

# List of publications

Iavor Velchev

## Theses

- June 2001, Ph.D. thesis from Vrije Universiteit, Amsterdam, The Netherlands  
“Stimulated Brillouin Scattering pulse compression and harmonic generation: Applications to precision XUV laser spectroscopy”
- July 1994, M.Sc. thesis from Sofia University, Bulgaria  
“Numerical modeling and experimental investigation of the generation and evolution of dark spatial solitons”

## Journal Articles (peer reviewed)

1. “Energy and information flow in superlensing ”  
E. Fourkal, **I. Velchev**, and A. Smolyakov  
*Phys. Rev. A* **79** (3), 033846 (2009).
2. “Laser-to-proton energy transfer efficiency in laser-plasma interactions”  
E. Fourkal, **I. Velchev**, and C.-M. Ma  
*J. Plasma Phys.* **75**, 235–250 (2009).
3. “Decoupling and asymmetric coupling in triple-core photonic crystal fibers”  
Y. Yan, J. Toulouse, **I. Velchev**, and S. Rotkin  
*J. Opt. Soc. Am B*, **25** (9), 1488–1495 (2008).
4. “Shielding design for a laser-accelerated proton therapy system”  
J. Fan, W. Luo, E. Fourkal, T. Lin, J. Li, **I. Velchev**, N. E. Ipe, and C.-M. Ma  
*Physics in Medicine and Biology*, **52** (13), 3913–3930 (2007).
5. “Laser induced Coulomb mirror effect: applications for proton acceleration”  
**I. Velchev**, E. Fourkal, and C.-M. Ma  
*Physics of Plasmas* **14** (3) 33106 (2007).
6. “Energy optimization procedure for treatment planning with laser-accelerated protons”  
E. Fourkal, **I. Velchev**, J. Fan, W. Luo, and C.-M. Ma  
*Medical Physics* **34** (2), 577–584 (2007).
7. “Resonant transparency of opaque materials”  
E. Fourkal, **I. Velchev**, and A. Smolyakov  
*Physics Letters A* **361**, 277–282 (2007).
8. “Creation of tailored features by laser heating of  $\text{Nd}_{0.2}\text{La}_{0.8}\text{BGeO}_5$  glass”  
P. Gupta, H. Jain, D.B. Williams, J. Toulouse, and **I. Velchev**  
*Optical Materials* **29** (4), 355–359 (2006).
9. “Development of a laser-driven proton accelerator for cancer therapy”  
C.-M. Ma, **I. Velchev**, E. Fourkal, J. S. Li, W. Luo, J. Fan, and A. Pollack  
*Laser Physics* **16** (4), 1–8 (2006).

