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DIEGO DEL-CASTILLO-NEGRETE*

Distinguished R&D Scientist
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EDUCATION

- Ph.D. *Physics.* University of Texas at Austin (1994).
  Thesis: "Dynamics and Transport in Rotating Fluids and Transition to Chaos in Area Preserving Maps".
- B.S. *Physics* Universidad Nacional Autónoma de México (1988).
  Thesis: "Symmetries of the Geodesic Equation and S-Equivalent Lagrangians".

WORK EXPERIENCE

- *Distinguished Scientist.* Oak Ridge National Laboratory (2019–Present)
- *Senior Research Scientist.* Oak Ridge National Laboratory (2007– 2019)
- *Research Scientist.* Oak Ridge National Laboratory (2000–2007)
- *Postdoctoral Research Associate.* Theoretical Division. Los Alamos National Laboratory (1998–2000).
- *Assistant Instructor.* Graduate level course: "Methods of Applied Mathematics" University of California at San Diego (Scripps Institution of Oceanography) (September 1997–March 1998)
- *Postdoctoral Fellow.* Scripps Institution of Oceanography, UCSD (1994–1998)
- *Research Assistant.* Institute for Fusion Studies. University of Texas at Austin (1990–1994)
- *Teaching Assistant.* Department of Physics. University of Texas at Austin (1989–1990)

VISITING POSITIONS, FELLOWSHIPS, AND AWARDS

* https://scholar.google.com/citations?user=tz_LBVEAAAAJ&hl=en&oi=ao
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- *Visiting Researcher/Scholar.* Oden Institute, University of Texas at Austin (February 2024).
- Great Minds in STEM HENAAC *Outstanding Technical Achievement* award (August 2021)
- *Visiting Professor.* Aix-Marseille Université. Marseille, France (June 2017)
- *Joint Institute for Fusion Theory (JIFT) exchange visiting scientist*. National Institute for Fusion Studies (NIFS). Toki-city, Japan (June 2016)
- *Visiting Professor fellowship. "*Cátedra Extraordinaria UNAM*"*. Institute of Applied Mathematics and Systems (IIMAS). México City, Mexico (May 2016)
- *J.T. Oden Faculty Fellow*. Institute for Computational Engineering and Sciences at the University of Texas at Austin (September 2015)
- *Visiting Staff Member.* Geophysical Fluid Dynamics Program, Woods Hole Oceanographic Institution. Woods Hole, Massachusetts (August 2012)
- *Visiting Professor.* Department of Physics. University Carlos III. Madrid, Spain (March 2012)
- *Visiting Scientist Fellowship*. Erasmus Mundus European Nuclear Fusion Science and Engineering program (2011)
- *Visiting Professor.* Department of Physics. University of Sao Paulo. Sao Paulo, Brazil (September 2011)
- *Visiting Staff Member.* Geophysical Fluid Dynamics Program, Woods Hole Oceanographic Institution. Woods Hole, Massachusetts (June 2011)
- *Visiting Professor.* Aix-Marseille Université. Marseille, France (July 2010)
- *Visiting Professor.* Department of Modeling and Mechanics. Aix-Marseille Université. Marseille, France (June 2008)
- *Visiting Professor.* Aix-Marseille Université. Marseille, France (October 2007)
- *Fellow Woods Hole Oceanographic Institution.* Summer program in Geophysical Fluid Dynamics (June 21– August 27, 1993)
- *Ocean Modeling Fellowship* (1994–1996). University Corporation for Atmospheric Research
- *E.D. Farmer Fellowship* (1993–1994) University of Texas at Austin.
- *National Autonomous University of Mexico (UNAM) DGAPA fellowship* (1988-1993)

MISCELLANEOUS PROFESSIONAL ACTIVITIES

- *Organizing Committee Member*. Computer Sciences and Engineering SIAM (Society of Applied Mathematics and Engineering) bi-annual meeting (2024).
- *Official Opponent Doctoral Program in Science,* Aalto University Physics Department*,* Finland (June 20, 2023).
- *Program Committee Member*, Magnetic Confinement Theory. APS (American Physical Society) Division of Plasma Physics Meeting (2023).
- *Prize selection Committee Member*. J.D. Crawford Prize, SIAM (Society of Applied Mathematics and Engineering) Activity Group on Dynamical Systems (2023).
- *Mini-symposium organizer*. Dynamical Systems Approaches to Active Mixing, SIAM Conference on Applications of Dynamical Systems (2023).

- *Panel participant.* DOE Laboratory Workshop on Advance Research Directions in AI for Science and Security. (2022).
- *International Advisory Committee Member.* 20th International Congress on Plasma Physics. Hico, Gyeongju, Korea (2022).
- *Selection Committee Member*. J.D. Crawford Prize, Society for Industrial and Applied Mathematics (SIAM) Activity Group on Dynamical Systems (2022).
- *Selection Committee Member.* Student Presentation Awards, Sherwood Fusion Theory Conference. August (2021).
- *Selection Committee Member*. J.D. Crawford Prize, Society for Industrial and Applied Mathematics (SIAM) Activity Group on Dynamical Systems (2021).
- *Committee Member*. The University of Wisconsin-Madison, Graduate School Preliminary Examination for Mr. B.S. Cornille. August 26 (2020).
- *Panel Participant.* Department of Energy (DOE) Fusion Energy Sciences and Advanced Scientific Computing Research needs workshop on "Advancing Fusion with Machine Learning". Gaithersburg, Maryland. April 30–May 2 (2019).
- *Co-organizer* and *Committee Member.* Workshop on "Hamiltonian system, from topology to applications through analysis". Mathematics Science Research Institute (MSRI) Berkeley, California. November 26–30 (2018).
- *ORNL-Principal Investigator.* "Simulation Center for Runaway Electron Avoidance and Mitigation" DOE Scientific Discovery through Advanced Computing. (2017–present).
- *Member.* ITER DMS (Disruption Mitigation Systems) Task Force. Runaway electrons group (2019).
- *Organizing Committee Member*. SIAM conference on "Analysis of Partial Differential Equations". Baltimore, Maryland. December 9–12 (2017).
- *Guest Editor.* Plasma Physics and Controlled Fusion. Special issue featuring invited papers from the 2016 International Sherwood Fusion Theory Conference.
- *Principal Investigator.* ORNL internal funding "Modeling and simulation of tokamak disruptions in ITER plasmas" (2016–2019).
- *Program Subcommittee Member*. International Congress on Plasma Physics. Kaohsiung, Taiwan, (2016).
- *Executive Committee Member.* International Sherwood Fusion Theory Conference (2004–2016).
- *Executive Committee Chairman*. International Sherwood Theory Conference, (2015).
- *MFE Theory Program Subcommittee Member.* American Physical Society, Division of Plasma Physics Meeting. Savannah, Georgia (2015).
- *Program Committee Member.* International Sherwood Fusion Theory Conference. New York, NY (2015).
- *Mini-symposium Organizer.* First Pan American Congress on Computational Mechanics PANACM. Buenos Aires, Argentina (2015).
- *Program Committee Member.* International Congress on Plasma Physics, Lisbon, Portugal (2014).
- *Chair Program Committee.* International Sherwood Fusion Theory Conference. Santa Fe, New Mexico (2013).

- *International Advisory Committee Member.* International Congress on Plasma Physics. (2005–Present).
- *Program Committee Member.* 9th Nonlinear Waves Workshop. San Diego, California. (2013).
- *International Program Committee Member.* 3rd Conference on Nonlinear Science and Complexity. Ankara, Turkey. July 28-–1 (2010).
- *Symposium Co-organizer.* Fractional Calculus Applications.3rd Conference on Nonlinear Science and Complexity. Ankara, Turkey, July 28-31 (2010).
- *Program Committee Member.* 8th Nonlinear Waves Workshop. San Diego, California. February (2010).
- *Scientific International Committee Member.* Symposium on Fractional Signals and Systems. Portugal, Lisbon. November (2009).
- *Local Organizing Committee Member.* Dynamics Days Meeting. Knoxville, TN. (2007).
- *Member of the American Physical Society*
- *Member of the Society of Industrial and Applied Mathematics*

REFEREEING SERVICES

Journals

- *Physical Review Letters*
- *Physics of Plasmas*
- *CHAOS*
- *Physica D*
- *Physical Review E*
- *Nuclear Fusion*
- *Plasma Physics and Controlled Fusion*
- *Journal of Computational Physics*
- *Computer Physics Communications*
- *Physics of Fluids*
- *Journal of Fluid Mechanics*
- *Journal of Atmospheric Sciences*
- *Journal of Plasma Physics*
- *Transport Theory and Statistical Physics*
- *Physics Letters A*
- *Journal of Statistical Physics*
- *Communications in Nonlinear Science and Numerical Simulations*
- *Mathematics and Computers in Simulation*
- *IEEE Transactions on Plasma Science*
- *SIAM Journal on Scientific Computing*
- *Applied Mathematical Modeling*
- *Reviews of Modern Physics*
- *Revista Mexicana de Física*
- *Physica Scripta*
- *Nonlinear Processes in Geophysics*
- *Journal of Theoretical Biology*
- *Nature Communications*

Domestic and International Funding Agencies

- USA Department of Energy
- Italian Institute for the Physics of Matter
- Kilman Program Canada Council for the Arts
- ORNL-LDRD Program
- National Science Foundation
- German-Israeli Foundation for Scientific Research and Development
- Israel Science Foundation.

