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Evangelos Siminos

curriculum vitae

Education

2005–2009 **PhD in Physics**, Georgia Institute of Technology, Atlanta, GA, USA
adviser: Prof. P. Cvitanović

2003–2005 **MS in Physics**, Georgia Institute of Technology, Atlanta, GA, USA

1998–2003 **BS in Physics**, University of Thessaloniki, Thessaloniki, Greece

FALL 2001 **Exchange Student**, Max Planck Institut für Plasmaphysik, Greifswald, Germany

Employment

2011 – NOW **Guest Scientist (postdoc)**, Max Planck Institute for the Physics of Complex Systems
Dresden, Germany

2009 – 2011 **Postdoctoral Fellow**, Commissariat à l' Énergie Atomique (CEA), DAM, DIF
Arpajon (Paris area), France

2008 – 2009 **Research Assistant**, Center for Nonlinear Science, School of Physics, Georgia Tech
Atlanta, GA, USA
support: NSF grant DMS-0807574 & G. Robinson Fund

2003 – 2008 **Teaching Assistant**, School of Physics, Georgia Tech

Research Experience

2011 – NOW **Max Planck Inst. for the Physics of Complex Systems**, Germany

PROJECT I *Ultra-intense laser pulse propagation in solid density targets*
AREA Relativistic optics
TOOLS Maxwell-Vlasov (Particle-in-Cell) codes, relativistic cold fluid-plasma theory
MAIN RESULTS Connection of phase-space topology of a simple dynamical system to self-induced transparency threshold for relativistic intensity pulses interacting with overdense plasmas
IN PROGRESS Study of time-dependent separatrices, ion motion, applications to ion acceleration schemes

PROJECT II *Dynamical systems approach to soliton dynamics in nonlocal nonlinear media*
AREA Nonlinear optics
TOOLS Linear stability analysis, projection of dynamics to intrinsic, lower-dimensional basis
MAIN RESULTS Intermittent oscillations of solitary waves in the nonlocal nonlinear Schröndinger equation are organized by homoclinic connections of such waves

2009 – 2011 **Dép. Physique Théorique et Appliquée**, CEA, DAM, DIF, France

PROJECT I *Kinetic Description of Stimulated Raman Scattering*
AREA Basic plasma physics, inertial confinement fusion, nonlinear dynamics

TOOLS Plasma kinetic theory, Galerkin projection methods, spectral deformation, sparse eigenproblems, Vlasov codes

MAIN RESULTS A fast converging semi-analytic method for the computation of stability of nonlinear Vlasov-Poisson waves. Application to vortex fusion instabilities of electrostatic plasma waves.

PROJECT II *Relativistic Solitary Waves in Plasmas*

AREA Relativistic intensity laser-plasma interaction

TOOLS Plasma-fluid models, Hamiltonian dynamical systems, spectral methods

MAIN RESULTS Identification and classification of new families of solitary waves

2004 – 2009 **Center for Nonlinear Science**, School of Physics, Georgia Tech, USA

PHD THESIS *Recurrent Spatio-temporal Structures in Presence of Continuous Symmetries*

ADVISER Prof. P. Cvitanović

AREA Spatially extended systems, chaos and turbulence

TOOLS Dynamical systems theory, symmetry reduction, state-space visualization, numerical integration of stiff partial differential equations, periodic orbit searches

MAIN RESULTS Efficient continuous symmetry reduction methods for systems with a high-dimensional state space. Geometric description of symmetry reduced Kuramoto-Sivashinsky and complex Lorenz attractors in terms of the unstable manifolds of traveling waves.

