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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". Advisor: P.J. Morrison.
- B.S. *Physics* Universidad Nacional Autónoma de México (1988).
  Thesis: "Symmetries of the Geodesic Equation and S-Equivalent Lagrangians". Advisor: S. Hojman.

WORK EXPERIENCE

- *Distinguished R&D 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

- 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).
- *Program Committee Member*, Magnetic Confinement Theory. APS-DPP 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. 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”. Submitted to Nuclear Fusion (2024).
2. 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.” Submitted to SIAM journal of Scientific Computing (2023).
3. 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).
4. 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).

5. 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).
6. 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).
7. 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).
8. 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).
9. 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).
10. 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).
11. 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).
12. 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).
13. 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).
14. 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).
15. L. Carbajal, D. del-Castillo-Negrete, and J. Martinell, “Runaway Electron Transport in Stochastic Toroidal Magnetic Fields.” Physics of Plasmas **27**, 032502 (2020).

16. 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).
17. 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).
18. 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).
19. 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).
20. 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).
21. 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).
22. 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).
23. 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).
24. G. Zhang and D. del-Castillo-Negrete, "A backward Monte-Carlo method for time-dependent runaway electron simulations". *Physics of Plasmas* **24**, 092511 (2017).
25. 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).
26. 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).
27. 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).
28. D. Gamborino, D. del-Castillo-Negrete and J. Martinell, "Multiscale statistical analysis of coronal solar activity". *Nonlin. Processes Geophys.,* **23**, 175-188 (2016).
29. 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).

30. 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).
31. 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).
32. D. del-Castillo-Negrete and D. Blazevski, "Heat pulse propagation in chaotic three-dimensional magnetic fields". *Nuclear Fusion* **54**, 064009 (2014).
33. D. del-Castillo-Negrete, "Front propagation in reaction-diffusion systems with anomalous diffusion." *Bulletin Mexican Mathematical Society* **20**, 87-105 (2014).
34. 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).
35. 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).
36. 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).
37. J. Martinell and D. del-Castillo-Negrete, "Gyroaverage effects on chaotic transport by drift waves in zonal flows". *Phys. of Plasmas* **20**, 022303 (2013).
38. 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).
39. D. del-Castillo-Negrete and L. Chacon, "Parallel heat transport in integrable and chaotic magnetic fields". *Phys. of Plasmas* **19**, 056112 (2012).
40. 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).
41. 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).
42. A. Kullberg and D. del-Castillo-Negrete, "Transport in the spatially tempered fractional Fokker-Planck equation". *J. Phys. A: Math. Theor*. **45**, 255101 (2012).
43. 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).
44. 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).
45. D. del-Castillo-Negrete and L. Chacon, "Local and nonlocal parallel transport in general magnetic fields". *Phys. Rev. Letters* **106**, 19, 195004 (2011).
46. 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).
47. 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).
48. D. del-Castillo-Negrete, "Non-diffusive, non-local transport in fluids and plasmas". Nonlin. *Processes Geophys*. **17**, 795-807 (2010).
49. 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).
50. D. del-Castillo-Negrete, "Truncation effects in superdiffusive front propagation with Lévy flights". *Phys. Rev. E* **79**, 031120 (2009).
51. 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).
52. 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).
53. 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).
54. 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).
55. 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).
56. 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).
57. 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).
58. 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).
59. 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).
60. A. Cartea and D. del-Castillo-Negrete, "Fractional diffusion models of option prices in markets with jumps". *Physica A* **374** (2) 749-763 (2007).
61. D. del-Castillo-Negrete, "Fractional diffusion models of nonlocal transport". *Phys. of Plasmas* **13**, 082308 (2006).
62. 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).
63. 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).