GRADUATE STUDENTS SUPERVISED

Following is a list of graduate students that have worked with me as co-advisor in parts of their thesis.

1. Benoit Clavier. Aix-Marseille University, France. Ph.D. Physics candidate.
2. D. Martinez del Rio. IIMAS, UNAM. Mexico City, Mexico. Ph.D. Mathematics (2019). Currently at Mathematics Institute, University of Warwick, UK.
3. J. Fonseca. University of Sao Paulo. Sau Paulo, Brazil. Ph.D. Physics (2016). Currently at State University of São Paulo, Brazil.
4. Lei Zhang. Georgia Institute of Technology. Department of Mathematics. Ph.D. Mathematics (2016).
5. D. Gamborino Uzcanga. ICN, UNAM. Mexico City, Mexico. M.Sc. Earth Sciences (2015). Currently at Physics Institute, University of Bern, Switzerland.
6. A. Kullberg. UCLA Department of Physics. Los Angeles, CA. Ph.D. Physics (2014).
7. D. Blazevski. University of Texas at Austin Department of Mathematics. Austin, TX. Ph.D. Mathematics (2012). Currently Senior Software Engineer at Square, New York City, NY.
8. L. Carbajal. ICN, UNAM. Mexico City, Mexico. MSc Physics (2011). Currently at the Institute of Nuclear Sciences UNAM, Mexico City, Mexico.
9. David Hatch. University of Wisconsin-Madison, Department of Physics. Madison, WI. Ph.D. Physics (2011). Currently at Institute for Fusion Studies, University of Texas at Austin.
10. R. Nguyen. École Normale Supérieure. Paris, France. Ph.D. (2010).
11. S. Futatani. Aix-Marseille University, Marseille, France. Ph.D. Physics (2009). Currently at Polytechnic University of Catalonia, Spain.
12. Kyle Gustafson. University of Maryland Department of Physics. College Park, MD. Ph.D. Physics (2009).

POSTDOCTORAL RESEARCHERS SUPERVISED

1. Dr. Minglei Yang (2020–2022). Currently staff member at Oak Ridge National Laboratory, USA.
2. Dr. Leopoldo Carbajal (2016–2018). Currently staff member at Type-One Energy, USA.
3. Dr. Damian Hernandez. (2011). Currently at “Universidad de Mexico”. Mexico City, Mexico.
4. Dr. Marie-Christine Firpo. (2002). Currently at Laboratoire de Physique et Technologie des Plasmas, Ecole Polytechnique. France.

PUBLICATIONS IN PEER REVIEWED JOURNALS

1. B. Clavier, D. Zarzoso, D. del-Castillo-Negrete and E. Frenord, "A generative machine learning surrogate model of plasma turbulence". Submitted to Phys. Rev. E. arXiv preprint arXiv:2405.13232 (2024).
2. H Betar, D. Zarzoso, J. Varela, D. del-Castillo-Negrete, and L. Garcia, "Transport and losses of energetic particles in tokamaks in the presence of Alfvén activity using the new full orbit TAPaS code coupled to FAR3d." Submitted to Nuclear Fusion (2024).
3. C. Marini, E. Hollmann, S.W. Tang, J. Herfindal, D. Shiraki, R. Wilcox, D. del-Castillo-Negrete, M. Yang, N. Eidietis, and M. Hoppe, "Runaway electron plateau current profile reconstruction from synchrotron imaging and Ar-II line polarization angle measurements in DIII-D". Accepted for publication in Nuclear Fusion (2024).
4. M. Beidler, D. del-Castillo-Negrete, D. Shiraki, E. Hollmann, C. Lasnier, and L. Baylor, "Wall Heating by Subcritical Energetic Electrons Generated by the Runaway Electron Avalanche Source". Accepted for publication in Nuclear Fusion (2024).
5. M. Yang, P. Wang, D. del-Castillo-Negrete,Y. Cao and G. Zhang, "A pseudo-reversible normalizing flow for stochastic dynamical systems with various initial conditions." arXiv preprint arXiv:2306.05580. Submitted to SIAM journal of Scientific Computing (2023).
6. M. Yang, G. Zhang, D. del-Castillo-Negrete, and Y.Cao, "A probabilistic scheme for semilinear nonlocal diffusion equations with volume constrains." SIAM Journal of Numerical Analysis **61**, (6), 2718-2743 (2023).
7. J. Varela, D. A. Spong, L. Garcia, Y. Ghai, D. Zarzoso, D. del-Castillo-Negrete, H. Betar, J. Ortiz-Luengo, D. C. Pace, M. A. Van Zeeland, X. Du, R. Sanchez, V. Tribaldos, and J. M. Reynolds-Barredo, "Effect of the neutral beam injector operational regime on the Alfven eigenmode saturation phase in DIII-D plasma." Plasma Physics and Controlled Nuclear Fusion **65** (12), 125004 (2023).
8. M. Yang, D. del-Castillo-Negrete, G. Zhang, and M. Beidler, "A divergence-free constrained magnetic field interpolation for scattered data." Physics of Plasmas **30**, 033901 (2023).
9. B. S. Cornille, M. T. Beidler, S. Munaretto, B. E. Chapman, D. Del-Castillo-Negrete, N. C. Hurst, J. S. Sarff, and C. R. Sovinec, "Computational study of runaway electrons in MST tokamak discharges with applied resonant magnetic perturbations." Phys. Plasmas **29**, 052510 (2022).
10. D. Zarzoso, D. del-Castillo-Negrete, R. Lacroix, P-E. Bernard, and S.Touzet, "Transport and losses of fusion-born alpha particles in the presence of tearing modes using the new Toroidal Accelerated Particle Simulator (TAPaS)." Plasma Phys. Contol. Fusion **64** 044003 (2022).
11. B. Kadoch, D. del-Castillo-Negrete, W.J.T. Bos, and K. Schneider, "Lagrangian conditional statistics and flow topology in edge plasma turbulence." *Physics of Plasmas* **29**, 102301 October 12, (2022).

12. C. Paz-Soldan, C. Reux, K. Aleynikova, P. Aleynikov, V. Bandaru, M. Beidler, N. Eidietis, Y.Q. Liu, C. Liu, A. Lvovskiy, S. Silburn, L. Bardoczi, L. Baylor, I. Bykov, D. Carnevale, D. Del-Castillo Negrete, X. Du, O. Ficker, S. Gerasimov, M. Hoelzl, E. Hollmann, S. Jachmich, S. Jardin, E. Joffrin, C. Lasnier, M. Lehnen, E. Macusova, A. Manzanares, G. Papp, G. Pautasso, Z. Popovic, F. Rimini, D. Shiraki, C. Sommariva, D. Spong, S. Sridhar, G. Szepes, and C. Zhao, "A Novel Path to Runaway Electron Mitigation via Deuterium Injection and Current-Driven MHD Instability". Nucl. Fusion **61** 116058 (2021).
13. Ž. Popović, E.M. Hollmann, D. Del-Castillo-Negrete, I. Bykov, R.A. Moyer, J.L. Herfindal, D. Shiraki, N.W. Eidietis, C. Paz-Soldan, A. Lvovskiy. "Polarized imaging of visible synchrotron emission from runaway electron plateaus in DIII-D." Phys. Plasmas **28**, 082510 (2021).
14. M. Yang, G. Zhang, D. del-Castillo-Negrete, and M. Stoyanov, "A Feynman-Kac based numerical method for the exit time probability of a class of transport problems." Journal of Computational Physics **444**, 110564 (2021).
15. Renato Calleja, Diego del-Castillo-Negrete, David Martinez-del-Rio, Arturo Olvera, "A new method to compute periodic orbits in general symplectic maps." *Commun. Nonlinear Sci. Numer. Simulations* **99**, 105838 (2021).
16. M. T. Beidler, D. del-Castillo-Negrete, L. R. Baylor, D. Shiraki, and D. A. Spong, "Spatially-dependent modeling and simulation of runaway electron mitigation in DIII-D." *Physics of Plasmas* **27** 112507 (2020).
17. D. Zarzoso and D. del-Castillo-Negrete, "Anomalous losses of energetic particles in the presence of an oscillating radial electric field in fusion plasmas." Special issue on Invited talks at Sherwood Meeting. *Journal of Plasma Physics* **86** (2), 795860201 (2020).
18. L. Carbajal, D. del-Castillo-Negrete, and J. Martinell, "Runaway Electron Transport in Stochastic Toroidal Magnetic Fields." Physics of Plasmas **27**, 032502 (2020).
19. C. Paz-Soldan , N. W. Eidietis, E. M. Hollmann, P. Aleynikov, L. Carbajal, W.W. Heidbrink, M. Hoppe, C. Liu, A. Lvovskiy, D. Shiraki, D. Spong, D. P. Brennan, C. M. Cooper, D. del-Castillo-Negrete, X. Du, O. Embreus, T. Fulop, J. Herfindal, R. Moyer, P. Parks and K. E. Thome, "Recent advances in runaway electron measurements and model validation". *Nucl. Fusion* **59,** 066025 (2019).
20. D. del-Castillo-Negrete, L. Carbajal, D. Spong and V. Izzo, "Numerical simulation of runaway electrons: 3D effects on synchrotron radiation and impurity based runaway current dissipation." Invited paper APS-DPP. *Phys. Plasmas* **25**, 056104 (2018).
21. D. Zarzoso, D. del-Castillo-Negrete, D.F. Escande, Y. Sarazin, X. Garbet, V. Grandgirard, C. Passeron, G. Latau and S. Benkadda, "Particle transport due to energetic-particle-driven geodesic acoustic modes". *Nucl. Fusion* **58,** 106030 (2018).
22. E. Hirvijoki, C. Liu, G. Zhang, D. del-Castillo-Negrete and D. Brennan, "A fluid-kinetic framework for self-consistent runaway-electron simulation". *Phys. of Plasmas* **25**, 062507 (2018).
23. N. Kryukov, J. Martinell and D. del-Castillo-Negrete, "Finite Larmor radius effects on **E**x**B** weak turbulence transport". *J. Plasma Phys* **84,** 905840301 (2018).

