

# CURRICULUM VITAE

## Sergei TOCHITSKY

### GENERAL INFORMATION

Date & Place of birth: September 8, 1962, Republic of Belarus.  
Marital Status : Married, son 24 yrs, and daughter 12 yr.  
Business Address : Department of Electrical Engineering, UCLA, 56-125B EIV  
405 Hilgard avenue, Los Angeles, CA 90095  
Tel: 310-825-2068; e-mail: sergei12@ucla.edu

### EDUCATION & QUALIFICATION

1992 Ph. D. Degree in Laser Physics, the Institute of Physics, Academy of Sciences of Belarus, Minsk, Belarus.  
1985 MS/B.S degree in Optical Engineering, Byelorussian Polytechnic Academy, Department of Optic and Electro-Optic Engineering, Minsk, Belarus..

### PROFESSIONAL EMPLOYMENT

2000-pres. Department of Electrical Engineering, UCLA , Research Scientist  
1998-2000 Department of Electrical Engineering, UCLA, USA (Postdoctoral pos.).  
1996-1997 Cavendish Laboratory, University of Cambridge, UK (The Royal Society Guest Researcher).  
Mar.-July  
1996 Brookhaven National Laboratory, USA (Visiting Scientist).  
1994-1995 Institute of Physics, Academy of Sciences of Belarus, Minsk, Belarus ( Senior Research Scientist).  
Oct.-Dec.  
1995 ENEA CRE Frascati, Italy (Visiting Scientist).  
1993-1994 Department of Physics, National Tsing Hua University, Taiwan (Postdoctoral position).  
1987-1992 Institute of Physics, Academy of Sciences of Belarus, Minsk, Belarus (Junior Research Scientist).  
1985-1987 Institute of Physics, Academy of Sciences of Belarus, Molecular Kinetics Laboratory, Minsk, Belarus (Post-graduate).

MEMBERSHIP AND AWARDS: member of the Optical Society of America, 1990 Award of the American Physical Society, 1994 Fellowship of the European Environmental Research Organisation (The Netherlands), 1996 The Royal Society fellowship (UK),

PUBLICATIONS : More than 117 scientific publications including 40 in refereed journals (see attachment).

## LIST OF PUBLICATIONS

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### a) REFEREED PAPERS

1. Bertel' I.M., Petukhov V.O., Prokopov A.P., Tochitsky S.Ya., Churakov V.V. Energetic, spectral and temporal characteristics of two-wave CO<sub>2</sub> laser// Journal of Applied Spectroscopy ( English translation of Zhurnal Prikladnoi Spectroscopii). v.46, No.3, p.245-249 (1987).
2. Petukhov V.V., Tochitsky S.Ya., Churakov V.V. Two-color TEA CO<sub>2</sub> laser oscillation on the lines of regular and hot band// Appl.Phys.B. v.42, No.3, p.245-249 (1987).
3. Petukhov V.V., Tochitsky S.Ya., Churakov V.V. Possibility of effective lasing at the 02<sup>0</sup>1 (10<sup>0</sup>1)-01<sup>1</sup>1 transition of the CO<sub>2</sub> molecule// Journal of Applied Spectroscopy. v.47, No. 13, p.890- 895 (1987).
4. Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Efficient simultaneous stimulated emission of two lines in different sequence bands in a TEA CO<sub>2</sub> laser// Sov. J of Quantum Electron. v.17, No.3, p.389-391 (1987).
5. Petukhov V.O., Pivovarchik V.F., Solodukhin A.S., Tochitsky S.Ya. Trushin S.A., Churakov V.V. Stabilized continuous CO<sub>2</sub> laser that is tunable over lines of five bands// Instruments and Experimental Tech. (English translation of Pribory i Technika Eksperimenta) v. 30, No.4, p.946-949 (1987).
6. Petukhov V.V., Tochitsky S.Ya., Churakov V.V. Two-color TEA XeI-CO<sub>2</sub> laser// J.Phys.E. Scientific Instruments. v.21, No.6, p.611-613 (1988).
7. Petukhov V.V., Tochitsky S.Ya., Churakov V.V. TEA laser excited by a self-sustained discharge and emitting due to infrared transitions in Xe I, Kr I, Ar I and Ne I// Sov. J of Quantum Electron. v.18, No.3, p.318-320 (1988).
8. Petukhov V.V., Tochitsky S.Ya., Churakov V.V. Reduction of the optically pumped molecular laser output with increased pump intensity// Optics Commun. v.27, No.1,2, p.87-92 (1989).
9. Petukhov V.V., Tochitsky S.Ya., Trushin S.A., Churakov V.V. Use of coincidences of transition frequencies of various isotopic forms of CO<sub>2</sub> for lasing in the 4.3 μm region// Sov. Tech. Phys. Lett. v.14, No.4, p.577-579 (1988).
10. Petukhov V.V., Tochitsky S.Ya., Churakov V.V. Two-color TEA XeI-CO<sub>2</sub> laser // Engineering Optics. v.2, p.409-411 (1988).
11. Petukhov V.V., Tochitsky S.Ya., Churakov V.V. Investigation of the output parameters of a transversely excited CO<sub>2</sub> laser in the wavelength range 4.2-4.5 μm (1001-1000 band)// Sov. J. of Quantum Electron. v.20, No 6, p.602-608 (1990).
12. Kuntzevich B.F., Petukhov V.V., Tochitsky S.Ya., Churakov V.V. Field mechanism for simultaneous oscillation on several transitions in TEA CO<sub>2</sub> lasers// Quantum Electron. v.23, No.6, p.481-487 (1993).
13. Gorobetz V.A., Kozlov K.V., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. A cw CO laser with acousto-optic Q-factor modulation// Journal of Applied Spectroscopy. v.58, No.3-4, p.394-396 (1993).