64. 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).
65. D. del-Castillo-Negrete, B.A. Carreras, and V. Lynch, "Fractional diffusion in plasma turbulence". *Phys. of Plasmas* **11**, 3854-3864 (2004).
66. 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).
67. 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).
68. 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).
69. V. Lynch, B.A. Carreras, D. del-Castillo-Negrete, K.M. Ferreira-Mejias and H.R. Hicks, "Numerical methods for the solution of partial differential equations of fractional order". *J. Comp. Phys*. **192**, 2, 406-421 (2003).
70. F. Cecconi, D. del-Castillo-Negrete, M. Falcioni and A. Vulpiani, "The origin of diffusion: the case of non-chaotic systems". *Physica D* **180** (3-4), 129-139 (2003).
71. G. Boffetta, D. del-Castillo-Negrete, C. Lopez, G. Pucacco and A. Vulpiani, "Diffusive transport and self-consistent dynamics in coupled maps". *Phys. Rev. E* **67**, 026224 (2003).
72. D. del-Castillo-Negrete, B.A. Carreras and V. Lynch, "Front propagation and segregation in a reaction-diffusion model with cross diffusion". *Physica D* **168-169**, 45-60 (2002).
73. D. del-Castillo-Negrete and M.C. Firpo, "Coherent structures and self-consistent transport in a mean field Hamiltonian model". *CHAOS* **12**, 496-507, (2002).
74. D. del-Castillo-Negrete and B.A. Carreras, "Stratified shear flows in a model of turbulence-shear flow interaction". *Phys. of Plasmas* **9**, (1), (2002).
75. J.M. Finn and D. del-Castillo-Negrete, "Lagrangian chaos and Eulerian chaos in shear flow dynamics". *CHAOS* **11**, (4), (2001).
76. C. Sovinec, J.M. Finn and D. del-Castillo-Negrete, "Formation and sustainment of electrostatically driven spheromaks in the resistive MHD model". *Phys. of Plasmas* **8**, (2), 475-490, (2001).
77. D. del-Castillo-Negrete, "Self-consistent dynamics in the Single Wave Model". *Physica A* **280**, 10-21 (2000).
78. D. del-Castillo-Negrete, "Chaotic transport in zonal flows in analogous fluid and plasma systems." Invited paper, APS-DPP. *Phys. of Plasmas* **7**, 1702-1711 (2000).
79. D. del-Castillo-Negrete, "Self-consistent chaotic transport in fluids and plasmas". *CHAOS*, **10**, 75-88 (2000).
80. J.M Finn, C. Sovinec and D. del-Castillo-Negrete, "Chaotic scattering and self-organization in spheromak sustainment". *Phys. Rev. Lett.* **85**, (21), 4538-4541, (2000).
81. J.M. Finn, D. del-Castillo-Negrete and D. Barnes, "Destabilization of the l=1 diocotron mode in nonneutral plasmas". *Phys. Rev. Lett.* **84**, (11), 2401-2404, (2000).

82. J.M Finn, D. del-Castillo-Negrete and D. Barnes "Compression effects in nonneutral plasmas, the shallow water analogy, and applications to the l=1 diocotron instability". *Phys. of Plasmas* **6**, (10), 3744-3758, (1999).
83. D. del-Castillo-Negrete, "Weakly nonlinear dynamics of electrostatic perturbations in marginally stable plasmas". *Phys. of Plasmas* **5**, 3886-3900 (1998).
84. D. del-Castillo-Negrete, "Nonlinear evolution of perturbations in marginally stable plasmas". *Phys. Letters A* **241**, 99-104 (1998).
85. D. del-Castillo-Negrete, "Asymmetric transport and non-Gaussian statistics of passive scalars in vortices in shear." *Phys. Fluids* **10**, 576-594 (1998).
86. 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).
87. N.J. Balmforth, D. del-Castillo-Negrete and W.R. Young "Dynamics of vorticity defects in shear". *J. Fluid Mech*. **333**, 197-230, (1997).
88. 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)
89. D. del-Castillo-Negrete and P.J. Morrison, "Chaotic Transport by Rossby Waves in Shear Flow". *Phys. Fluids A* **5**, 948-965, (1993)
90. D. del-Castillo-Negrete, and S. Hojman, "Symmetries of space-time and geodesic symmetries". *J. Math. Physics* **31**, (9), 2211-2216, (1990).

Book Chapters

1. M. Yang, G. Zhang, D. del-Castillo-Negrete, M. Stoyanov, and M. Beidler, "A sparse-grid probabilistics 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. L. Carbajal, D. del-Castillo-Negrete, 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).

29. Finn, J.M., D. del-Castillo-Negrete and D. Barnes, "The m=1 diocotron instability in single species plasmas". In *Non-neutral Plasma Physics III*, edited by John J. Bollinger, et.al. American Institute of Physics (1999).
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 PRESENTATIONS AT INTERNATIONAL (OUTSIDE THE USA) MEETINGS (as main, presenting author)

1. "A Feynman-Kac based method for the computation of local and nonlocal anisotropic transport in magnetized plasmas." Workshop on Trends in Hamiltonian systems, chaos and its applications. Marseille, France. May 30-June 1, 2023.
2. "A Feynman-Kac based probabilistic method for the computation of confinement and exit-time in plasma and fluid local and nonlocal transport problems." 30th International Toki Conference on Plasma and Fusion Research. Remote Conference. Nov. 18, 2021.
3. "Modeling and simulation of runaway electrons: Spatiotemporal effects in dynamic scenarios." *IAEA Technical Meeting on Plasma Disruptions and their Mitigation.* Virtual meeting. July 20-23, 2020.