10. “Evanescent wave interference and the total transparency of a warm high-density plasma slab”  
E. Fourkal, **I. Velchev**, A. Smolyakov, and C.-M. Ma  
Physics of Plasmas **13** (9), 092113 (2006).
11. “Coulomb explosion effect and the maximum energy of protons accelerated by high-power lasers”  
E. Fourkal, **I. Velchev**, and C.-M. Ma  
Physical Review E **71** (3), 036412 (2005).
12. “Statistical properties of the Stokes signal in stimulated Brillouin scattering pulse compressors”  
**I. Velchev** and W. Ubachs  
Physical Review A **71** (4), 043810 (2005).
13. “Two-beam modulation instability in noninstantaneous nonlinear media”  
**I. Velchev**, R. Pattnaik, and J. Toulouse  
Physical Review Letters **91**, 093905 (2003).
14. “Fourier analysis of the spectral properties of multi-mode laser radiation”  
**I. Velchev** and J. Toulouse  
The American Journal of Physics **71** (3), 269–272 (2003).
15. “A novel narrow-band wavelength-tunable laser system delivering high-energy 300 ps pulses in the near-infrared”  
F. Brandi, **I. Velchev**, D. Neshev, W. Hogervorst, and W. Ubachs  
Review of Scientific Instruments **74** (1), 32–37 (2003).
16. “Higher order stimulated Brillouin scattering with non-diffracting beams”  
**I. Velchev** and W. Ubachs  
Optics Letters **26** (8), 530–532 (2001).
17. “Vacuum-ultraviolet spectroscopy of Xe: Hyperfine splittings, isotope shifts, and isotope-dependent ionization energies”  
F. Brandi, **I. Velchev**, W. Hogervorst, and W. Ubachs  
Physical Review A **64** (3), 032505 (2001).
18. “Lifetime measurements on the  $c'_4 \ ^1\Sigma_u^+$ ,  $v=0, 1$ , and 2 states of molecular nitrogen”  
W. Ubachs, R. Lang, **I. Velchev**, W. -U. L. Tchang-Brillet, A. Johansson, Z. S. Li, V. Lokhnygin, and C. -G. Wahlstrom  
Chemical Physics **270** (1), 215–225 (2001).
19. “Isotope dependent predissociation in the  $C \ ^1\Sigma^+$ ,  $v=0$  and  $v=1$  states in CO”  
P. Cacciani, F. Brandi, **I. Velchev**, C. Lynga, C. -G. Wahlstrom, and W. Ubachs  
The European Physics Journal **D15** (1), 47–56 (2001).
20. “Predissociation in the  $E \ ^1\Pi$ ,  $v=1$  state of the six natural isotopomers of CO”  
W. Ubachs, **I. Velchev**, and P. Cacciani  
Journal of Chemical Physics **113** (2), 547–560 (2000).
21. “Predissociation of  $b \ ^1\Pi_u$ ,  $v$  ( $v=1,4,5,6$ ) levels of  $N_2$ ”  
W. Ubachs, **I. Velchev**, and A. de Lange  
Journal of Chemical Physics **112** (13), 5711–5716 (2000).
22. “Pulse compression to the sub-phonon lifetime region by half-cycle gain in transient stimulated Brillouin scattering”  
**I. Velchev**, D. Neshev, W. Hogervorst, W. Ubachs  
IEEE Journal of Quantum Electronics **QE-35** (12), 1812–1816 (1999).
23. “Precision VUV spectroscopy of argon I at 105 nm”  
**I. Velchev**, W. Hogervorst, W. Ubachs  
Journal of Physics **B32** (17), L511–L516 (1999).

24. “Steering of one-dimensional odd dark beams of finite length”  
A. Dreischuh, G. G. Paulus, F. Zacher, **I. Velchev**  
Applied Physics **B69** (2), 113–117 (1999).
25. “SBS pulse compression to 200 ps in a compact single-cell setup”  
D. Neshev, **I. Velchev**, W. A. Majewski, W. Hogervorst, and W. Ubachs  
Applied Physics **B68** (4), 671–675 (1999).
26. “A dense grid of reference Iodine lines for optical frequency calibration in the range 571–596nm”  
**I. Velchev**, R. van Dierendonck, W. Hogervorst, and W. Ubachs  
Journal of Molecular Spectroscopy **187** (1), 21–27 (1998).
27. “Multiple-charged optical vortex solitons in bulk Kerr media”  
**I. Velchev**, A. Dreischuh, D. Neshev, S. Dinev  
Optics Communications **140** (1–3), 77–82 (1997).
28. “Interaction of optical vortex solitons superimposed on different background beams”  
**I. Velchev**, A. Dreischuh, D. Neshev, and S. Dinev  
Optics Communications **130** (4–6), 385–392 (1996).
29. “Phase measurements of ring dark solitons”  
A. Dreischuh, W. Fliesser, **I. Velchev**, S. Dinev, and L. Windholz  
Applied Physics **B62** (2), 139–142 (1996).
30. “Generation and evolution of two-dimensional dark spatial solitons”  
S. Baluschev, A. Dreischuh, **I. Velchev**, S. Dinev, and O. Marazov  
Physical Review E **52** (5), 5517–5523 (1995).
31. “Odd and even two-dimensional dark spatial solitons”  
S. Baluschev, A. Dreischuh, **I. Velchev**, S. Dinev, and O. Marazov  
Applied Physics **B61** (1), 121–124 (1995).

