

Evangelos Siminos

curriculum vitae

EDUCATION

- 2009 **PhD in Physics**, Georgia Institute of Technology, Atlanta, GA, USA
adviser: Prof. P. Cvitanović
- 2005 **MS in Physics**, Georgia Institute of Technology, Atlanta, GA, USA
- 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 Schrödinger equation are organized by homoclinic connections between 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.
IN PROGRESS	Application to the modeling and control of stimulated Raman scattering
PROJECT II	<i>Relativistic Solitary Waves in Plasmas</i>
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	<i>Recurrent Spatio-temporal Structures in Presence of Continuous Symmetries</i>
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	<i>Lattice-gas modeling of anomalous diffusion</i>
ADVISER	Prof. L. Vlahos
DESCRIPTION	Numerical study of anomalous diffusion of passive tracers in a turbulent environment modeled by a lattice-gas cellular automaton
FALL 2001	Max Planck Institut für Plasmaphysik , Greifswald, Germany
PROJECT	<i>Asymptotic study of toroidal and helical MHD equilibria of magnetic confinement devices</i>
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 <i>Nonlinear Dynamics</i> (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	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	L ^A T _E X, 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 Dynamics Days Europe, Gothenbourg, Sweden
talk **E. Siminos** and P. Cvitanović, *Continuous symmetry reduction in high-dimensional flows with the method of slices*
- July 2012 EPS Conference on Plasma Physics, Stockholm, Sweden
poster **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 Frontiers in Intense Laser-Matter Interactions Theory Workshop, Garching, Germany
poster **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 Workshop on Laser-Plasma Interaction at Ultra-High Intensity, Dresden, Germany
talk **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

Prof. Predrag Cvitanović

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 School of Physics
 Georgia Institute of Technology
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 the Physics of Complex Systems
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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](https://arxiv.org/abs/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