24. L. Carbajal and D. del-Castillo-Negrete, "On the synchrotron emission in kinetic simulations of runaway electrons in magnetic confinement fusion plasmas". Invited paper, Sherwood International Fusion Theory Conference. *Plasma Phys. and Control. Fusion* **59**, 124001 (2017).
25. L. Carbajal, D. del-Castillo-Negrete, D. Spong, S. Seal and L. Baylor, "Space dependent, full orbit effects on runaway electron dynamics in tokamak plasmas". *Physics of Plasmas* **24**, 042512 (2017).
26. R. Calleja, D. del-Castillo-Negrete, D. Martinez-del-Rio and A. Olvera, "Global transport in a non-autonomous periodic standard map". *Commun. Nonlinear Sci. Numer. Simulations* **51**,198-215 (2017).
27. G. Zhang and D. del-Castillo-Negrete, "A backward Monte-Carlo method for time-dependent runaway electron simulations". *Physics of Plasmas* **24**, 092511 (2017).
28. H. Hernandez-Coronado, M. Coronado and D. del-Castillo-Negrete, "Anomalous transport in the presence of time-dependent, anisotropic diffusion". *Journal of Mexican Physical Society (Rev. Mex. Fis.)* **63**, 40-48 (2017).
29. D. del-Castillo-Negrete and D. Blazevski, "Modulated heat pulse propagation and partial transport barriers in chaotic magnetic fields" *Phys. of Plasmas* **23**, 042505 (2016).
30. J. Fonseca, D. del-Castillo-Negrete, I.M. Sokolov and I.L. Caldas, "A statistical study of gyro-averaging effects in a reduced model of drift-wave turbulence". *Physics of Plasmas* **23**, 082308 (2016).
31. D. Gamborino, D. del-Castillo-Negrete and J. Martinell, "Multiscale statistical analysis of coronal solar activity". *Nonlin. Processes Geophys.,* **23**, 175-188 (2016).
32. S. Moradi, D. del-Castillo-Negrete and J. Anderson, "Charged particle dynamics in the presence of non-Gaussian Lévy electrostatic fluctuations". *Phys. of Plasmas* **23**, 090704 (2016).
33. S. Ogawa, B. Cambon, X. Leoncini, M. Vittot, D. del-Castillo-Negrete, G. Dif-Pradalier and X. Garbet, "Full particle effects in regular and stochastic magnetic fields". *Physics of Plasmas* **23**, 072506 (2016).
34. D. Martinez, and D. del-Castillo-Negrete, A. Olvera and R. Calleja, "Self-consistent chaotic transport in a high-dimensional mean-field Hamiltonian map model". *Qualitative Theory of Dynamical Systems* **14**, 313-335 (2015).
35. D. del-Castillo-Negrete and D. Blazevski, "Heat pulse propagation in chaotic three-dimensional magnetic fields". *Nuclear Fusion* **54**, 064009 (2014).
36. D. del-Castillo-Negrete, "Front propagation in reaction-diffusion systems with anomalous diffusion." *Bulletin Mexican Mathematical Society* **20**, 87-105 (2014).
37. J. Fonseca, D. del-Castillo-Negrete and I.L. Caldas, "Area-preserving maps models of gyroaverage ExB chaotic transport". *Physics of Plasmas* **21**, 092310 (2014).
38. L. Chacon, D. del-Castillo-Negrete and C.D. Hauck, "An asymptotic-preserving semi-Lagrangian algorithm for the time-dependent anisotropic heat transport equation". *Journal of Computational Physics*, **272,** 719-746 (2014).
39. D. Blazevski and D. del-Castillo-Negrete "Local and non-local anisotropic transport in reversed shear magnetic fields: shearless Cantori and non-diffusive transport". *Phys. Rev. E* **87**, 063106 (2013).

40. J. Martinell and D. del-Castillo-Negrete, "Gyroaverage effects on chaotic transport by drift waves in zonal flows". *Phys. of Plasmas* **20**, 022303 (2013).
41. A. Kullberg, D. del-Castillo-Negrete, G.J. Morales and J.E. Maggs, "Isotropic model of nonlocal transport in two-dimensional bounded domains". *Phys. Rev. E* **87**, 052115 (2013).
42. D. del-Castillo-Negrete and L. Chacon, "Parallel heat transport in integrable and chaotic magnetic fields". *Phys. of Plasmas* **19**, 056112 (2012).
43. D. del-Castillo-Negrete and J. Martinell, "Gyroaverage effects on nontwist Hamiltonians: separatrix reconnection and chaos suppression". *Communications in Nonlinear Science and Numerical Simulation* **17**, 2031-2044 (2012).
44. S. Futatani, D. del-Castillo-Negrete, X.Garbet, S. Benkadda and N. Dubuit, "Self-consistent dynamics of impurities in magnetically confined plasmas: turbulence intermittency and non-diffusive transport". *Phys. Rev. Letters* **109**, 185005 (2012).
45. A. Kullberg and D. del-Castillo-Negrete, "Transport in the spatially tempered fractional Fokker-Planck equation". *J. Phys. A: Math. Theor*. **45**, 255101 (2012).
46. L. Carbajal, D. del-Castillo-Negrete and J. J. Martinell, "Dynamics and transport in mean-field coupled, many degrees-of-freedom, area-preserving nontwist maps". *CHAOS* **22**, 013137 (2012).
47. D. R. Hatch, D. del-Castillo-Negrete and P. W. Terry, "Analysis and compression of six-dimensional gyrokinetic datasets using higher order singular value decomposition". *Journal of Computational Physics* **231**, 4234-4256 (2012).
48. D. del-Castillo-Negrete and L. Chacon, "Local and nonlocal parallel transport in general magnetic fields". *Phys. Rev. Letters* **106**, 19, 195004 (2011).
49. B. Kadoch, D. del-Castillo-Negrete, W.J.T. Bos and K. Schneider, "Lagrangian statistics and flow topology in forced two-dimensional turbulence". *Phys. Rev. E* **83**, 036314 (2011).
50. S. Futatani, W.J.T. Bos, D. del-Castillo-Negrete, K. Schneider, S. Benkadda and M. Farge, "Coherent Vorticity Extraction in Resistive Drift-wave Turbulence: Comparison of Orthogonal Wavelets versus Proper Orthogonal Decomposition". *Comptes Rendus Physique* **12**, 123-131 (2011).
51. D. del-Castillo-Negrete, "Non-diffusive, non-local transport in fluids and plasmas". Nonlin. *Processes Geophys*. **17**, 795-807 (2010).
52. R. Nguyen, D. del-Castillo-Negrete, K. Schneider, M. Farge and G. Chen, "Wavelet-based density estimation for noise reduction in plasma simulations using particles". *Journal of Computational Physics* **229**, 2821–2839 (2010).
53. D. del-Castillo-Negrete, "Truncation effects in superdiffusive front propagation with Lévy flights". *Phys. Rev. E* **79**, 031120 (2009).
54. I. Sandberg, S. Benkadda, X. Garbet, G. Ropokis, K. Hizanidis and D. del-Castillo-Negrete, "Universal Probability Distribution Function for Bursty Transport in Plasma Turbulence". *Phys. Rev. Lett.* **103**, 165001 (2009).
55. V. Naulin, J. Juul Rasmussen, P. Mantica and D. del-Castillo-Negrete, "Fast Heat Pulse Propagation by Turbulence Spreading". *J. Plasma Fusion Res*. SERIES, Vol. **8**, 55 (2009).
56. S. Futatani, S. Benkadda and D. del-Castillo-Negrete, "Spatio-temporal multi-scaling analysis of impurity transport in plasma turbulence using proper orthogonal decomposition". *Phys. of Plasmas* **16**, 042506-042506-12 (2009).

