

IGOR MARIYENKO, Ph.D.

Permanent Resident of the US

cell: 310-619-8390

E-mail: mariyenko.igor@gmail.com

Engineer/Research Scientist with 7 years of Academic Research experience in Optics and 7 years of commercial R&D experience in multiple optics-related topics and X-ray imaging. Seeking position to utilize my skills in Research or R&D environment. The skills include experimental investigation, numerical simulation, and theoretical analysis that allow to perform R&D work starting from idea generation, through its modeling and analysis, and subsequent testing by building proof-of-principle demonstration prototype. All my prototypes were operational and the corresponding projects received next phase funding. Worked both in teams and as an independent player on many R&D and research projects and was able to advance the projects by finding alternative scientific/engineering solutions using different approach or details neglected by others. Authored/co-authored the scientific papers, reports, and proposals. Presented my work at the scientific conferences and to the government officials; lectured Physics courses.

RESEARCH AND R&D EXPERIENCE

Optics and Lasers:

- Femtosecond optics: pulses shaping.
- Optical Vortices (wave optics, Laser modes transformations, light wavefront topology, Orbital Angular Momentum of Light).
- Solid state lasers: *ns* Ti:Sapphire laser design and development.

R & D experience:

- X-ray imaging detectors design and development.
- Lobster-Eye Optics for X-rays and neutrons.
- Electro Optics, Acousto Optics prototypes.
- LIDAR.
- Spectroscopy of highly ionized gases.
- Second Harmonics Generation and phase conjugation in photorefractive media

R&D PROJECTS, ACHIEVEMENTS, POSITIONS

May. 2010 – Dec. 2014, Sr. Scientist, MIG Science & Technology, Independence, MO

- Invented novel design of the advanced X-Ray imaging detector for tomosynthesis and mammography. It stands out due to its improved MTF and lower dose by up to 50%.
- Numerically modeled the single-mode wavelength-tunable nanosecond Ti:S laser with increased slope efficiency; the model matched the experimental results perfectly.
- Developed the high-throughput technique for dynamic space shaping of intense fs laser pulses.

Apr. 2007 – Feb. 2010, Research Scientist, Physical Optics Corporation, Torrance, CA

- Designed and built from scratch the Phase-1 NIH prototype for acousto-optical tomography; after, the project received Phase-2 award.
- Created from scratch the Phase-1 LIDAR prototype for air temperature measurements by using Raman effect; this DoE project received Phase-2 award.
- Managed Phase-2 DoE project on development Lobster-Eye lens and collimator for thermal neutrons
- Designed and built from scratch the novel prototype for X-ray and Gamma-photon imaging; the BAA project received Phase-2 and Phase-3 awards. The technology was patented: US # 7,781,739.
- Co-authored the award-winning Phase-1 NIH proposal on soft X-ray (2 nm) laser development; theoretically identified the proper ion and its stripping degree for laser active medium.
- Suggested and implemented the Si-plates selection method for the X-ray Lobster-Eye lens assembly – it was a crucial step to achieve sharp focusing.
- Suggested and implemented the design improvement of the X-Ray Lobster-Eye lens made of Silicon wafers – it was one-step advancement in the lens design concept.

ACADEMIC POSITIONS and RESEARCH PROJECTS

Oct. 2003 – July 2006: Jorgensen Postdoctoral Fellow & Lecturer, Univ. of Nebraska-Lincoln, NE

- Generated experimentally for the first time a pure vortex in femtosecond laser field and devised the theoretical model. The work became the scientific sensation in its field.
- Lectured Quantum Mechanics 461/861.
- Created and lectured the advanced graduate course “Intro to Optical Vortices”.

Nov. 2001 – Sep. 2003: Postdoctoral Research Associate, Texas A&M University

- Set up the lab for Prof. A. Sokolov.
- Designed and built wavelength-tunable single-mode nanosecond Ti:S laser for the lab.

Sep. 2001: Visiting Researcher, Prof. L.Torner lab, Univ. Politec. de Catalunya, Barcelona, Spain.

- Experimentally studied Second Harmonic Generation of ps laser pulses possessing vortices with fractional topological charges produced with subharmonic holographic gratings.

Aug. 2000 – Jul. 2001: Research Fellow, Inst. of Physics, Nat’l Acad. of Sciences, Kiev, Ukraine.

- Studied the field structure of the light beams with an optical vortex in a leaky planar waveguide.

2000 – 1995: Ph.D.-student, Institute of Physics, National Acad. of Sciences, Kiev, Ukraine.