4. "Pitch angle dynamics and synchrotron emission of runaway electrons in quiescent and disruptive DIII-D plasmas". *27th IAEA Fusion Energy Conference.* Ahmedabad. India. Oct. 25, 2018.
5. "Production rate of runaway electrons in dynamics scenarios: a probabilistic backward Monte Carlo method". *6th Runaway Electron Meeting (REM)*. Prague, Czech Republic. June 28-30, 2018.
6. "Relativistic runaway electrons in magnetically confined fusion plasmas". *International Congress on Plasma Physics (ICPP)*. Vancouver, Canada. June 4-8, 2018.
7. "Runaway Electrons in Magnetically Confined Fusion Plasmas". Plenary talk *16th Latin American Workshop on Plasma Physics. LAWPP 2017*. Mexico City, Mexico. September 4-8, 2017.
8. "Modulated heat pulse propagation and partial transport barriers in 3-D stochastic fields". *18th International Congress on Plasma Physics*. Kaohsiung, Taiwan. June 27-July 1, 2016.

9. "Fractional diffusion models of nonlocal transport in bounded domains". *First Pan American Congress on Computational Mechanics*. Buenos Aires, Argentine. April 27-29, 2015.
10. "Hamiltonian mean-field models of self-consistent chaos: the single-wave model". *Chaos, Complexity and Transport CCT15 Workshop*. Le Pharo, Marseille, France. June 1-5, 2015.
11. "Nonlocal models of anomalous transport in bounded domains". Mini-symposium: *Nonlocal Models for Mechanics and Diffusion. I Pan-American Congress on Computational Mechanics - PANACM 2015*. Buenos Aires, Argentine. April 27-29, 2015.
12. "Fractional diffusion models of nonlocal transport in bounded domains". *2014 International Conference on Fractional Differentiation and its Applications*. Catania, Italy. June 23-25, 2014.
13. "Nonlocal transport in plasma physics". *12º Brazilian Meeting on Plasma Physics-Challenges and Future of Plasma Physics in Brazil*. University of Brasilia, Brasilia, Brazil. December 1-5, 2013.
14. "Applications of fractional calculus to non-diffusive, non-local transport in plasmas and fluids". *Workshop on Fractional Calculus, Probability and Non-local Operators: Applications and Recent Developments."* Basque Center for Applied Mathematics. Bilbao, Spain. (Remote, Skype participation). November 6-8, 2013.
15. "Transport barriers and coherent structures in mean-field Hamiltonian systems". *Workshop on Uncovering Transport Barriers in Geophysical Flo*ws. Banff International Research Station (BIRS). Banff, Canada. September 22-27, 2013.
16. "Parallel Heat Transport in Stochastic Magnetic Fields". *Workshop on Plasma Physics and Controlled Nuclear Fusion.* Institute for Nuclear Sciences. UNAM Mexico City, Mexico. April 11-12, 2013.
17. "Anisotropic, local and non-local, heat transport in stochastic magnetic fields". *6th International Workshop on Stochasticity in Fusion Plasmas.* Julich, Germany. March 18-21, 2013.
18. "Nonlocal Transport". *Turbulent Mixing and Beyond. Third International Conference.* The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy. 21-28 August 2011.
19. "Anomalous transport in the presence of truncated Levy flights". *Weak Chaos, Infinite Ergodic Theory and Anomalous Dynamics*. Max Planck Institute, Dresden, Germany. August 1-5, 2011.
20. "Coherent Structures and Self-consistent Chaotic Transport". *Workshop on Coherent Structures in Dynamical Systems*. Lorentz Center, Leiden, Netherlands. May 16-20, 2011.
21. "Nonlocal transport in plasmas". *International Congress on Plasma Physics (ICPP)*. Santiago, Chile. August 8-13, 2010.
22. "Models of non-diffusive, non-local transport in fusion plasmas".*19th International Toki Conference* (ITC 19). Toki, Japan. December 8-11, 2009.
23. "Truncated Levy flights in fractional diffusion and superdiffusive front propagation". *Non-local Effects in Pattern-Forming Systems*. Haifa, Israel. June 16-22, 2009.
24. "Fractional diffusion models of non-diffusive transport in plasmas". *Solvay Workshop: A tribute to Prof. Radu Balescu* Brussels, Belgium. March 6-8, 2008.