57. D. del-Castillo-Negrete, V.Yu. Gonchar and A.V. Chechkin, “Fluctuation-driven directed transport in the presence of Lévy flights”. *Physica A* **27**, 6693-6704. (2008).
58. D. del-Castillo-Negrete, D.A. Spong, and S.P. Hirshman, “Proper orthogonal decomposition methods for noise reduction in particle-based transport calculations”. *Phys. of Plasmas* **15**, 092308 (2008).
59. D. del-Castillo-Negrete, P. Mantica, V. Naulin and J. Rasmussen, “Fractional diffusion models of non-local perturbative transport: numerical results and applications to JET experiments”. *Nuclear Fusion* **48**, 75009 (2008).
60. K. Gustafson, D. del-Castillo-Negrete and W. Dorland, “Finite Larmor radius effects on non-diffusive tracer transport in a zonal flow”. *Phys. of Plasmas* **15**, 102309 (2008).
61. D. del-Castillo-Negrete, S.P. Hirshman, D.A. Spong and E.F. D'Azevedo, “Compression of magnetohydrodynamic simulation data using singular value decomposition”. *J. Comp. Phys.* **222**, 265 (2007).
62. A. Cartea and D. del-Castillo-Negrete, “Fluid limit of the continuous-time random walk with general Levy jump distribution functions”. *Phys. Rev. E.* **76**, 041105 (2007).
63. A. Cartea and D. del-Castillo-Negrete, “Fractional diffusion models of option prices in markets with jumps”. *Physica A* **374** (2) 749-763 (2007).
64. D. del-Castillo-Negrete, “Fractional diffusion models of nonlocal transport”. *Phys. of Plasmas* **13**, 082308 (2006).
65. J.J. Martinell, D. del-Castillo-Negrete, A.C. Raga and D.A. Williams, “Non-local diffusion and the chemical structure of molecular clouds”. *Mon. Not. R. Astron. Soc.,* **372**, 213 (2006).
66. D. del-Castillo-Negrete, “Coherent structures and self-consistent chaos in the resonant wave-particle interaction”. *Plasma Phys. and Controlled Fusion* **47**,1-11 (2005).
67. D. del-Castillo-Negrete, B.A. Carreras and V. Lynch, “Non-diffusive transport in plasma turbulence: a fractional diffusion approach”. *Phys. Rev. Lett.* **94**, 065003 (2005).
68. D. del-Castillo-Negrete, B.A. Carreras, and V. Lynch, “Fractional diffusion in plasma turbulence”. *Phys. of Plasmas* **11**, 3854-3864 (2004).
69. D. del-Castillo-Negrete, B.A. Carreras and V.E. Lynch, “High confinement modes with radial structures”. *Plasma Phys. and Control. Fusion* **46** A105-A112 (2004).
70. A.E. Hubbard, B.A. Carreras, N.P. Basse, D. del-Castillo-Negrete, J.W. Hughes, A. Lynn, E.S. Marmar, D. Mossessian, P. Phillips and S. Wukitch, “Local threshold conditions and fast transition dynamics of the L-H transition on Alcantor C-Mod”. *Plasma Physics and Controlled Fusion* **46**, A95 (2004).
71. D. del-Castillo-Negrete, B.A. Carreras and V. Lynch, “Front dynamics in reaction-diffusion systems with Levy flights: A fractional diffusion approach”. *Phys. Rev. Lett*. **91**, (1), 018302, (2003).
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89. D. del-Castillo-Negrete, J.M. Greene and P.J. Morrison, "Renormalization and transition to chaos in area preserving nontwist maps". *Physica D* **100**, 311-329, (1997).
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91. D. del-Castillo-Negrete, J.M. Greene and P.J. Morrison, "Area preserving nontwist maps: periodic orbits and transition to chaos". *Physica D* **91**, 1-23, (1996)

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Book Chapters

1. M. Yang, G. Zhang, D. del-Castillo-Negrete, M. Stoyanov, and M. Beidler, "A sparse-grid probabilistic approximation of the runaway probability of electrons in fusion tokamak simulations". Book chapter. Springer Verlag Lecture Notes on CS&E (2021).
2. D. del-Castillo-Negrete, "Anomalous transport in the presence of truncated Levy flights." Chapter in *Fractional Dynamics. Recent Advances*. Edited by J. Klafter, S.C. Lim, and R. Metzler. World Scientific, Singapore (2011).
3. D. del-Castillo-Negrete, "Fractional diffusion: fundamentals, numerical methods and applications." Chapter in *Anomalous Transport: Foundations and Applications.* Edited by G. Radons, R. Klages and I.M. Sokolov, Wiley-VCH (Weinheim) (2008).
4. D. del-Castillo-Negrete, "Dynamics and self-consistent chaos in a mean field Hamiltonian model". Chapter in *Dynamics and Thermodynamics of Systems with Long Range Interactions*, edited by T. Dauxois, S. Ruffo, E. Arimondo, and M. Wilkens. Lecture Notes in Physics Vol. 602, Springer (2002).

Publications in proceedings

1. H. Betar, D. Zarzoso, J. Varela and D. del-Castillo-Negrete, "Full-orbit Toroidal Accelerated PArticle Simulator (TAPAS) to Study the Transport and Losses of Energetic Particles in Fusion Devices: Coupling with Far3D code." Proceedings of the 49th EPS Conference on Plasma Physics July 2023.
2. T. Beidler, D. del-Castillo-Negrete, E. M. Hollmann, D. Shiraki, and L. R. Baylor, "Wall Heating by Subcritical Energetic Electrons Generated By the Runaway Electron Avalanche Source" Proceedings of the 29th IAEA Fusion Energy Conference (2023).
3. D. Zarzoso, H. Betar, D. del Castillo Negrete, and J. Varela, "Transport and losses of fusion-born alpha particles in the presence of MHD instabilities: from HPC simulations to Artificial Intelligence" Proceedings of the 29th IAEA Fusion Energy Conference (2023).
4. L.F. Delgado-Aparicio, et al., "Runaway seed formation and growth in low density Tokamak scenarios at the Madison Symmetric Torus (MST). Proceedings of the 29th IAEA Fusion Energy Conference (2023).
5. D. del-Castillo-Negrete, et al., "Generation and mitigation of runaway electrons: spatio-temporal effects in dynamic scenarios". *IAEA. Proceedings. 28th Int. Conference*. IAEA-CN-286/101. Online (2021).
6. D. Zarzoso, D. del-Castillo-Negrete, et al., "Towards the prediction and quantification of energetic particle transport and losses in fusion plasmas". *IAEA. Proceedings. 28th Int. Conference*. IAEA-CN-1105. Remote online (2021).

7. M. T. Beidler, D. del-Castillo-Negrete, et al., “Model Validation and Comparative Studies of Runaway Electron Dissipation by Impurity Injection in DIII-D and JET Using KORC”. *IAEA. Proceedings c. 28th Int. Conference*. IAEA-CN-286/713. Online (2021).
8. C. Paz-Soldan, Y.Q. Liu, C. Reux, D. del-Castillo-Negrete, et al., “A novel path to runaway electron mitigation via current-driven EX-S kink instability”. *IAEA. Proceedings. 28th Int. Conference*. IAEA-CN-286/EX/5-2. Remote online Online (2021).
9. Eric Nardon, et al., “Theory and Modelling activities in support of the ITER Disruption Mitigation System”. *Proceedings. 28th Int. Conference*. IAEA-CN-1479. Remote online Online (2021).
10. M Graham Lopez, Adam McDaniel, David L Green, Diego Del-Castillo-Negrete, Ed F D’Azevedo, Wael Elwasif, Hao Lu, Lin Mu, B Tyler McDaniel, and Timothy R Younkin, “Implementing an Adaptive Sparse Grid Discretization (ASGarD) for High Dimensional Advection-Diffusion Problems on Exascale Architectures”. SC19 Denver, CO (2019).
11. D. del-Castillo-Negrete, J. D. Lore, G. Zhang, S. Seal, L. Carbajal and D. A. Spong, “Integrated Simulation of Runaway Electrons: A Backward Monte Carlo Approach for a Fluid-Kinetic Self-Consistent Coupling”. *IAEA. Proc. 27th Int. Conference*. IAEA-CN-258-374 TH/P8-19 Ahmedabar, India (2018).
12. D. del-Castillo-Negrete, L. Carbajal, C. Paz-Soldan, E.M. Hollmann, R.A. Moyer and C.J. Lasnier, “Pitch angle dynamics and synchrotron emission of runaway electrons in quiescent and disruptive DIII-D plasmas”. *IAEA. Proc. 27nd Int. Conference*. IAEA-CN-258-674 TH/4-3 Ahmedabar, India (2018).
13. D. del-Castillo-Negrete and D. Blazevski, “Modulated heat pulse propagation and partial transport barriers in 3-dimensional chaotic magnetic fields”. *IAEA. Proc. 26nd Int. Conference*. TH/P3-22 Kyoto, Japan (2016).
14. D. del-Castillo-Negrete, L. Chacón and D. Blazevski, “Anisotropic heat transport in integrable and chaotic magnetic fields”. *IAEA. Proc. 24nd Int. Conference*. TH/P2-29 San Diego, USA (2012).
15. D. del-Castillo-Negrete, D. Blazevski and L. Chacón, “Anisotropic heat transport in magnetized plasmas”. *Proceedings 39th EPS Plasma Physics Conference*, Stockholm, Sweden (2012).
16. J. Martinell and D. del-Castillo-Negrete, “Finite Larmor Radius Effects on Transport Barriers in plasmas zonal flows”. *Proceedings 39th EPS Plasma Physics Conference*, Stockholm, Sweden (2012).
17. B. Kadoch, D. del-Castillo-Negrete, W.J.T. Boss and K. Schneider, “Influence of flow topology on Lagrangian statistics in two-dimensional turbulence”. Proceedings of 13th European Turbulence Conference. Warsaw, Poland (2011).
18. D. del-Castillo-Negrete, N. Tamura and S. Inagaki, “Non-local transport modeling of heat transport in the LHD”. *IAEA. Proc. 23nd Int. Conference*. Daejon, Rep. f Korea (2010).
19. D. del-Castillo-Negrete, “Non-local transport in the presence of internal transport barriers”. *Proceedings 37th EPS Plasma Physics Conference*, Dublin, Ireland (2010).