- Studied diffraction of light beams with Optical Vortices on edge and slit apertures.
- Discovered experimentally the novel Vortex Self-Reconstruction effect and modeled the effect numerically. This discovery raised a research wave in the field of Optical Vortices and demonstrated robustness of Vortices upon propagation.
- Characterized by modeling the effect of the reversed energy flow in the vicinity of an edge light field dislocation at subwavelength scale in free space that was discovered in the collinear propagation of two Gaussian beams.
- Recorded polymer volume phase holograms to generate intense optical-vortex beams.
- Studied experimentally the phase conjugation of light beams possessing optical vortices by four-wave mixing in Lithium Niobate photorefractive crystal.

PROGRAMMING & NUMERICAL SIMULATIONS

- Programming: Mathematica, Delphi and MatLab (are used in past).
- Numerical calculations: ordinary and partial differential equations, Fourier analysis.

EDUCATION

- *Ph.D.*, 2000 in Optics and Laser Physics from Inst. of Physics, Nat’l Acad. of Sciences of Ukraine.
Thesis title: "Diffraction of Light Beams with Optical Vortices"
- *M.S. in* 1995, and *B.S.* in 1993 from Moscow Institute of Physics and Technology, Russia.

OTHER EXPERIENCE

- 2011–present: manuscript reviewer for Journal of Optics & Laser Technology (Elsevier - JOLT D)
- Member of Organizing Committee for the International Conference “Singular Optics-2000”.

AWARDS

- Theodore P. Jorgensen Postdoctoral Fellowship, University of Nebraska-Lincoln, 2003-05
- Prizewinner in young scientists competition, 11th General Meeting of European Physical Society, London, UK, 1999.
- Fellowship from National Academy of Sciences of Ukraine, 1997-1998.
- Fellowship from Soros Science Foundation for outstanding young researchers in Ukraine, 1995.

PATENT

US Patent # 7,781,739. – “Quantum Imaging System and Mode of Operation and Method of Fabrication Thereof”, M. Gertsenshteyn, V. Grubsky, V. Romanov, R. Pradhan, I. Marienko, Y. Yang, W. Mengesha, G. Medvedkin, T. Jansson.

RELEVANT PUBLICATIONS

- [1] I. Marienko, V. Denisenko, V Slusar, and M. Soskin, "Dynamic space shaping of intense ultrashort laser light with blazed-type gratings," *Optics Express* 18, 25143-25150 (2010)
- [2] J. Strohaber, I. Marienko, Cornelis J. Uiterwaal, "Generation and diagnosis of focused ultrashort pulses of complex light", *Proceedings of SPIE Vol. 6483, 64830M* (2007).
- [3] I.G. Marienko, J. Strohaber, C.J.G.J. Uiterwaal, Creation of optical vortices in femtosecond pulses. *Optics Express* 13, 7599-7608 (2005) – *Cover Paper, 100 citations*.
- [4] I.G.Marienko, V.A.Pas'ko, V.V.Slyusar, M.S.Soskin, and M.V.Vasnetsov, Investigation of an optical vortex beam with a leaky planar waveguide, *Opt. Commun.* 213, iss. 1-3, pp. 1-11 (2002)
- [5] Marienko I.G., Vasnetsov M.V., Soskin M.S. Self-restoration limits for an optical vortex, *SPIE Proc.* **4403**, 139-146 (2001).
- [6] M.V.Vasnetsov, I.G.Marienko and M.S.Soskin, Self-reconstruction of an Optical Vortex, *Letters to Journal of Experimental and Theoretical Physics (JEPT)* 71(4), 130-133 (2000).
- [7] M.V.Vasnetsov, I.G.Marienko, V.N.Gorshkov and M.S.Soskin, Wavefront motion in the vicinity of a Phase Dislocation: "Optical Vortex", *Optics and Spectroscopy* 88(2), 260-265 (2000).
- [8] Marienko I.G., Soskin M.S., Vasnetsov M.V. Diffraction of optical vortices, *SPIE Proc.* **3904**, 27-34 (1999).
- [9] Basistiy I.V., Kreminskaya L.V., Marienko I.G., Soskin M.S. and Vasnetsov M.V. Experimental observation of rotation and diffraction of a "singular" light beam, *SPIE Proc.* **3487**, 34-38 (1998)
- [10] Marienko I.G., Soskin M.S. and Vasnetsov M.V. Phase reversal of light beams carrying optical vortices, *Asian Journal of Physics*, 7, 495-502 (1998).