25. "Non-locality and perturbative transport". *34th EPS Conference on Plasma Physics.* Warsaw, Poland. July 2-6, 2007.
26. "Non-diffusive transport in fusion plasmas: a fractional diffusion approach". *First ITER Summer School: Turbulent Transport in Fusion Plasmas.* Aix-en-Provence, France. July 16-20, 2007.
27. "Fractional diffusion and fast pulse propagation". *Annual Workshop of JET Task Force.* T Culham Science Centre Abingdon United Kingdom. January 22-26, 2007.
28. "Fractional diffusion models of anomalous transport: theory and applications". *Workshop on Anomalous Transport: Experimental Results and Theoretical Challenges.* Bad Honnef, Germany. July 12-16, 2006.
29. "Fractional diffusion models of transport in magnetically confined plasmas".*32nd EPS Conference on Plasma Physics.* Tarragona, Spain. June 27 – July 1, 2005.
30. "Non-diffusive transport in 3-D, pressure-driven plasma turbulence". *20th IAEA Fusion Energy Conference.* Vilamoura, Portugal. Nov. 1-6, 2004.
31. "Coherent structures and self-consistent chaos in the resonant wave-particle interaction". *12th International Congress of Plasma Physics.* Nice, France. Oct. 25-29, 2004.
32. "Anomalous diffusive transport in fluids and plasmas". *Mexican Physical Society, IX Meeting of the Division of Fluid Dynamics.* México City, México. Nov. 2003.
33. "Fractional diffusion transport models of front propagation". *Active Flow Workshop.* Max Planck Institute for Complex Systems, Dresden, Germany. Aug. 26-30, 2002.
34. "Cross-diffusion, a pattern forming mechanism in the absence of Turing instabilities". *Active Flow Workshop.* Max Planck Institute for Complex Systems, Dresden, Germany. Sep. 02-06, 2002.
35. "Mean-field dynamics of marginal stable fluids and plasmas". *Les Houches School on Dynamics and Thermodynamics of Systems with Long Range Interactions.* Les Houches, France. February 18-22, 2002.
36. "Mean-field models of self-consistent chaotic transport in fluids and plasmas". *International workshop on Chaotic Transport and Complexity.* Carry le Route, France. June 26-30, 2000.
37. "Self-consistent transport in fluids and plasmas". *International Conference on Statistical Mechanics and Strongly Correlated Systems.* University of Rome. "La Sapienza", Italy. September 27-29, 1999.

INVITED TALKS AT MEETINGS IN USA (as main, presenting author)

1. "Self-Consistent Dynamics of Charged Particles as an Active Mixing Problem." Mini symposium on Dynamical Systems Approaches to Active Mixing. SIAM Conference on Applications of Dynamical Systems. Portland, OR. May 14-18, 2023.
2. "A probabilistic approach for the computation of local and nonlocal transport." Invited talk. 64th Annual Meeting of the APS Division of Plasma Physics. Spokane, Washington. October 17-21, 2022.
3. "The widening gap between the mathematics of fractional order operators and the physics of fractional transport." SIAM Conference on Computational Science and Engineering. MS253. Online, March 1- 5, 2021.

