

RESUME

Duke University
Department of Physics
BOX 90305
Durham, NC 27708
tel:(919)-660-2506
lena@phy.duke.edu

500-H N.Benson Ct.
Cary, NC 27513
tel:(919)-388-3026
tel:(919)-308-5403

OBJECTIVE

To obtain a position that will utilize my skills based on my education and more than 10 years of research and teaching experience in different areas of nonlinear optics, laser physics and biophysics, resulted in a number of publications in peer-reviewed journals and conference presentations.

PERSONAL DATA

Birth Date: February 10, 1970

Marital status: married

EDUCATION

Institute NonLineaire de Nice, Nice, France 2003 **Ph.D.** in Physics (nonlinear optics)
Title of the thesis: "Powerful radiation propagation in the nonlinear structures with periodically modulated index of refraction"

Belarussian State University, Minsk, Belarus 1992 **M.S.** in Physics (theoretical physics)

Belarussian State University, Minsk, Belarus 1991 **B.S.** in Physics (theoretical physics)

PROFESSIONAL EXPERIENCE

2001 – **Research Associate;** Duke University, NC, USA
Post-Doctoral mentor: Prof. D. Gauthier

1997 – 2001 **Visiting Scientist;** Institut NonLinearity de Nice, France;
Scientific Adviser: Prof. J. Tredicce

1995 – 1997 **Junior Researcher;** Institute of Physics, Belarus Academy of Science;

1992 – 1995 **Post-graduate courses;** Institute of Physics, Belarus Academy of Science;
Graduate Advisor: Prof. A.A. Afanas'ev

RESEARCH INTERESTS**Cardiac dynamics**

- dynamics of small cardiac tissue under the periodic pacing by a small electrical stimuli;
- control of alternans in small cardiac tissue;

Laser physics and nonlinear dynamics

- polarization switching in vertical cavity surface emitting lasers;
- dynamics of two coupled lasers;
- dynamics of laser with nonlinear distributed Bragg reflector;

Nonlinear optics

- radiation propagation in nonlinear distributed feedback structures;
- radiation propagation in active medium with periodically modulated population inversion and/or index of refraction;
- stimulated Raman scattering;

TEACHING EXPERIENCE

- 2003 – “Clocks, chaos and complexity in the living world”; Conceptual development and Design, Supervisor Prof. D. Gauthier, in collaboration with Dr. Lucas Illing;
- 2001 – **Supervision** of Graduate and Undergraduate students;
Duke University, NC, USA
- 1997 – 2001 **Mentor**; Graduate and Undergraduate students; Institut NonLinearity de Nice, France;
- 1996 – 1997 **Invited Instructor**; High School Physics, Lyceum attached to Belarussian State University, Minsk, Belarus
- 1992 – 1995 **Teaching and Laboratory Assistant**; Undergraduate physics – Mechanics, Optics, Belarussian State University, Minsk, Belarus;
Graduate Advisor: Prof. A.A. Afanas'ev

AWARDS

- 2002 APS International travel grant
- 2001 OSA International travel grant
- 2000 International travel grant
- 1997 Short-Term Fellowship Grant of the UNESCO/ICSU/TWAS
- 1995 International Science Foundation (Soros) Grant

PROFESSIONAL ACTIVITIES

- 2001 Technical Program Committee Member
International Conference on Quantum and Nonlinear Optics, ICONO'2001
- 1998 Technical Program Committee Member
II International Conference on Quantum Electronics
- 1998 Technical Program Committee Member
VII International Seminar on Quantum Optics
- 1997 Technical Program Committee Member
III International Conference “Laser Physics and Spectroscopy”
- 1995 Technical Program Committee Member
II International Conference “Laser Physics and Spectroscopy”
- Reviewer for:** Journal of Optical Society of America

MEMBERSHIPS

American Physical Society

EXTERNAL FUNDING

- 1998 **PI** of the Research grant M96-016 , Fundamental Research Foundation of Belarus
- 1996 **PI** of the Research grant MΦ-015 , Fundamental Research Foundation of Belarus

PROFESSIONAL REFERENCES**1. D. Gauthier**, Associate Professor of Physics and Biomedical Engineering

Room 139, Physics Bldg.
Department of Physics
Duke University, Box 90305
Durham, NC 27708

Tel: (919) 660-2511
Fax: (919) 660-2525
email: gauthier@phy.duke.edu

2. D. Schaeffer, James B. Duke Professor

Room 132B, Physics Bldg.
Department of Mathematics
Duke University, Box 90305
Durham, NC 27708

Tel: (919) 660-2814
Fax: (919) 660-2525
e-mail: dgs@math.duke.edu

3. J. Tredicce, Professor, Director of INLN (Scientific advisor)

Institut Non Linéaire de Nice
Sophia Antipolis
UMR 6618 CNRS
1361 route des Lucioles 06560
Valbonne, France

Tel: +33 (0)4 92 96 73 55
Fax: +33 (0)4 93 65 25 17
e-mail: jorge.tredicce@inln.cnrs.fr

INVITED TALKES

1. "The effect of memory on cardiac dynamics", September 2003, Institute for Cardiovascular research, Syracuse, NY.