20. D. del-Castillo-Negrete and J. J. Martinell, "Transport suppression in non-monotonic zonal flows including finite Larmor radius". *Proceedings 37th EPS Plasma Physics Conference*, Dublin, Ireland (2010).
21. D. del-Castillo-Negrete, "Non-diffusive transport in fusion plasmas: fractional diffusion approach". Chapter in the proceedings of the *First ITER Summer School: Turbulent Transport in Fusion Plasmas* Edited by Sadri Benkadda, AIP Conference Proceedings, Vol.1013 (2008).
22. D. del-Castillo-Negrete, P. Mantica, V. Naulin and J.J. Rasmussen, "Non-local models of perturbaive transport: numerical results and applications to JET experiments". *IAEA. Proc. 22nd Int. Conference*. Geneve, (2008).
23. M. Vlad, F. Spineau, S. Benkadda, S. Futatani, X. Garbet and D. del-Castillo-Negrete, "Nonlinear dynamics of impurities in turbulent tokamak plasmas". *IAEA. Proc. 22nd Int. Conference.* Geneve, (2008).
24. K. Gustafson, I. Broemstrup, D. del-Castillo-Negrete, W. Dorland and M. Barnes, "Self-consistent particle tracking in a simulation of the entropy mode in a Z pinch". *Proceedings of the joint Varenna-Lausanne international workshop*. Varena (Italy) AIP Conference Proceedings Volume 1069. Edited by O. Sauter, X. Garbet, and E. Sindoni (2008).
25. D. del-Castillo-Negrete, P. Mantica, V. Naulin, J.J. Rassmussen and JET EFDA contributors, "Non-locality and perturbative transport". *Proceedings 34nd EPS Plasma Physics Conference*, Warsaw, Poland (2007).
26. D. del-Castillo-Negrete, "Fractional diffusion models of transport in magnetically confined plasmas". *Proceedings 32nd EPS Plasma Physics Conference*, Tarragona, Spain (2005).
27. D. del-Castillo-Negrete, B.A. Carreras and V. Lynch, "Non-diffusive transport in 3-D, pressure-driven plasma turbulence". Proceedings of the 20th IAEA Fusion Energy Conference. (2004).
28. D. del-Castillo-Negrete and J.M. Finn, "The modified drift-Poisson model: analogies with geophysical flows and Rossby waves". In *Non-neutral Plasma Physics III*, ed. John J. Bollinger, et.al. American Institute of Physics (1999).
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30. D. del-Castillo-Negrete, W.R. Young and N.J. Balmforth, "Vorticity Dynamics in shear flow". Woods Hole Oceanographic Institution technical report WHOI-96-09. In Proceedings of the *1995 Summer Study Program in Geophysical Fluid Dynamics*, edited by Rick Salmon, and Glen Flierl (1995).
31. D. del-Castillo-Negrete, "A study of a shell model of fully developed turbulence". Woods Hole Oceanographic Institution technical report WHOI-94-12. In Proceedings of the 1*993 Summer School on Geophysical Fluid Dynamics,* edited by Rick Salmon (1993).
32. D. del-Castillo-Negrete and P.J. Morrison, "Hamiltonian chaos and transport in quasigeostrophic flows". In *Research Trends in Physics: Chaotic Dynamics and Transport in Fluids and Plasmas,* edited by I. Prigogine, etal. (AIP, New York, 1993).

INVITED TALKS

2024

1. *SISSA, International School of Advanced Studies*. Trieste, Italy. Fractional Calculus Seminar Series. Online/Virtual. Invited talk: "Fractional diffusion models of nonlocal turbulent transport in plasmas and fluids." May 31, 2024.
2. *Sherwood Fusion Theory Conference.* Missoula, MT. Invited talk: "A generative artificial intelligence surrogate model of plasma turbulence." May 6-8, 2024.
3. *ICERM, Brown University*. Nonlocality: Challenges in Modeling and Simulation workshop. Invited talk: "A Feynman-Kac probabilistic approach for the computation of nonlocal transport." April 15-19, 2024.

2023

4. *Trends in Hamiltonian systems, chaos and its applications workshop*. Marseille, France. Invited talk: "A Feynman-Kac based method for the computation of local and nonlocal anisotropic transport in magnetized plasmas." May 30-June 1, 2023.
5. *SIAM Conference on Applications of Dynamical Systems*. Mini symposium on Dynamical Systems Approaches to Active Mixing. Portland, OR. Invited talk: "Self-Consistent Dynamics of Charged Particles as an Active Mixing Problem." May 14-18, 2023.
6. *Aix Marseille University*. Marseille, France. Plasma physics seminar: "What's wrong with the diffusion equation? Nonlocal models of anomalous transport." June 14, 2023.
7. *Aalto University.* Helsinki, Finland. Plasma physics seminar: "A Feynman-Kac based method for the computation of local and nonlocal anisotropic transport in magnetized plasmas." June 20, 2023.
8. *University of Tennessee Knoxville*. Department of Mathematics. Probability Seminar: "A Feynman-Kac based method for the computation of the exit time probability of local and nonlocal transport problems." March 28, 2023.
9. *ORNL Computer Sciences and Mathematics Division*. Mathematics in Computation (MiC) Talk Series. Invited seminar: "A Feynman-Kac based method for the computation of the exit time probability of local and nonlocal transport problem." April 27, 2023.
10. *University of Wisconsin, Madison*. Physics Department. Seminar: "Modeling and simulation of runaway electrons: Production, dissipation and diagnostic." Feb. 17, 2022.

2022

11. *64th Annual Meeting of the APS Division of Plasma Physics*. Spokane, Washington. Invited talk: "A probabilistic approach for the computation of local and nonlocal transport." Oct. 17-21, 2022.

2021

12. *30th International Toki Conference on Plasma and Fusion Research*. Remote Conference. Invited talk: "A Feynman-Kac based probabilistic method for the computation of confinement and exit-time in plasma and fluid local and nonlocal transport problems." Nov. 18, 2021.

13. *SIAM Conference on Computational Science and Engineering*. MS253. Online. Invited talk: "The widening gap between the mathematics of fractional order operators and the physics of fractional transport." March 1- 5, 2021.
14. *Instituto de Física y Matemáticas Universidad Michoacana de San Nicolas*. Mexico. Online. Physics Colloquium: "Some physics and mathematics problems inspired by the study of magnetically confined plasmas." April 30, 2021.

2020

15. *IAEA Technical Meeting on Plasma Disruptions and their Mitigation.* Virtual meeting. Talk: "Modeling and simulation of runaway electrons: Spatiotemporal effects in dynamic scenarios." July 20-23, 2020.
16. *SIAM Conference on Mathematics of Data Science* (MDS20). Cincinnati, Ohio. Virtual meeting. Invited talk: "A machine-learning-based method to accelerate collisional transport calculations in plasmas." May 5 - 8, 2020,
17. *Princeton Plasma Physics Laboratory.* Experts and Insights, speaker series. Hispanic Heritage Month. Online. Invited talk: "Some physics and mathematics problems inspired by the study of magnetically confined plasmas." Sep. 16, 2020.
18. *Yeshiva University.* Department of Mathematics. Online. Mathematical Physics Seminar: "A Feynman-Kac based numerical method for the exit time probability of a class of transport problems." Nov.18, 2020.

2019

19. *61st APS-DPP Meeting*. "Mini-conference "Non-equilibrium transport, interfaces and mixing in plasmas." Fort Lauderdale, FL. Invited talk: "Non-diffusive asymmetric transport of energetic particles in fusion plasmas." Oct. 21-25, 2019.
20. *43rd Annual Meeting SIAM Southeastern Atlantic Section*, Knoxville, TN. Invited talk: "Non-local transport in fluid and plasma physics systems." Sep. 21-22, 2019.
21. *US-EU Transport Task Force Meeting*. Austin, TX. Invited talk: "Modeling and simulation of runaway electrons." March 18-21, 2019.

2018

22. *Mathematics Science Research Institute (MSRI)*. Berkeley, CA. Workshop on Hamiltonian system, from topology to applications through analysis. Invited talk: "Plasma Physics inspired Hamiltonian dynamics problems." Nov. 26-30, 2018.
23. *Princeton Plasma Physics Laboratory.* Theory and Simulation of Disruptions Workshop. Princeton, NJ. Talk: "Validation of runaway electron models using synchrotron radiation measurements and fill-orbit simulations." July 16-18, 2018.
24. *International Sherwood Fusion Theory Conference.* Auburn, AL. Invited talk: "Production rate of runaway electrons in dynamic scenarios: a probabilistic backward Monte-Carlo method." April 23-25, 2018.
25. *27th IAEA Fusion Energy Conference.* Ahmedabad. India. Invited talk: "Pitch angle dynamics and synchrotron emission of runaway electrons in quiescent and disruptive DIII-D plasmas." Oct. 25, 2018.
26. *6th Runaway Electron Meeting (REM)*. Prague, Czech Republic. Invited talk: "Production rate of runaway electrons in dynamics scenarios: a probabilistic backward Monte Carlo method." June 28-30, 2018.