1. "A machine-learning-based method to accelerate collisional transport calculations in plasmas." *SIAM Conference on Mathematics of Data Science* (MDS20). May 5 - 8, 2020, Cincinnati, Ohio. Changed to virtual meeting.
2. "Non-diffusive asymmetric transport of energetic particles in fusion plasmas". Mini-conference "Non-equilibrium transport, interfaces and mixing in plasmas." *61st APS-DPP Meeting*, Fort Lauderdale, FL. Oct. 21-25, 2019.
3. "Non-local transport in fluid and plasma physics systems." *43rd Annual Meeting SIAM Southeastern Atlantic Section*, Knoxville, TN. Sep. 21-22, 2019.
4. "Modeling and simulation of runaway electrons." *US-EU Transport Task Force Meeting*. Austin, TX. March 18-21, 2019.
5. "Plasma Physics inspired Hamiltonian dynamics problems." *Workshop on Hamiltonian system, from topology to applications through analysis*. Mathematics Science Research Institute (MSRI). Berkeley, CA. Nov. 26-30, 2018.
6. "Validation of runaway electron models using synchrotron radiation measurements and fill-orbit simulations." *Theory and Simulation of Disruptions Workshop*. Princeton Plasma Physics Laboratory. Princeton, NJ. July 16-18, 2018.
7. "Production rate of runaway electrons in dynamic scenarios: a probabilistic backward Monte-Carlo method." *International Sherwood Fusion Theory Conference*. Auburn, AL. April 23-25, 2018.
8. "Introduction to anomalous diffusion models and applications." *Modeling, analysis and Numerics for Nonlocal Applications meeting*. Santa Fe, NM. Dec. 11-15, 2017.
9. "Full-orbit and backward Monte Carlo simulation of runaway electrons." *59th Annual Meeting of the American Physical Society, Division of Plasma Physics Meeting*. Milwaukee, WI. October 23-27, 2017.
10. "Simulation of runaway electrons: orbit effects, synchrotron emission and backward Monte-Carlo method" *Theory and Simulation of Disruptions Workshop*. Princeton Plasma Physics Laboratory. Princeton, NJ. July 17-19, 2017.
11. "A mean-field model of collective effects in beam dynamics." *Institute of Pure and Applied Mathematics (IPAM) Workshop on Beam Dynamics*. UCLA, Los Angeles, CA. January 23-27, 2017.
12. "Nonlocal transport in bounded domains" *Mini-symposium on Nonlocal Models at SIAM Conference on Computational Sciences and Engineering*. Atlanta, GA. Feb. 27-March 3, 2017.
13. "Full-orbit effects in the dynamics of runaway electrons in toroidal plasmas." *Theory and Simulation of Disruptions Workshop*. Princeton Plasma Physics Laboratory. Princeton, NJ. July 20-22, 2016.
14. "Hamiltonian mean-field models of self-consistent chaos: the single-wave model." *Boulder Dynamics Conference in Honor of Jim Meiss'60th Birthday*. Boulder, CO. July 21-25, 2014.
15. "Non-local transport in the presence of transport barriers," *Mini-conference 'Mixing in Fusion Plasmas', Annual Meeting of the Division of Plasma Physics of the American Physical Society*. Denver, CO. November 11-15, 2013.
16. "Tempered fractional diffusion." *International Symposium on Fractional PDEs: Theory, Numerics and Applications.* Newport, RI. June 3-5, 2013.
17. "Periodic orbits and transition to chaos in many-degrees of freedom, mean-field Hamiltonian systems." *Mini-symposium: Recent Developments in KAM Theory.*

SIAM meeting on Applications of Dynamical Systems. Snowbird, UT. May 19-23, 2013.

18. "Non-local models of anomalous transport." *GFD Summer Study Program, Woods Hole Oceanographic Institution*. Woods Hole, MA. July 31, 2012.
19. "Tensor product decomposition methods for noise reduction, data compression, multi-scale analysis and projective integration." *Workshop on Computational Challenges in Magnetized Plasmas*. IPAM, Los Angeles, CA. April 16, 2012.
20. "Local and Nonlocal Parallel Heat Transport in General Magnetic Fields." *APS DPP Meeting*. Salt Lake City, UT. Nov. 14-18, 2011.
21. "Gyroaverage effects on separatrix reconnection and destruction of shearless KAM barriers in non-twist systems." *Minisymposium on Nontwist Hamiltonian systems. SIAM Conference on Applications of Dynamical Systems*. Snowbird, UT. May 22-26, 2011.
22. "Tensor product decomposition methods for data processing." *CPES Spring all-hands meeting*. Annapolis, MD. April 11-12, 2010.
23. "Tensor product decomposition methods for data processing in particle-based computations." *ORNL-UTK Numerical Day*. Oak Ridge TN. April 28, 2010.
24. "Non-local models of non-diffusive transport." 8th *Nonlinear Waves Workshop*. San Diego, CA. Feb. 2010.
25. "A review of some dynamical systems problems in plasma physics." *Dynamics Days 2008 Conference.* Knoxville, TN. January 3-6, 2008.
26. "Fractional Diffusion Models of Anomalous Transport in Finite Size Domains." *Minisymposium on Nonlinear Dynamics in Systems with Anomalous Diffusion. SIAM Conference on Applications of Dynamical Systems*. Snowbird, UT. 27 May 28-June 1, 2007.
27. "Front dynamics in reaction-diffusion systems with anomalous diffusion." *Minisymposium on Chaotic advection and anomalous diffusion in reactive flows. SIAM Conference on Applications of Dynamical Systems*. Snowbird, UT. 27 May 22-26, 2005.
28. "Non-diffusive transport in plasma turbulence: a fractional diffusion approach." *International Sherwood Fusion Theory Conference.* Missoula, MT. April 26-28, 2004.
29. "Fractional diffusion models of anomalous transport." *CMG Workshop: Non-Gaussian Tracer Distributions, Ocean Flows, and Mixing.* University of North Carolina, Chapel Hill, NC. May 17-18, 2004.
30. "Asymmetric chaotic transport by coherent structures: anomalous diffusion and Lévy statistics." *American Geophysical Union, Spring Meeting.* Washington, DC. May 30- June 3, 2000.
31. "Transport in zonal flows in analogous geophysical and plasma systems." *American Physical Society, 41st Annual Meeting of the Division of Plasma Physics.* Seattle, WA. November 15-19, 1999.
32. "Self-consistent chaos in a mean field Hamiltonian model of fluids and plasmas." *APS-DPP Mini-Conference Hamiltonian and Lagrangian Methods in Fluids and Plasmas. A celebration of Allan Kaufman's 75th birthday.* Orlando, FL. Nov. 14, 2002

