Design and testing of DiMES Carbon Ablation Rods in the DIII-D tokamak, IMECE2021-73326, ASME IMECE 2021 Conference Proceedings
- T F Jones, **E G Kostadinova**, J L Padgett, Q Sheng, (2021). A series representation of the discrete fractional Laplace operator of arbitrary order. *Journal of Mathematical Analysis and Applications*, 504(1), 125323.
- **E G Kostadinova**, J L Padgett, C D Liaw, L S Matthews, & T W Hyde, (2020). Numerical study of anomalous diffusion of light in semi-crystalline polymer structures. *Phys. Rev. Research,* 2(4), 043375.
- J L Padgett, **E G Kostadinova**, C D Liaw, K Busse*, L S Matthews, & T W Hyde (2020). Anomalous diffusion in one-dimensional disordered systems: a discrete fractional Laplacian method. *J. Phys. A: Mathematical and Theoretical*, *53*(13), 135205.
- L S Matthews, **E G Kostadinova**, D Sanford*, TW Hyde, S Ashrafi, E Guay* (2020), Dust charging in dynamic ion wakes, *Phys. Plasmas, 27,* 023703 ***(Featured & Scilight)***
- **E G Kostadinova**, C D Liaw, A S Hering, A Cameron*, F Guyton*, L S Matthews, & T W Hyde (2019). Spectral approach to transport in a two-dimensional honeycomb lattice with substitutional disorder. *Phys. Rev. B, 99*, 024115
- P Hartmann, J C Reyes, **E G Kostadinova**, L S Matthews, T W Hyde, R U Masheyeva, K N Dzhumagulova, T S Ramazanov, T Ott, H Kählert, M Bonitz, I Korolov, & Z Donkó (2019). Self-diffusion in two-dimensional quasi-magnetized rotating dusty plasmas. *Phys. Rev. E, 99*, 013203
- **E G Kostadinova**, F Guyton*, A Cameron*, K Busse*, C D Liaw, L S Matthews, & T W Hyde (2018) Transport properties of disordered two-dimensional complex plasma crystal, *Contrib. Plasma Phys*., 58 (2-3), 209–216.
- ***(book)* E G Kostadinova** (2018). Spectral Approach to Transport Problems in Two-Dimensional Disordered Lattices: Physical Interpretation and Applications. Springer

- **E G Kostadinova**, K Busse*, N Ellis*, J Padgett, C D Liaw, L S Matthews, & T W Hyde (2017). Delocalization in infinite disordered two-dimensional lattices of different geometry. *Phys. Rev. B*, *96*(23), 235408.
- **E G Kostadinova**, C D Liaw, L S Matthews, & T W Hyde (2016). Physical interpretation of the spectral approach to delocalization in infinite disordered systems. *Mater. Res. Express*, *3*(12), 125904.

WORK IN PROGRESS **Undergraduate student co-authors*

- **E G Kostadinova**, E Gehr*, E Guay*, M Lechuga*, J Carmona-Reyes, P Hartmann, M Rosenberg, L S Matthews, & T W Hyde, Anomalous diffusion and instabilities in microgravity dusty plasma, to be submitted to *Phys. Plasmas*
- **E G Kostadinova**, Transport beyond eigenvalues: a fractional Laplacian spectral approach, to be submitted to *Phys. Rev. A.*
- K Vermillion, D Sanford, L S Matthews, P Hartmann, M Rosenberg, **E G Kostadinova**, T W Hyde, Modeling Ionization Wave Effects on Dust Chain Formation

CONFERENCE TALKS [2] **Undergraduate student co-authors*

- **EG Kostadinova**, DM Orlov, & C Mehta "Laboratory study of carbon ablation in Jupiter-like heating environment", APS DPP, Nov 8-12, 2021
- **E G Kostadinova**, E Gehr*, E Guay*, J Padgett, C D Liaw, P Hartmann, M Rosenberg, L S Matthews, & T W Hyde, "Fractional Laplacian Spectral Approach to Anomalous Diffusion in Dusty Plasma", IEEE *ICOPS*, remote, Sep 12-16, 2021
- **EG Kostadinova**, DM Orlov, "Analytical Study of Nonlocal Transport in Stochastic Magnetic Fields", Sherwood Fusion Theory Conference, remote, Aug 16-18, 2021
- **EG Kostadinova**, DM Orlov, "Fractional Spectral Approach to Anomalous Diffusion in Stochastic Magnetic Fields", US Transport Task Force meeting 2021, remote, Apr 19-21, 2021
- **E G Kostadinova**, D M Orlov, I Bykov, J Schmidt, G Herdrich, L S Matthews, & T W Hyde, "Small Grains, Hyper Impact: Frontier Science at the DIII-D Tokamak", *APS DPP*, remote, Nov 9-13, 2020
- **E G Kostadinova**, R Banka*, J Padgett, C D Liaw, L S Matthews, & T W Hyde, "Semi-classical turbulence in a dusty plasma monolayer", *APS DPP*, remote, Nov 9-13, 2020
- **E G Kostadinova**, J Padgett, C D Liaw, L S Matthews, & T W Hyde, "Spectral Approach to Particle Transport in Turbulent Dusty Plasma", *APS DPP*, Ft. Lauderdale, FL, Oct 21-25, 2019
- **E G Kostadinova**, J Padgett, C D Liaw, P Hartmann, M Rosenberg, L S Matthews, & T W Hyde, "Plasma Kristall-4: Anomalous diffusion and vorticity in a multi-chain dusty plasma", *IEEE PPPS*, Orlando, FL, June 23-28, 2019
- **E G Kostadinova**, J Padgett, K Busse*, C D Liaw, L S Matthews, & T W Hyde, "Anomalous diffusion in microgravity complex plasma cloud", *APS DPP*, Portland, OR, Nov 5-9, 2018
- **E G Kostadinova**, J Padgett, K Busse*, C D Liaw, L S Matthews, & T W Hyde, "Anomalous diffusion in 1D dusty plasma structures: A fractional Laplacian model for strong correlations", *15th Dusty Plasma Workshop*, Baltimore, MD, May 29-June 1, 2018
- **E G Kostadinova**, C D Liaw, L S Matthews, & T W Hyde, "Lattice wave transport in a 2D complex plasma graphene analogue", *APS DPP*, Milwaukee, WI, Oct 23-27, 2017
- **E G Kostadinova**, C D Liaw, L S Matthews, & T W Hyde, "Transport properties of disordered 2D complex plasma crystal", *SCCS*, Kiel, Germany, Jul 30-Aug 4, 2017
- **E G Kostadinova**, C D Liaw, L S Matthews, & T W Hyde, "Spectral Approach to Anderson Localization in 2D Complex Plasma Crystal", *APS DPP*, San Jose, CA, Oct 31-Nov 4, 2016