## Proceedings

- “Topological-charge controlled interaction within ordered structures of optical vortex solitons”  
M. Assa, **I. Velchev**, D. Neshev, A. Dreischuh, and S. Dinev  
Proceedings SPIE **3502**, 218–222 (1997).
- “Two-dimensional dark spatial solitons”  
A. Dreischuh, S. Baluschev, **I. Velchev**, D. Neshev, S. Dinev, and O. Marazov  
Proceedings of VIII School on Quantum Electronics, Lasers, and Applications 327–332 (1996) M. Nenchev, P. Atanasov, and M. Himber (eds.), University Paris-Nord, Paris.

## Conference Presentations

1. “Polarization Dependence of Inter-Core Coupling in Multi-Core Photonic Crystal Fibers”  
Y. Yan, J. Toulouse, **I. Velchev**, s. Rotkin  
Frontiers In Optics, Rochester 2008 [talk].
2. “Optimizing the Laser Parameters in a Simulated Laser-Proton Accelerator”  
**I. Velchev**, E. Fourkal, and C.-M. Ma  
American Association of Physicists in Medicine (AAPM2008) [talk].
3. “Improved Proton Yield From a Laser-Proton Accelerator”  
**I. Velchev**, A. Guemnie Tafo, T. Lin, E. Fourkal, J. Fan, J. Li, C.-M. Ma, S. Orimo, and K. Ogura  
American Association of Physicists in Medicine (AAPM2008) [poster].

4. “Laser-To-Proton Energy Transfer Efficiency in Laser-Plasma Interactions”  
E. Fourkal, **I. Veltchev**, and C.-M. Ma  
American Association of Physicists in Medicine (AAPM2008) [**talk**].
5. “Cellular Radiosensitivity of Laser Accelerated Protons: A Feasibility Study”  
J. Fan, E. Fourkal, A. Guemnie Tafo, **I. Veltchev**, J. Li, Q. Xu, T. Lin, L. Wang, K. Paskalev, L. Jin,  
and C.-M. Ma  
American Association of Physicists in Medicine (AAPM2008) [**poster**].
6. “Laser-Proton Inter-Track Effect and the DNA Double-Strand Break ”  
J. Fan, E. Fourkal, A. Guemnie Tafo, **I. Veltchev**, R. Price Jr., W. Luo, J. Li, A. Eldib, L. Chen, and  
C.-M. Ma  
American Association of Physicists in Medicine (AAPM2008) [**poster**].
7. “A Laser-Ion Accelerator for Radiation Therapy Application”  
C.-M. Ma, E. Fourkal, **I. Veltchev**, J. Li, J. Fan, T. Lin, A. Guemnie Tafo  
American Association of Physicists in Medicine (AAPM2008) [**poster**].
8. “Chain acceleration of protons using high-power laser pulses”  
**I. Veltchev**, E. Fourkal, and C.-M. Ma  
American Association of Physicists in Medicine (AAPM2007) [**talk**].
9. “Beam of laser-accelerated protons: generation and characterization”  
**I. Veltchev**, T. Lin, E. Fourkal, J. Fan, J. Li, C.-M. Ma, S. Orimo, and K. Ogura  
American Association of Physicists in Medicine (AAPM2007) [**talk**].
10. “A laser system and target design for proton acceleration”  
**I. Veltchev**, E. Fourkal, T. Lin, and C.-M. Ma  
American Association of Physicists in Medicine (AAPM2006) [**talk** ].
11. “Prepulse effect and maximum energy of protons accelerated by high-power lasers”  
E. Fourkal, **I. Veltchev**, T. Lin, and C.-M. Ma  
American Association of Physicists in Medicine (AAPM2006) [**talk**].
12. “Laser-accelerated proton therapy: Target chamber design and shielding requirements”  
C.-M. Ma, **I. Veltchev**, E. Fourkal, J. Li, J. Fan, T. Lin, W. Luo, and S. Stathakis  
American Association of Physicists in Medicine (AAPM2006) [**talk**].
13. “Analytical calculation of spread-out-Bragg-peak distributions for laser-accelerated proton beams”  
E. Fourkal, **I. Veltchev**, J. Fan, J. Li, W. Luo, and C.-M. Ma  
American Association of Physicists in Medicine (AAPM2005) [**poster**].
14. “A laser-proton accelerator for radiation oncology: System design”  
C.-M. Ma, E. Fourkal, **I. Veltchev**, W. Luo, and A. Pollack  
American Association of Physicists in Medicine (AAPM2004) [**talk**].
15. “Heavy-ion dynamics in the acceleration of protons by the interaction of high-power lasers with double-  
layer targets”  
E. Fourkal, **I. Velchev**, and C.-M. Ma  
Quantum Electronics and Laser Science Conference (QELS) pp.1822–1824 (2005). [**poster** ].
16. “Directional coupling and switching in multi-core microstructure fibers”  
**I. Velchev** and J. Toulouse  
Conference on Lasers and Electro-Optics (CLEO) pp.997–999 (2004) [**talk** ].
17. “A novel narrow-band wavelength-tunable laser system delivering high-energy 300 ps pulses in the  
near-infrared”  
F. Brandi, **I. Velchev**, D. Neshev, W. Hogervorst, and W. Ubachs  
Symposium IEEE/LEOS Benelux Chapter, Amsterdam, The Netherlands (9 December 2002) [**talk**].