27. *International Congress on Plasma Physics (ICPP)*. Vancouver, Canada. Invited talk: "Relativistic runaway electrons in magnetically confined fusion plasmas." June 4-8, 2018.
28. *University of Maryland.* College Park, MD. Department of Physics. Plasma Physics Seminar: "Full-orbit and backward Monte Carlo simulation of runaway electrons." March 6, 2018.
29. *University of Maryland*. College Park, MD. Department of Mathematics. Numerical Analysis Seminar: "Nonlocal transport modeling: statistical foundations and applications." March 7, 2018.

2017

30. *Modeling, Analysis and Numerics for Nonlocal Applications meeting*. Santa Fe, NM. Invited talk: "Introduction to anomalous diffusion models and applications." Dec. 11-15, 2017.
31. *59th Annual Meeting of the American Physical Society, Division of Plasma Physics Meeting*. Milwaukee, WI. Invited talk: "Full-orbit and backward Monte Carlo simulation of runaway electrons." October 23-27, 2017.
32. *Princeton Plasma Physics Laboratory.* Theory and Simulation of Disruptions Workshop. Princeton, NJ. Talk: "Simulation of runaway electrons: orbit effects, synchrotron emission and backward Monte-Carlo method." July 17-19, 2017.
33. *Institute of Pure and Applied Mathematics (IPAM).* Workshop on Beam Dynamics. UCLA, Los Angeles, CA. Invited talk: "A mean-field model of collective effects in beam dynamics." Jan. 23-27, 2017.
34. *SIAM Conference on Computational Sciences and Engineering*. Mini-symposium on Nonlocal Models. Atlanta, GA. Invited talk: "Nonlocal transport in bounded domains." Feb. 27-March 3, 2017.
35. *16th Latin American Workshop on Plasma Physics. LAWPP 2017*. Mexico City, Mexico. Plenary talk: "Runaway Electrons in Magnetically Confined Fusion Plasmas." Sep. 4-8, 2017.
36. *Centre de Physique Theorique, Aix-Marseille Universite.* Marseille, France. Quantum and Classical Dynamics Seminar: "Fractional diffusion in finite size domains." June 21, 2017.
37. *ITER office. Cadarache, France.* Physics Division Seminar: "Full-orbit effects on runaway electron dynamics and synchrotron emission in tokamak plasmas." July 6, 2017.
38. *Institute of Applied Mathematics and Systems (IIMAS)*. Universidad Nacional Autonoma de Mexico (UNAM). Applied Mathematics Colloquium: "Nonlocal transport in bounded domains." May 17, 2017.
39. *Institute of Applied Mathematics and Systems (IIMAS)*. Universidad Nacional Autónoma de México (UNAM). Special Colloquium: "Nonlocal models of anomalous transport." September 27, 2017.
40. *Georgia Institute of Technology.* Department of Mathematics. CDSNS Colloquium: "Nonlocal transport in bounded domains." March 3, 2017.

2016

41. *18th International Congress on Plasma Physics*. Kaohsiung, Taiwan. Invited talk: "Modulated heat pulse propagation and partial transport barriers in 3-D stochastic fields." June 27-July 1, 2016.
42. *Princeton Plasma Physics Laboratory.* Theory and Simulation of Disruptions Workshop. Princeton, NJ. Talk: "Full-orbit effects in the dynamics of runaway electrons in toroidal plasmas." July 20-22, 2016.
43. *National Institute for Fusion Science.* Toki, Japan. LHD Physics Meeting presentation: "Modulated heat pulse propagation and partial transport barriers in 3-dimensional chaotic magnetic fields." June 13, 2016.

2015

44. *First Pan American Congress on Computational Mechanics*. Buenos Aires, Argentine. Invited talk: "Fractional diffusion models of nonlocal transport in bounded domains." April 27-29, 2015.
45. *Chaos, Complexity and Transport CCT15 Workshop*. Le Pharo, Marseille, France. Invited talk: "Hamiltonian mean-field models of self-consistent chaos: the single-wave model." June 1-5, 2015.
46. *Pan-American Congress on Computational Mechanics - PANACM 2015*. Buenos Aires, Argentine. Mini-symposium: *Nonlocal Models for Mechanics and Diffusion.* Invited talk: "Nonlocal models of anomalous transport in bounded domains." April 27-29, 2015.
47. *University of Texas at Austin.* Department of Physics. Colloquium: "What is wrong with the diffusion equation? Nonlocality and anomalous transport." September 23, 2015.
48. *Institute for Computational Sciences and Engineering (ICES).* University of Texas at Austin. Applied Mathematics Group. Center for Numerical Analysis Group Series. Mini-course (four, 1 ½ hours lectures) on "Nonlocal Transport Modeling: fundamental, applications and numerical methods." Sep. 22, 24, 29 and Oct.1, 2015.
49. *Oak Ridge National Laboratory.* Computational and Applied Mathematics seminar: "Nonlocal models of anomalous transport." April 9, 2015.
50. *Institute for Fusion Studies*. University of Texas at Austin. Seminar: "Self-consistent chaos in large degree-of-freedom Hamiltonian systems." April 3, 2015.
51. *Institute for Fusion Studies.* University of Texas at Austin. Seminar: "A Lagrangian-Green's function approach to anisotropic heat transport in 3-D chaotic magnetic fields." April 2, 2015.
52. *University of Tennessee, Knoxville.* Department of Mathematics. PDE Seminar: "Nonlocal models of anomalous transport: an overview." Jan. 15, 2015.

2014

53. *2014 International Conference on Fractional Differentiation and its Applications*. Catania, Italy. Invited talk: "Fractional diffusion models of nonlocal transport in bounded domains." June 23-25, 2014.
54. *Boulder Dynamics Conference in Honor of Jim Meiss'60th Birthday*. Boulder, CO. Invited talk: "Hamiltonian mean-field models of self-consistent chaos: the single-wave model." July 21-25, 2014.

55. *Michigan State University*. Department of Mathematics. Lansing, MI. QUPED Seminar: "Nonlocal transport: statistical basis and applications." Oct. 7, 2014.

2013

56. *12º Brazilian Meeting on Plasma Physics- Challenges and Future of Plasma Physics in Brazil*. University of Brasilia, Brasilia, Brazil. Invited talk: "Nonlocal transport in plasma physics." Dec. 1-5, 2013.
57. *Workshop on Fractional Calculus, Probability and Non-local Operators: Applications and Recent Developments."* Basque Center for Applied Mathematics. Bilbao, Spain. Remote participation. Invited talk: "Applications of fractional calculus to non-diffusive, non-local transport in plasmas and fluids." Nov. 6-8, 2013.
58. *Annual Meeting of the Division of Plasma Physics of the American Physical Society*. Denver, CO. *Mini-conference 'Mixing in Fusion Plasmas.* Invited talk: "Non-local transport in the presence of transport barriers." Nov. 11-15, 2013.
59. *International Symposium on Fractional PDEs: Theory, Numerics and Applications.* Newport, RI. Invited talk: "Tempered fractional diffusion." June 3-5, 2013.
60. *SIAM meeting on Applications of Dynamical Systems*. Mini-symposium: Recent Developments in KAM Theory. Snowbird, UT. Invite talk: "Periodic orbits and transition to chaos in many-degrees of freedom, mean-field Hamiltonian systems." May 19-23, 2013.
61. *Workshop on Uncovering Transport Barriers in Geophysical Flo*ws. Banff International Research Station (BIRS). Banff, Canada. Invited talk: "Transport barriers and coherent structures in mean-field Hamiltonian systems." Sep. 22-27, 2013.
62. *Workshop on Plasma Physics and Controlled Nuclear Fusion.* Institute for Nuclear Sciences. UNAM Mexico City, Mexico. Invited talk: "Parallel Heat Transport in Stochastic Magnetic Fields." April 11-12, 2013.
63. *6th International Workshop on Stochasticity in Fusion Plasmas.* Julich, Germany. Invited talk: "Anisotropic, local and non-local, heat transport in stochastic magnetic fields." March 18-21, 2013.
64. *Georgia Institute of Technology.* Department of Mathematics. Seminar: "Fractional calculus and Lévy statistics in non-diffusive transport modeling." April 25, 2013.
65. *Columbia University*. Plasma Physics Seminar: "Tensor product decomposition methods for data compression and noise reduction." March 26, 2013.
66. *Princeton Plasma Physics Laboratory*. Princeton University, NJ. Theory Seminar: "Nonlocal effective transport models of nondiffusive transport." March 14, 2013.
67. *Washington State University.* Department of Mathematics. Seminar: "Tensor product decomposition methods for noise reduction, data compression, multi-scale analysis, and projective integration." Feb. 26, 2013.
68. *Michigan State University.* Department of Mathematics. Seminar: "Non-local models of anomalous transport." Feb. 12, 2013

2012

69. *GFD Summer Study Program, Woods Hole Oceanographic Institution*. Woods Hole, MA. Seminar: "Non-local models of anomalous transport." July 31, 2012.
70. *Institute for Pure and Applied Mathematics (IPAM) UCLA.* Workshop on Computational Challenges in Magnetized Plasmas. Los Angeles, CA. Invited talk:

"Tensor product decomposition methods for noise reduction, data compression, multi-scale analysis and projective integration." April 16, 2012.