POSTER PRESENTATIONS

[2] A full list of my talks (including outreach) can be found here: https://sites.baylor.edu/eva_kostadinova/outreach/

- **E G Kostadinova**, D M Orlov, G Griffin, J Schmidt, & T W Hyde, "Dust clustering in inductively heated plasma jet", *APS GEC*, Oct 4-8, 2021
- **E G Kostadinova**, M Lechuga*, L S Matthews, & T W Hyde, "Ion-dust streaming instability in microgravity dusty plasma", *APS DPP*, Ft. Lauderdale, FL, Oct 21-25, 2019
- **E G Kostadinova**, K Busse*, L S Matthews, & T W Hyde, "Dust chain formation in microgravity complex plasma", *APS DPP*, Portland, OR, Nov 5-9, 2018
- **E G Kostadinova**, K Busse*, C D Liaw, L S Matthews, & T W Hyde, "Nematic transition in microgravity complex plasma liquid crystals", *15th Dusty Plasma Workshop*, Baltimore, MD, May 29-June 1, 2018

SERVICE AND OUTREACH

Plasma Science and Fusion community

- Chair of Coalition for Plasma Science, June 2021-present, https://www.plasmacoalition.org/index.html
- Member of organizing committee for MagNetUS Inaugural Meeting, August 2-4, 2021
- Executive committee member-at-large, APS Forum for Early Career Scientists, Nov 2020-present
- Program committee chair of the Fundamental Plasma Physics subcommittee for APS DPP, 2021
- Vice-chair of the APS DPP Executive Nominating Committee, 2020-2021
- Member of the APS DPP Public Information Committee for 2019-2021
- Lecturer for 2020 Introduction to Fusion Energy and Plasma Physics Course, as part of the Princeton Plasma Physics Lab Science Undergraduate Laboratory Internship (SULI) program
- Member of the Plasma Science Expo organization committee for APS DPP 2020-2021
- Member of APS DPP Community Planning Process group on workforce development, 2019-2020
- Workshop coordinator for APS DPP Conference, San Jose, CA, Oct 31-Nov 4, 2016

Referee work

- Grant review referee for the National Science Foundation
- Member of advisory board for Heliyon Physics
- Referee for CRC Press, Journal of Plasma Physics, IEEE Transactions on Plasma Science, Chaos, Physics of Plasmas

Baylor University and Local Community

- Educator for Baylor University Present Your PhD initiative, presenting novel scientific work to students from 1st to 12th grade, undergraduate, and graduate students
- Physics mentor for CODE RED, Baylor academic event for High Ability High School Students
- Lecturer for Baylor University's physics department graduate and undergraduate colloquium, CASPER seminar, and Women in STEM speaker series, Baylor Physics Bowl (High School science competition)
- Department Representative in Baylor Graduate Students Association, Sep 2014-May 2017
- Graduate School Mentor in Baylor Mentor-Mentee Program, Sep 2015-Dec 2017

HONORS AND AWARDS

- Springer Thesis outstanding PhD research award, 2017
- Baylor University Graduate School Fellowship, Aug 2014-Dec 2017
- Second place on Atmel Corporation National Robotics Competition at World Maker Faire, New York Hall of Science, Queens, NY, September 2012
- National Scholar Award from the National Society of High School Scholars, May 2011
- Dean's List – for students with GPA in the top 25% of their class, 2013, 2012, 2011, 2010

SCIENTIFIC ORGANIZATIONS AND SOCIETIES

- US Burning Plasma Organization, Jan 2020-present

- IEEE, July 2019-Present
- American Physical Society (APS), Division of Plasma Physics, Sep 2012-Present
- Society of Physics Students (SPS), Sep 2010-2014
- Association for Women in Mathematics, Sep 2016-2018
- National Society of High School Scholars (NSHSS), Honorable Member, May 2010-Present
- Sigma Pi Sigma Physics Honor Society, Honorable Member, Apr 2013-Present
- Pi Sigma Alpha Honor Society, Honorable Member, Jan 2014-Present