18. “Modulation instability induced by cross-phase modulation in Raman fiber amplifiers”  
R. Pattnaik, **I. Velchev**, J. Toulouse  
Conference on Lasers and Electro-Optics (CLEO) pp.535–536 (2002) [**poster**].
19. “Narrow-band XUV laser source”  
F. Brandi, D. Neshev, **I. Velchev**, W. Hogervorst, and W. Ubachs  
IQEC/LAT, Moscow, Russia, (22–28 June 2002) [**poster**].
20. “Dense grid of reference I<sub>2</sub>-lines for optical frequency calibration in the range 571-655 nm”  
W. Ubachs, **I. Velchev**, S.-C. Xu, R. van Dierendonck, and W. Hogervorst  
International Quantum Electronics Conference (IQEC) p.92 (2000) [**poster**].
21. “Precision VUV laser spectroscopy on Ar, Kr and Xe”  
**I. Velchev**, F. Brandi, W. Hogervorst, and W. Ubachs  
International Quantum Electronics Conference (IQEC) p.77 (2000) [**talk**].
22. “Narrowband coherent Soft-X-ray laser source”  
**I. Velchev**, W. Hogervorst, and W. Ubachs  
ESF workshop on applications of high-order harmonics, Lund, Sweden, (March 17–18 2000) [**poster**].
23. “SBS-compressed FT-limited laser pulses tunable in wavelength and duration (200-2000 ps)”  
D. Neshev, **I. Velchev**, S. Schieman, W. Hogervorst, and W. Ubachs  
Conference on Lasers and Electro-Optics Europe (CLEO-Europe) p.54 (1998) [**talk**].
24. “Detailed investigation of stimulated Brillouin scattering compression in liquids with one-cell compact generator-amplifier setup”  
D. Neshev, **I. Velchev**, W. Majewski, W. Hogervorst, and W. Ubachs  
Tenth International School on Quantum Electronics, Varna, Bulgaria, (21–25 Sept 1998) [**poster**].
25. “Topological Charge Controlled Interaction within Ordered Structures of Optical Vortex Solitons”  
M. Assa, **I. Velchev**, S. Dinev, D. Neshev, and A. Dreischuh,  
Nineth International School of Quantum Electronics, Varna, Bulgaria (16–20 Sept 1996) [**poster**].
26. “Two-Dimensional Dark Solitons: Formation and Interactions”  
A. Dreischuh, S. Balushev, **I. Velchev**, D. Neshev, and S. Dinev,  
Eight International School of Quantum Electronics, Varna, Bulgaria (29 Sept – 4 Oct 1994) [**poster**].
27. “Numerical Modeling of Generation and Interactions of Dark Optical Solitons”  
A. Dreischuh, **I. Velchev**, D. Neshev, and S. Dinev  
First Symposium on Nonlinear Phenomena and Solitons, Sofia, Bulgaria (21–22 June 1994) [**talk**].