LIST OF PUBLICATIONS

1. E.G. Tolkacheva, M.M. Romeo, M. Guerraty, D.J. Gauthier "Condition for alternans and its control in two-dimensional mapping model of paced cardiac tissue", submitted for publication (2003).
2. S. Sau, H. Dobrovolny, E.G. Tolkacheva, W. Krassowska, D.J. Gauthier "Simultaneous experimental measurement of dynamic, S1-S2 and constant-BCL restitution in ventricular myocardium", submitted for publication (2003).
3. E.G. Tolkacheva, M.M. Romeo, and D.J. Gauthier "Control of cardiac alternans in a mapping model with memory", submitted for publication (2003).
4. E.G. Tolkacheva, D.G. Schaeffer, D.J. Gauthier, and W. Krassowska, "Condition for alternans and stability of the 1:1 response pattern in a memory model of paced cardiac dynamics", *Phys. Rev. E*. v.67, pp.031904 (2003) (*Selected to appear in the Virtual Journal of Biological Physics Research*, v.5, March 15, 2003.)
5. E.G. Tolkacheva, D.G. Schaeffer, D.J. Gauthier, and C.C. Mitchell, "Analysis of the Fenton-Karma model through approximation by a one-dimensional map," *Chaos* v. 12, p. 1034 (2002). (*Selected to appear in the Virtual Journal of Biological Physics Research*, v.4, November 1, 2002.)

6. M.San Miguel, S.Balle, J.Mulet, C.R.Mirasso, E.G.Tolkachova, J.R.Tredicce, "Combined effects of semiconductor gain dynamics, spin dynamics and thermal shift in polarization selection in VCSELS", In Physics and Simulation of Optoelectronic Devices VIII, **SPIE Procs.**, v.3944, pp.242-251, 2000.
7. A.A.Afanas'ev, E.G.Tolkacheva, J.Tredicce, V.M.Volkov, "Spatial instability of counterpropagating waves in nonlinear DFB-structure", **Phys. Rev. A**, v. 60, N3, pp.2375-2379, 1999.
8. S.Balle, E.G.Tolkachova, M.San Miguel, J.R.Tredicce, J.Martin-Regalado and A.Gahl, "Mechanisms of polarization switching in single-transverse-mode VCSELS: thermal shift and nonlinear semiconductor dynamics", **Optics Letters**, v. 24, N16, pp.1121-1123, 1999.
9. N.B.Gubar, E.G.Tolkacheva, "Investigation of the SRS process taking into account the back Stokes and anti-Stokes components", **Izvestiya NANB**, N1, pp.94-99, 1999.
10. A.A.Afanas'ev, V.V.Dritz, E.G.Tolkacheva, "Spatial modulation of light beam reflected from a nonlinear DFB-structure", **Opt. Comm**, 148, pp.236-241, 1998.
11. A.A.Afanas'ev, B.A.Samson, E.G.Tolkacheva, "Effect of chirped laser pulses narrowing by reflection from a nonlinear DFB-structure", **J. of Modern Optics**, v.45, N1, pp.91-101, 1998.
12. A.A.Afanas'ev and E.G.Tolkacheva, "Theory of stationary generation of a laser with nonlinear Bragg reflector", **IEEE J. of Quantum Electronics**, v.32, N10, pp. 1740-1745, 1996.
13. A.Afanas'ev, B.A.Samson and E.G.Tolkacheva, "The DFB of counterpropagating waves in a periodically modulated medium with relaxing cubic nonlinearity", **J. of Modern Optics**, v.42, N11, pp.2285-2294, 1995.
14. P.A.Apanasevich, A.A.Afanas'ev, V.V.Drits, B.A.Samson and E.G.Tolkacheva, "Radiation Transformation using Stimulated Resonant Scattering of Light with a Small Frequency Shift", **Laser Physics**, v.4, N3, pp.553-563, 1994.

LIST OF PRESENTATIONS

1. S. Sau, H. Dobrovolny, E.G. Tolkacheva, W. Krassowska, and D.J. Gauthier, "New experimental protocol for simultaneous measurement of dynamic, S1-S2, and constant-BCL restitution in ventricular myocardium", in preparation, Gordon Research Conferences on Cardiac Arrhythmia Mechanisms, New London, NH, Aug 10-15, 2003.
2. E.Tolkacheva, M.M. Romeo, M. Guerryat, D.J. Gauthier "Condition for alternans and its control in two-dimensional mapping model of paced cardiac tissue", Gordon Research Conferences on Cardiac Arrhythmia Mechanisms, New London, NH, Aug 10-15, 2003.
3. H. Dobrovolny, S. Sau, E. Tolkacheva, D. Schaeffer, W. Krassowska, and D. Gauthier New experimental protocol for simultaneous measurement of the S1-S2, constant-BCL and dynamic restitution curves, NASPE 2003.