2002 – 2003 **Department of Physics**, University of Thessaloniki, Greece

DIPLOMA THESIS *Lattice-gas modeling of anomalous diffusion*

ADVISER Prof. L. Vlahos

DESCRIPTION Numerical study of anomalous diffusion of passive tracers in a turbulent enviroment modeled by a lattice-gas cellular automaton

FALL 2001 **Max Planck Institut für Plasmaphysik**, Greifswald, Germany

PROJECT *Asymptotic study of toroidal and helical MHD equilibria of magnetic confinement devices*

ADVISER Prof. J. Nührenberg

DESCRIPTION Perturbative study of the effect of magnetic field geometry in steady-state confinement properties of tokamaks and stellarators

Teaching Experience

FALL 2008 **Symmetry in dynamical systems**, School of Physics, Georgia Tech, USA
Series of three lectures for the advanced graduate course *Nonlinear Dynamics* (PHYS 7224)

2003–2008 **Teaching Assistant**, School of Physics, Georgia Tech, USA

COURSES Undergraduate Physics I & II, Physics Laboratory I & II, Classical Mechanics I & II, Electromagnetism, Special Relativity, Quantum Mechanics I

DUTIES Lab sessions, recitation sessions, office hours, preparation and grading of homework & exams

1999-2000 **Voluntary Teaching Assistant**, Department of Physics, University of Thessaloniki, Greece

FALL 1999 Lab assistant for Introductory Computer Lab

SPRING 2000 Grader for course Calculus II

Student supervision

2012 Advising PhD student Fabian Maucher on the use of dynamical systems methods in the study of solitons in nonlocal nonlinear media

Fall 2008 Advised student Dominic Kohler in his project "Armbruster-Guckenheimer-Holmes flow" for graduate level course "Nonlinear Dynamics"

Fellowships

2007 Gerondelis Foundation Graduate Student Fellowship, USA

2001 Erasmus Fellowship, European Union

Computer skills

programming	C/C++, Fortran, Python	libraries	PETSc, matplotlib, channelflow
markup	LaTeX, html	other	Mathematica, Matlab

Other Activities

2008 Organized informal seminar for Center for Nonlinear Science, Georgia Tech.

Seminar Talks

June 2012 Helmholtz Institute Jena, Germany
When does an ultra-intense laser pulse propagate in a plasma?

March 2011 ETH Zurich, Department of Materials
Stability of nonlinear waves in collisionless plasmas

Recent Conferences

Sept. 2012 talk Dynamics Days Europe, Gothenbourg, Sweden
E. Siminos and P. Cvitanović, *Continuous symmetry reduction in high-dimensional flows with the method of slices*

July 2012 poster EPS Conference on Plasma Physics, Stockholm, Sweden
E. Siminos, M. Grech, S. Skupin, T. Schlegel, and V. T. Tikhonchuk, *Electron heating effect on self-induced-transparency threshold in ultra-intense laser pulse interaction with overdense plasmas*

Sept. 2012 poster Frontiers in Intense Laser-Matter Interactions Theory Workshop, Garching, Germany
E. Siminos, M. Grech, S. Skupin, T. Schlegel, and V. T. Tikhonchuk, *Electron heating effect on self-induced transparency in relativistic intensity laser-plasma interaction*

April 2012 talk Workshop on Laser-Plasma Interaction at Ultra-High Intensity, Dresden, Germany
E. Siminos, M. Grech, S. Skupin, T. Schlegel, and V. T. Tikhonchuk, *Electron heating effect on self-induced-transparency threshold in ultra-intense laser pulse interaction with overdense plasmas*

June 2011 — EPS Conference on Plasma Physics, Strasbourg, France
poster — **E. Siminos**, D. Bénisti and L. Gremillet, *A spectral method for the stability of BGK modes and application to vortex-fusion instabilities*

May 2011 — Chaos, Complexity and Transport, Marseilles, France
talk — **E. Siminos**, D. Bénisti and L. Gremillet, *A spectral method for the stability of nonlinear Vlasov-Poisson equilibria*

Nov. 2010 — Annual Meeting of the APS Division of Plasma Physics, Chicago, IL, USA
talk — **E. Siminos**, D. Bénisti and L. Gremillet, *Stability of nonlinear Vlasov-Poisson equilibria through spectral deformation and Fourier-Hermite expansion*