33. "A mean-field model of active chaotic transport." *International workshop on Active Chaotic Flow.* Los Alamos, NM. May 29-31, 2001.
34. "Anomalous diffusion and Lévy flights in 2-dimensional fluids." *Workshop on Dynamical Systems and Statistical Mechanics Methods for Coherent Structures in Turbulent Flows*. University of California, Santa Barbara, CA. Feb. 12-13, 1997.

INVITED SEMINARS AND COLLOQUIA AT UNIVERSITIES (as main, presenting author)

1. D. del-Castillo-Negrete, "What's wrong with the diffusion equation? Nonlocal models of anomalous transport." Plasma physics seminar. Aix Marseille University. Marseille, France. June 14, 2023.
2. D. del-Castillo-Negrete, "A Feynman-Kac based method for the computation of local and nonlocal anisotropic transport in magnetized plasmas." Plasma physics seminar. Aalto University. Helsinki, Finland. June 20, 2023.
3. "A Feynman-Kac based method for the computation of the exit time probability of local and nonlocal transport problems." Probability Seminar, Department of Mathematics. University of Tennessee Knoxville. March 28, 2023.
4. "A Feynman-Kac based method for the computation of the exit time probability of local and nonlocal transport problem." Mathematics in Computation (MiC) Talk Series. ORNL Computer Sciences and Mathematics Division. April 27, 2023.
5. "Modeling and simulation of runaway electrons: Production, dissipation and diagnostic." Plasma Group Meeting. Physics Department. University of Wisconsin, Madison. February 17, 2022.
6. "Some physics and mathematics problems inspired by the study of magnetically confined plasmas". Physics Colloquium. Instituto de Física y Matemáticas Universidad Michoacana de San Nicolas, Mexico. Online. April 30, 2021.
7. "Some physics and mathematics problems inspired by the study of magnetically confined plasmas". *Experts and Insights, speaker series. Hispanic Heritage Month. Princeton Plasma Physics Laboratory.* Online September. 16, 2020. https://sites.google.com/pppl.gov/Hispanic-heritage.
8. "A Feynman-Kac based numerical method for the exit time probability of a class of transport problems". Mathematical Physics Seminar Department of Mathematics Yeshiva University. Online. November 18, 2020.
9. "Full-orbit and backward Monte Carlo simulation of runaway electrons". Plasma Physics Seminar, Department of Physics, University of Maryland at College Park, MD. March 6, 2018.
10. "Nonlocal transport modeling: statistical foundations and applications". Numerical Analysis Seminar, Department of Mathematics, University of Maryland at College Park, MD. March 7, 2018.
11. "Fractional diffusion in finite size domains". Quantum and Classical Dynamics Seminar Centre de Physique Theorique, Aix-Marseille Universite. Marseille, France. June 21, 2017.
12. "Full-orbit effects on runaway electron dynamics and synchrotron emission in tokamak plasmas." ITER office, Physics Division Seminar. France. July 6, 2017.