4. E.G. Tolkacheva, D.G. Schaeffer, D.J. Gauthier, and W.Krassowska, "A new criterion for stability of the 1:1 response pattern in a memory model of paced cardiac tissue," APS Meeting, Austin, TX, USA, 2003.
5. E.G. Tolkacheva, D.G. Schaeffer, C.C. Mitchell, "Analysis of the Fenton-Karma model through approximation by a one-dimensional map," APS Meeting, Indianapolis, IN, USA, 2002.
6. E.G.Tolkacheva, A.A.Afanas'ev, "Quasi-stationary regime of generation of B-class laser with linear and nonlinear Bragg reflectors", "International Conference on Quantum and Nonlinear Optics" ICONO'2001, Minsk, Belarus, 2001.
7. E.G.Tolkacheva, A.A.Afanas'ev, "Quasi-stationary regime of generation of B-class laser with linear and nonlinear Bragg reflectors", Topical Meeting "Nonlinear Guided Waves and Their Applications", Clearwater, Florida, USA, 2001.
8. E.G.Tolkacheva, A.A.Afanas'ev, V.M.Volkov, "Spatial instability of counterpropagating waves in nonlinear DFB-structure", International Congress "Optics -- XXI", S.-Peterburg, Russia, 2000.
9. J.Mulet, S.Balle, C.R.Mirasso, M.San Miguel, E.G.Tolkacheva, J.R.Tredicce, "Polarization selection in VCSELS: influence of gain dynamics, spin dynamics and thermal shift", CLEO'2000, Nice, France, 2000.
10. Balle, S., Tolkacheva, E., San Miguel, M., Tredicce, J.R, Regalado, J.M. and Gahl, A, "Mechanism of Polarization switching in VCSEL's: Thermal shift and Nonlinear Semiconductor Dynamics". "Control of Complex Behavior in Optical Sysems and Applications: COCOS 99". Munster, Germany, 1999.
11. Balle, S., Tolkacheva, E., San Miguel, M., Tredicce, J., Regalado, J.M. and Gatti, A. "Mechanism of Polarization switching in VCSEL's: Thermal shift and Nonlinear Semiconductor Dynamics". International Conference "Quantum Optics X", Palma de Mallorca, Spain, 1999.
12. E.G.Tolkacheva, N.B.Gubar, "The influence of the anti-Stokes and back Stokes components on SRS process", II International Conference on Quantum Electronics, Minsk, Belarus, 1998.
13. E.G.Tolkacheva, N.B.Gubar, "Stokes beam amplification in a field of given and focused pump beam", VII International Seminar on Quantum Optics, Minsk, Belarus, 1998.
14. E.G.Tolkacheva, N.B.Gubar, "The amplification of the Stokes component in the field of the focused gaussian pump", VI International Conference "Actual problems of Informatics", Minsk, Belarus, 1998.
15. A.A.Afanas'ev, E.G.Tolkacheva, "Coherent regime of the resonance four-wave parametric scattering of the light in the field of soliton-like pump", III International Conference "Laser Physics and Spectroscopy", Grodno, Belarus, 1997
16. A.A.Afanas'ev, B.A.Samson, E.G.Tolkacheva, "Effect of chirped laser pulses narrowing by reflection from a nonlinear DFB-structure", V International Workshop on Laser Physics (LPHYS'96), Moscow, 1996.
17. A.A.Afanas'ev, V.V.Dritz, B.A.Samson, E.G.Tolkacheva, "Effect of spatial modulation of light beam in a nonlinear DFB-structure", EQEC'96, Humburg, Germany, 1996.
18. A.A.Afanas'ev, B.A.Samson and E.G.Tolkacheva, "The DFB of counterpropagating waves in a periodically modulated medium with relaxing cubic nonlinearity", IV Conference on Nonlinear Dynamics of Optical Systems, Rochester, USA, 1995.

19. A.A.Afanas'ev and E.G.Tolkacheva, "Theory of stationary generation of a laser with nonlinear Bragg reflector", II International Conference "Laser Physics and Spectroscopy", Grodno, Belarus, 1995.
20. A.A.Afanas'ev, V.S.Belyaev, V.V.Drits, E.G.Tolkacheva, "The propagation of the ultra-short light pulses in a periodically modulated resonance medium", International Conference "Laser Optics", St.-Peterburg, Russia, 1993.
21. P.A.Apanasevich, A.A.Afanas'ev, E.G.Tolkacheva, "Stationary regime of generation of a laser on the basis of SRS of light with a small frequency shift", I International Conference "Laser Physics and Spectroscopy", Grodno, Belarus, 1993.