71. *Universidad Carlos III.* Madrid, Spain. Department of Mathematics. Seminar: "Non-local models of anomalous transport in the presence of Lévy flights." March 23, 2012.
72. *Georgia Institute of Technology*. Department of Mathematics. CDSNS Colloquium: "Non-local models of anomalous transport." Feb. 20, 2012.
73. *Oak ridge National Laboratory.* ORNL FEST Seminar: "Recent developments on transport theory, numerical computation, and modeling." Feb. 8, 2012.
74. *Universidad Carlos III.* Madrid, Spain. Department of Mathematics. Seminar: "Non-local models of anomalous transport in the presence of Lévy flights." March 23, 2012.

2011

75. *The Abdus Salam International Centre for Theoretical Physics.* Turbulent Mixing and Beyond. Third International Conference. Trieste, Italy. Invited talk: "Nonlocal Transport." 21-28 August 2011.
76. *Max Planck Institute*. Dresden, Germany. Conference Weak Chaos, Infinite Ergodic Theory and Anomalous Dynamics. Invited talk: "Anomalous transport in the presence of truncated Levy flights." Aug. 1-5, 2011.
77. *Lorentz Center*. Leiden, Netherlands. Workshop on Coherent Structures in Dynamical Systems. Invited talk: "Coherent Structures and Self-consistent Chaotic Transport." May 16-20, 2011.
78. *APS DPP Meeting.* Salt Lake City, UT. Invited talk: "Local and Nonlocal Parallel Heat Transport in General Magnetic Fields." Nov. 14-18, 2011.
79. *SIAM Conference on Applications of Dynamical Systems*. Minisymposium on Nontwist Hamiltonian systems. Snowbird, UT. Invited talk: "Gyroaverage effects on separatrix reconnection and destruction of shearless KAM barriers in non-twist systems." May 22-26, 2011.
80. *Lawrence Livermore National Lab.* Video remote presentation: "Anisotropic heat transport in general magnetic fields with local and non-local parallel flux closures." Dec. 8, 2011.
81. *University of Wisconsin at Madison*. Department of Physics. Seminar: "Nonlocal effective transport models of nondiffusive transport." Dec. 5, 2011.
82. *University of Wisconsin at Madison.* Department of Physics. Seminar: "Tensor product decomposition methods for data compression, noise reduction, and projective integration." Dec. 4, 2011.
83. *Massachusetts Institute of Technology.* Plasma Science and Fusion Center. Seminar: "Non-diffusive, non-local transport in plasmas." April 7, 2011.

2010

84. *International Congress on Plasma Physics (ICPP)*. Santiago, Chile. Invited talk: "Nonlocal transport in plasmas". August 8-13, 2010.
85. *CPES Spring all-hands meeting*. Annapolis, MD. Invited talk: "Tensor product decomposition methods for data processing." April 11-12, 2010.
86. *ORNL-UTK Numerical Day*. Oak Ridge TN. Invited talk: "Tensor product decomposition methods for data processing in particle-based computations." April 28, 2010.

87. 8th *Nonlinear Waves Workshop*. San Diego, CA. Invited talk: "Non-local models of non-diffusive transport." Feb. 2010.
88. *Courant Institute of Mathematical Sciences. New York University.* Magneto-Fluid Seminar: "Proper Orthogonal Decomposition Methods for Numerical Simulations: Noise Reduction, Projective Integration, and Data Compression." Feb. 15, 2010.

2009

89. *19th International Toki Conference*. Toki, Japan. Invited talk: "Models of non-diffusive, non-local transport in fusion plasmas." Dec. 8-11, 2009.
90. *Non-local Effects in Pattern-Forming Systems*. Haifa, Israel. Invited talk: "Truncated Levy flights in fractional diffusion and superdiffusive front propagation." June 16-22, 2009.
91. *University of Tennessee, Knoxville*. Department of Mathematics. Probability and Statistics Seminar: "Fractional diffusion models: statistical basis and applications." Oct. 12, 2009.
92. *Institute of Applied Mathematics and Systems Colloquium*. UNAM, Mexico City, Mexico. Seminar: "Projective integration of stochastic differential equations in collisional transport." April 15, 2009.
93. *Institute of Nuclear Sciences Seminar*. UNAM, Mexico City, Mexico. Seminar: "Applications of proper orthogonal decomposition methods to plasma physics." April 14, 2009.
94. *University of California Los Angeles.* Department of Physics and LAPD Seminar: "Non-local Models of Non-diffusive Transport." Feb. 9, 2009.
95. *University of California Los Angeles.* Department of Physics Seminar: "Proper Orthogonal Decomposition Methods for Particle Based Transport Computations." Feb. 10, 2009.

2008

96. *Solvay Workshop: A tribute to Prof. Radu Balescu.* Brussels, Belgium. Invited talk: "Fractional diffusion models of non-diffusive transport in plasmas." March 6-8, 2008.
97. *Dynamics Days 2008 Conference.* Knoxville, TN. *Invited talk* "A review of some dynamical systems problems in plasma physics." Jan. 3-6, 2008.
98. *Northwestern University.* Department of Applied Mathematics. Colloquium*:* "Fractional diffusion models of anomalous transport." April 14. 2008.
99. *University of Tennessee, Knoxville.* Department of Applied Mathematics. Seminar: "Front dynamics in reaction diffusion systems with fractional diffusion." Feb. 18, 2008.

2007

100. *34th EPS Conference on Plasma Physics.* Warsaw, Poland. Invited talk: "Non-locality and perturbative transport." July 2-6, 2007.
101. *First ITER Summer School: Turbulent Transport in Fusion Plasmas.* Aix-en-Provence, France. Invited talk: "Non-diffusive transport in fusion plasmas: a fractional diffusion approach." July 16-20, 2007.
102. *Culham Science Centre.* Annual Workshop of JET Task Force. Abingdon United Kingdom. Talk: "Fractional diffusion and fast pulse propagation." Jan. 22-26, 2007.

103. *SIAM Conference on Applications of Dynamical Systems*. Mini-symposium on Nonlinear Dynamics in Systems with Anomalous Diffusion. Snowbird, UT. Invited talk: "Fractional Diffusion Models of Anomalous Transport in Finite Size Domains." 27 May 28-June 1, 2007.
104. *Ecole Centrale de Marseille*. France. Laboratory of Modeling and Numerical Simulation seminar: "Fractional diffusion in plasma turbulence." Oct. 2007.
105. *UNAM.* México City. Institute of Nuclear Sciences Seminar: "Fractional diffusion in plasma turbulence." Aug. 2007.

2006

106. *Workshop on Anomalous Transport: Experimental Results and Theoretical Challenges.* Bad Honnef, Germany. Invited talk: "Fractional diffusion models of anomalous transport: theory and applications." July 12-16, 2006.

2005

107. *32nd EPS Conference on Plasma Physics.* Tarragona, Spain. Talk: "Fractional diffusion models of transport in magnetically confined plasmas." June 27 – July 1, 2005.
108. *SIAM Conference on Applications of Dynamical Systems*. Minisymposium on Chaotic advection and anomalous diffusion in reactive flows. Snowbird, UT. Invited talk: "Front dynamics in reaction-diffusion systems with anomalous diffusion." May 22-26, 2005.
109. *Institute of Mathematics University of Mexico* (UNAM) Mexico City, Mexico. Four lectures course on: "Fractional calculus: basic theory and applications." Aug. 15-17, 2005.
110. *ITAM*. Department of Applied Mathematics. México City. Seminar. August 2005.
111. *Institute of Nuclear Sciences.* UNAM, México City. Seminar: "Fractional diffusion in plasma turbulence." Aug. 2005.
112. *University of Provence.* France. Complex Systems Dynamics group. Seminar. June 2005.

2004

113. *20th IAEA Fusion Energy Conference.* Vilamoura, Portugal. Invited talk: "Non-diffusive transport in 3-D, pressure-driven plasma turbulence." Nov. 1-6, 2004.
114. *12th International Congress of Plasma Physics.* Nice, France. Invited talk: "Coherent structures and self-consistent chaos in the resonant wave-particle interaction." Oct. 25-29, 2004.
115. *International Sherwood Fusion Theory Conference.* Missoula, MT. Invited talk: "Non-diffusive transport in plasma turbulence: a fractional diffusion approach." April 26-28, 2004.
116. *CMG Workshop: Non-Gaussian Tracer Distributions, Ocean Flows, and Mixing.* University of North Carolina, Chapel Hill, NC. Invited talk: "Fractional diffusion models of anomalous transport." May 17-18, 2004.
117. *Oak Ridge National Laboratory.* OFES remote theory seminar: "Fractional diffusion in plasma turbulence." Sep. 16, 2004.