13. "Nonlocal transport in bounded domains." Applied Mathematics Colloquium. Institute of Applied Mathematics and Systems (IIMAS) Universidad Nacional Autonoma de Mexico (UNAM). May 17, 2017.
14. "Nonlocal models of anomalous transport." Special Colloquium. Institute of Applied Mathematics and Systems (IIMAS) Universidad Nacional Autónoma de México (UNAM). September 27, 2017.
15. "Nonlocal transport in bounded domains." Department of Mathematics, CDSNS Colloquium. Georgia Tech. March 3, 2017.
16. "Modulated heat pulse propagation and partial transport barriers in 3-dimensional chaotic magnetic fields." LHD Physics Meeting. NIFS Japan. June 13, 2016.
17. "What is wrong with the diffusion equation? Nonlocality and anomalous transport." Physics Colloquium. University of Texas at Austin. September 23, 2015.
18. Mini-course (four, 1 ½ hours lectures) on "Nonlocal Transport Modeling: fundamental, applications and numerical methods." Applied Mathematics Group. Center for Numerical Analysis Group Series. ICES, University of Texas at Austin. Sep. 22, 24, 29 and Oct.1 (2015).
19. "Nonlocal models of anomalous transport." Computational and Applied Mathematics seminar. Oak Ridge National Laboratory. April 9, 2015.
20. "Self-consistent chaos in large degree-of-freedom Hamiltonian systems" Institute for Fusion Studies. University of Texas at Austin. April 3, 2015.
21. "A Lagrangian-Green's function approach to anisotropic heat transport in 3-D chaotic magnetic fields." VIP Seminar. Institute for Fusion Studies. University of Texas at Austin. April 2, 2015.
22. "Nonlocal models of anomalous transport: an overview." PDE Seminar. Department of Mathematics. University of Tennessee, Knoxville. January 15, 2015.
23. "Nonlocal transport: statistical basis and applications." QUPED Seminar. Department of Mathematics. Michigan State University. Lansing, MI. Oct. 7, 2014.
24. "Fractional calculus and Lévy statistics in non-diffusive transport modeling." Department of Mathematics Seminar. Georgia Institute of Technology. April 25, 2013.
25. "Tensor product decomposition methods for data compression and noise reduction." Plasma Physics Seminar. Columbia University. March 26, 2013.
26. D. Del-Castillo-Negrete, "Nonlocal effective transport models of nondiffusive transport." Theory Seminar. Princeton Plasma Physics Laboratory. Princeton University, NJ. March 14, 2013.
27. "Tensor product decomposition methods for noise reduction, data compression, multi-scale analysis, and projective integration." Department of Mathematics Seminar. Washington State University. Feb. 26, 2013.
28. "Non-local models of anomalous transport". Department of Mathematics Seminar. Michigan State University. Feb. 12, 2013
29. "Non-local models of anomalous transport in the presence of Lévy flights." Department of Mathematics Seminar, Universidad Carlos III, Madrid, Spain. March 23, 2012.
30. "Non-local models of anomalous transport." Department of Mathematics, CDSNS Colloquium. Georgia Institute of Technology, Feb. 20, 2012.
31. "Recent developments on transport theory, numerical computation, and modeling."

ORNL FEST Seminar, Oak ridge National Laboratory, Feb. 8, 2012.

32. "Non-local models of anomalous transport in the presence of Lévy flights." Department of Mathematics, Universidad Carlos III. Madrid, Spain. March 23, 2012.
33. "Anisotropic heat transport in general magnetic fields with local and non-local parallel flux closures." Video remote conference. Lawrence Livermore National Lab. Dec. 8, 2011.
34. "Nonlocal effective transport models of nondiffusive transport." Department of Physics. University of Wisconsin at Madison. December 5, 2011.
35. "Tensor product decomposition methods for data compression, noise reduction, and projective integration." University of Wisconsin at Madison. December 4, 2011.
36. "Non-diffusive, non-local transport in plasmas." Plasma Science and Fusion Center Seminar. Massachusetts Institute of Technology. April 7, 2011.
37. "Proper Orthogonal Decomposition Methods for Numerical Simulations: Noise Reduction, Projective Integration, and Data Compression." *Magneto-Fluid Seminar,* Courant Institute, New York University. Feb. 15, 2010.
38. "Fractional diffusion models: statistical basis and applications." *Probability and Statistics Seminar, Department of Mathematics.* University of Tennessee, Knoxville, Oct. 12, 2009.
39. "Projective integration of stochastic differential equations in collisional transport." *Institute of Applied Mathematics and Systems Colloquium*. UNAM, Mexico City, Mexico, April 15, 2009.
40. "Applications of proper orthogonal decomposition methods to plasma physics." *Institute of Nuclear Sciences Seminar*. UNAM, Mexico City, Mexico. April 14, 2009.
41. "Non-local Models of Non-diffusive Transport." *Department of Physics and LAPD Seminar.* University of California Los Angeles, Feb. 9, 2009.
42. "Proper Orthogonal Decomposition Methods for Particle Based Transport Computations." *Department of Physics Seminar.* University of California Los Angeles, Feb. 10, 2009.
43. "Fractional diffusion models of anomalous transport." *Department of Applied Mathematics Colloquium.* Northwestern University, April 14. 2008.
44. "Front dynamics in reaction diffusion systems with fractional diffusion." *Department of Applied Mathematics* seminar. University of Tennessee, Knoxville. UT Knoxville. Feb. 18, 2008.
45. "Fractional diffusion in plasma turbulence." *Laboratory of Modeling and Numerical Simulation* seminar. Ecole Centrale de Marseille, France. October 2007.
46. "Fractional diffusion in plasma turbulence," *Institute of Nuclear Sciences* Seminar. UNAM, México City, August 2007.
47. *Institute of Applied Mathematics and Systems* Seminar. UNAM, México City, Aug. 2007.
48. "Fractional calculus: basic theory and applications." Four lectures course presented at the *Institute of Mathematics* of the University of Mexico (UNAM) Mexico City, Mexico. Aug. 15-17, 2005.
49. *Department of Applied Mathematics* Seminar. ITAM, México City, August 2005.
50. "Fractional diffusion in plasma turbulence." *Institute of Nuclear Sciences.* UNAM, México City, August 2005.