Sept. 2010 — International Workshop on Laser-Matter Interaction, Porquerolles, France
poster — **E. Siminos**, D. Bénisti and L. Gremillet, *Stability of nonlinear Vlasov-Poisson equilibria through Fourier-Hermite expansion*

June 2009 — Modern Challenges in Nonlinear Plasma Physics, Sani, Halkidiki, Greece
poster — **E. Siminos**, P. Cvitanović and R. L. Davidchack, *State-space geometry of a continuous symmetry reduced Kuramoto-Sivashinsky flow*

May 2009 — SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, USA
talk — **E. Siminos**, P. Cvitanović and R. L. Davidchack, *State-space geometry of a Kuramoto-Sivashinsky flow in terms of relative periodic orbits*
in Minisymposium: *Dynamical systems and turbulence: unstable periodic orbits*

Jan. 2009 — Dynamics Days, San Diego, CA, USA
poster — **E. Siminos** and P. Cvitanović, *Continuous symmetry reduction for high dimensional flows*

References

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Dr. Didier Bénisti
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Publications

Submitted

V. Saxena, I. Kourakis, G. Sanchez-Ariaga, and **E. Siminos**, *Interaction of spatially overlapping standing electromagnetic solitons in plasmas*, submitted to Phys. Lett. A (2012)

In Press

P. Cvitanović, D. Borrero-Echeverry, K. M. Carroll, B. Robbins and **E. Siminos**, *Cartography of high-dimensional flows: A visual guide to sections and slices*, to appear in Chaos (2012), arxiv:1209.4915

Journal Articles

[DOI] [PDF] [9] **E. Siminos**, M. Grech, S. Skupin, T. Schlegel, and V. T. Tikhonchuk, *Effect of electron heating on self-induced transparency in relativistic intensity laser-plasma interaction*, Phys. Rev. E **86** 056404 (2012)

[DOI] [PDF] [8] G. Sánchez-Arriaga, **E. Siminos** and E. Lefebvre, *Relativistic solitary waves with phase modulation embedded in long laser pulses in plasmas,* Phys. Plasmas **18** 082304 (2011)

[DOI] [PDF] [7] **E. Siminos**, D. Bénisti and L. Gremillet, *Stability of nonlinear Vlasov-Poisson equilibria through spectral deformation and Fourier-Hermite expansion,* Phys. Rev. E **83** 056402 (2011)

[DOI] [PDF] [6] G. Sánchez-Arriaga, **E. Siminos** and E. Lefebvre, *Relativistic solitary waves modulating long laser pulses in plasmas,* Plasma Phys. Contr. Fusion **53**, 045011 (2011)

[DOI] [PDF] [5] **E. Siminos** and P. Cvitanović, *Continuous symmetry reduction and return maps for high-dimensional flows,* Physica D **240**, 187–198 (2011)

[DOI] [PDF] [4] D. Bénisti, O. Morice, L. Gremillet, **E. Siminos** and D. J. Strozzi, *Self-organization and threshold of stimulated Raman scattering,* Phys. Rev. Lett. **105**, 015001 (2010)

[DOI] [PDF] [3] D. Bénisti, O. Morice, L. Gremillet, **E. Siminos** and D. J. Strozzi, *Nonlinear group velocity of an electron plasma wave,* Phys. Plasmas **17**, 082301 (2010)

[DOI] [PDF] [2] D. Bénisti, O. Morice, L. Gremillet, **E. Siminos** and D. J. Strozzi, *Nonlinear kinetic description of Raman growth using an envelope code, and comparisons with Vlasov simulations,* Phys. Plasmas **17**, 102311 (2010)

[DOI] [PDF] [1] P. Cvitanović, R. L. Davidchack and **E. Siminos**, *On the state space geometry of the Kuramoto-Sivashinsky flow in a periodic domain,* SIAM J. Appl. Dyn. Syst. **9**, 1 (2010)

Thesis

[HTML][PDF] E. Siminos, Recurrent spatio-temporal structures in presence of continuous symmetries, PhD Thesis, School of Physics, Georgia Institute of Technology, Atlanta, GA, USA, May 2009