118. *Bucknell University*. Department of Physics. Seminar: "Beyond Brownian motion: anomalous diffusion in fluids and plasmas." Sept. 2004.
119. *Institute of Nuclear Sciences*. UNAM, México City. Seminar: "Fractional diffusion in plasma turbulence." June 2004.

2003

120. *Mexican Physical Society, IX Meeting of the Division of Fluid Dynamics.* México City, México. Invited talk: "Anomalous diffusive transport in fluids and plasmas." Nov. 2003.
121. *College of William and Mary*. Dept. of Physics. Colloquium: "Diffusive transport in fluids and plasmas: a fractional diffusion approach." Nov. 2003.
122. *University of Wisconsin-Madison.* Dept. of Physics. Seminar: "Fractional diffusion in reaction-diffusion systems and plasmas." Nov. 2003.
123. *UNAM, Cuernavaca, México*. Center for Physical Sciences seminar. Sept. 2003.
124. *UNAM, México City*. Institute of Physics seminar. Sept. 2003.
125. *UNAM, México City*. Institute of Nuclear Sciences seminar. Sept. 2003.
126. *UNAM, México City*. Institute of Applied Mathematics and Systems seminar. Sept. 2003.
127. *UNAM, Morelia, México*. Institute of Mathematics seminar. Sept. 2003.
128. *University of North Carolina, Chapel Hill*. Department of Math. seminar. April 2003.

2002

129. *Max Planck Institute for Complex Systems.* Active Flow Workshop. Dresden, Germany. Invited talk: "Fractional diffusion transport models of front propagation." Aug. 26-30, 2002.
130. *Max Planck Institute for Complex Systems*. Active Flow Workshop. Dresden, Germany Invited talk: "Cross-diffusion, a pattern forming mechanism in the absence of Turing instabilities." Sep. 02-06, 2002.
131. *Les Houches School on Dynamics and Thermodynamics of Systems with Long Range Interactions.* Les Houches, France. Invited talk: "Mean-field dynamics of marginal stable fluids and plasmas." Feb. 18-22, 2002.
132. *APS-DPP Mini-Conference Hamiltonian and Lagrangian Methods in Fluids and Plasmas. A celebration of Allan Kaufman's 75th birthday.* Orlando, FL. Invited talk: "Self-consistent chaos in a mean field Hamiltonian model of fluids and plasmas." Nov. 14, 2002

2001

133. *Los Alamos National Laboratory.* International workshop on Active Chaotic Flow. Invited talk: "A mean-field model of active chaotic transport." May 29-31, 2001.
134. *Georgia Institute of Technology.* Department of Physics seminar. Nov. 2001.
135. *Emory University*. Department of Physics seminar. Sept. 2001.
136. *Duke University*. Department of Physics seminar. April 2001.
137. *Brown University*. Department of Applied Mathematics seminar Feb. 2001.

2000

138. *International workshop on Chaotic Transport and Complexity.* Carry le Route, France. Invited talk: "Mean-field models of self-consistent chaotic transport in fluids and plasmas." June 26-30, 2000.
139. *American Geophysical Union, Spring Meeting.* Washington, DC. Invited talk: "Asymmetric chaotic transport by coherent structures: anomalous diffusion and Lévy statistics." May 30- June 3, 2000.
140. *Universidad Carlos III.* Madrid, Spain. Department of Physics seminar. July 2000.
141. *UNAM, México City.* Institute of Physics seminar. July 2000.
142. *Los Alamos National Laboratory*. PT-Colloquium. April 2000.

1999

143. *International Conference on Statistical Mechanics and Strongly Correlated Systems.* University of Rome. "La Sapienza", Italy. Invited talk: "Self-consistent transport in fluids and plasmas." Sep. 27-29, 1999.
144. *American Physical Society, 41st Annual Meeting of the Division of Plasma Physics.* Seattle, WA. Invited talk: "Transport in zonal flows in analogous geophysical and plasma systems." Nov.15-19, 1999.

1998

145. *UNAM, México City*. Institute of Physics seminar. April 1998.
146. *Los Alamos National Laboratory*. Theoretical Division seminar. April 1998.
147. *UNAM, México City*. Institute of Applied Mathematics and Systems. April 1998.
148. *Los Alamos National Laboratory*. T-15 Plasma Theory Division seminar. April 1998.
149. *UNAM, México City*. Institute of Nuclear Sciences seminar. April 1998.
150. *Eotvos Institute for Theoretical Physics University Budapest.* Hungary. Four lectures course on: "Dynamics and chaotic transport in rotating fluids." Oct. 18-26, 1998.
151. *University of Utah*. Department of Mathematics seminar. March 1998.

1997

152. *Workshop on Dynamical Systems and Statistical Mechanics Methods for Coherent Structures in Turbulent Flows*. University of California, Santa Barbara, CA. Invited talk: "Anomalous diffusion and Lévy flights in 2-dimensional fluids." Feb. 12-13, 1997.
153. *University of California San Diego*. Department of Physics seminar. Oct. 1997.
154. *CISESE, Ensenada, Mexico*. Department of Oceanography seminar. Feb 1997.
155. *University of California Los Angeles*. Department of Atmospheric Sciences. Jan. 1997.

1996

156. *Scripps Institution of Oceanography*. Physical Oceanography Division. May 1996.
157. *CISESE, Ensenada*. Department of Oceanography seminar. Mexico, March 1996.

158. *Northwestern University*. Department of Engineering and Applied Mathematics seminar. Jan. 1996.
159. *University of Chicago*. Department of Mathematics seminar. Jan 1996.

1995

160. *Scripps Inst. of Oceanography*. Division of Physical Oceanography seminar. Feb 1995.

1994

161. *University of Texas at Austin*. Department of Mathematics seminar. Oct. 1994.
162. *Los Alamos National Laboratory.* T-15 Plasma Theory Division seminar. May 1994.
163. *University of Chicago.* Department of Mathematics seminar. April 1994.
164. *CISESE, Ensenada.* Department of Oceanography seminar. Mexico, Jan 1994.

1993

165. *University of Texas at Austin.* Department of Physics seminar. March 1989.

CONTRIBUTED PRESENTATIONS AT MEETINGS 1992-2020
(including first author and co-author presentations)
Numbers on brackets denote number of presentations P=poster O= oral.

- APS, Division of Plasma Physics Meeting 1992[1P], 1993[1P], 1998[1P], 1999[3P], 2000[3P], 2001[2P], 2002[1O,2P], 2003[2P], 2004[1P], 2005[2P], 2007[2P], 2008[4P],2009[3P],2010[5P],2011[5P],2012[6P],2013[4P],2014[2P],2015[6P],2016[4P],2017[4P],2018[3P],2019[2O,3P],2020[2O,1P].
- International Sherwood Fusion Theory Conference 1992[1P], 1993[1P], 1998[1P], 2000[1P], 2001[2P], 2002[2P], 2003[2P], 2004[3P], 2005[1P], 2006[1P],2007[1P], 2008[2P],2010[1P],2012[1P],2013[1P],2015[1P],2016[2P],2017[2P],2018[2P], 2019[3P].
- US and US-EU Transport Task Force (TTF) Meeting 2001[1O], 2003[1O], 2004[1O], 2005[1O], 2006[1O], 2008[1O], 2009[1O],2014[1P].
- IAEA Fusion Energy Conference 2004[10],2008[2P],2010[1P], 2012[1P], 2016[1P],2018[2O,1P],2021[5P].
- EPS (European Physical Society) Plasma Physics Conference 2010[2P],2015[1P],2018[1P].
- International Congress on Plasma Physics 2008[2P],2014[1P],2016[1P].
- APS, Division of Fluid Dynamics Meeting 1991[1O], 1992[1O], 1996[1O], 1997[1O].
- SIAM Conference on Applications of Dynamical Systems 1995[1O], 1997[1O], 2001[1P], 2003[1O].
- Dynamics Days Meeting 1992[1P], 1994[1O], 2000[1P], 2001[1O,1P].
- International Toki Conference on Plasma and Fusion Research 2000[1P].
- APS, March Meeting 2002[2P].

- Summer Study Programs in Geophysical Fluid Dynamics. Woods Hole Oceanographic Inst. Woods Hole, MA 1998[1O], 1995[1O], 1993[1O].
- International conference Nanobiology Atlanta, GA 2001[1O].
- VII Latin American Workshop on Nonlinear Phenomena: Extended and out of Equilibrium Systems. Cocoyoc, Mexico 2001[1O,2P].
- IUPAP International Statistical Physics Cancun, Mexico. Conference STATPHYS21 2001[1O].
- Dynamics of Complex Systems Meeting. Fairbanks, AK 2001[1O].
- 1999 Workshop on Nonneutral Plasmas Princeton, NJ 1999[1O].
- Dynamics of interfaces, patters, and domains Los Alamos, NM 1999[1O].
- Ocean Predictability and Dynamical Systems Workshop. Woods Hole Oceanographic Inst. Woods Hole, MA 1996[1O].
- Joint Meeting American Math. Soc. and SMM. Guanajuato, México 1995[1O].
- Fenomec Workshop on Hamiltonian systems and nonlinear waves. UNAM, México City 1995[1O].
- V Latin American Workshop on Plasma Physics. UNAM, México City 1992[1O].
- International Workshop on Stability Fluctuations and Structures. UNAM, Cocoyoc, México 1992[1O].