51. *Complex Systems Dynamics group* seminar. University of Provence, France, June 2005.
52. "Fractional diffusion in plasma turbulence." *Oak Ridge National Laboratory* OFES remote theory seminar. September 16, 2004.
53. "Beyond Brownian motion: anomalous diffusion in fluids and plasmas." Department of Physics Seminar. *Bucknell University*, Sept. 2004.
54. "Fractional diffusion in plasma turbulence." Institute of Nuclear Sciences Seminar. UNAM, México City, June 2004.
55. "Diffusive transport in fluids and plasmas: a fractional diffusion approach." *Dept. of Physics* Colloquium. College of William and Mary, Nov. 2003.
56. "Fractional diffusion in reaction-diffusion systems and plasmas." *Dept. of Physics* Seminar. University of Wisconsin-Madison, Nov. 2003.
57. *Center for Physical Sciences* seminar. UNAM, Cuernavaca, México, Sept. 2003.
58. *Institute of Physics* seminar. UNAM, México City, Sept. 2003.
59. *Institute of Nuclear Sciences* seminar. UNAM, México City, Sept. 2003.
60. *Institute of Applied Mathematics and Systems* seminar. UNAM, México City, Sept. 2003.
61. *Institute of Mathematics* seminar. UNAM, Morelia, México, Sept. 2003.
62. *Department of Mathematics* seminar. University of North Carolina, Chapel Hill. April 2003.
63. *Department of Physics* seminar. Georgia Tech. Nov. 2001.
64. *Department of Physics* seminar. Emory University, Sept. 2001.
65. *Department of Physics* seminar. Duke University, April 2001.
66. *Department of Applied Mathematics* seminar Brown University, Feb. 2001.
67. *Department of Physics* seminar. Universidad Carlos III, Madrid, Spain, July 2000.
68. *Institute of Physics* seminar. UNAM, México City, July 2000.
69. *PT-Colloquium*, Los Alamos National Laboratory, April 2000.
70. *Institute of Physics* seminar. UNAM, México City, April 1998.
71. *Theoretical Division* seminar. Los Alamos National Laboratory, April 1998.
72. *Institute of Applied Mathematics and Systems*. UNAM, México City, April 1998.
73. *T-15 Plasma Theory Division* seminar. Los Alamos National Laboratory, April 1998.
74. *Institute of Nuclear Sciences* seminar. UNAM, México City, April 1998.
75. "Dynamics and chaotic transport in rotating fluids." Four lectures course presented at the *Eotvos Institute for Theoretical Physics* University Budapest, Hungary. Oct. 18-26, 1998.
76. *Department of Mathematics* seminar. University of Utah, March 1998.
77. *Department of Physics* seminar. University of California San Diego, Oct. 1997.
78. *Department of Oceanography* seminar. CISESE, Ensenada, Mexico, Feb 1997.
79. *Department of Atmospheric Sciences*. University of California LA Jan. 1997.
80. *Physical Oceanography Division*. Scripps Institution of Oceanography, May 1996.
81. *Department of Oceanography* seminar. CISESE, Ensenada, Mexico, March 1996.
82. *Department of Engineering and Applied Mathematics* seminar. Northwestern University, Jan. 1996.
83. *Department of Mathematics* seminar. University of Chicago, Jan 1996.
84. *Division of Physical Oceanography*. Scripps Inst. of Oceanography, Feb 1995.
85. *Department of Mathematics* seminar. University of Texas at Austin, Oct. 1994.

86. *T-15 Plasma Theory Division* seminar. Los Alamos National Laboratory, May 1994.
87. *Department of Mathematics* seminar. University of Chicago, April 1994.
88. *Department of Oceanography* seminar. CISESE, Ensenada, Mexico, Jan 1994.
89. *Department of Physics* seminar. University of Texas at Austin, March 1989.

CONTRIBUTED PRESENTATIONS AT MEETINGS
(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].