14. Gorobetz V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. A cw stabilized CO<sub>2</sub> (CO) laser automatically tuned between generation lines// *Instruments and Experimental Tech.* v. 37, No.1, p.99-106 (1994).
15. Gorobetz V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Transversely excited CO<sub>2</sub> LIDAR laser tunable over lines of regular and nontraditional bands// *Quantum Electron.* v.25, No.5, p.489-493 (1995).
16. Chou C.-C., Tochitsky S.Ya., Shy J.-T., Maki A.G., Evenson K.M. Heterodyne frequency measurements of sequence band transitions of CO<sub>2</sub> laser stabilized by the 4.3 μm fluorescence technique// *J. Mol. Spectrosc.* v.172, No.2, p.233-242 (1995).
17. Tochitsky S.Ya., Chou C.-C., Shy J.-T. Frequency stabilization of the sequence band CO<sub>2</sub> laser using 4.3 μm fluorescence method// *IEEE J. Quantum Electron.* v.31, No.7, p.1223-1230 (1995).
18. Barbini R., Cosma B., Palucci A., Ricci C., Tochitsky S.Ya. Dual-wave compact CO<sub>2</sub> laser for atmosphere monitoring at LIDAR/DIAL station// *Energia Ambiente Innovazione.* v.12, No.3, p. 33-38 (1996).
19. Tochitsky S.Ya., Gorobetz V.A., Petukhov V.O., Churakov V.V., Jakimovich V.N., Efficient continuous wave frequency doubling of a tunable CO<sub>2</sub> laser in AgGaSe<sub>2</sub>// *Applied Optics.* v.36, No.9, p. 1882-1888 (1997).
20. Gorobetz V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Study of simultaneous oscillation on several given transitions in a cw CO laser// *Appl.Phys.B.* v.64, No.3, p.423-427 (1997).
21. Tochitsky S.Ya., Butcher R.J. Precise measurements of line broadening and line shifts in low-pressure gases using a heterodyne CO<sub>2</sub> laser spectrometer: applications to C<sub>2</sub>H<sub>4</sub> and CH<sub>3</sub>OH// *JOSA B.* v.15, No.4, p.1392-1398 (1998).
22. Gorobetz V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Remote detection of sulfur dioxide by means of CO<sub>2</sub> laser// *Journal of Applied Spectroscopy* v.65, No.4, p.526-534 (1998).
23. Gorobetz V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. A three-color CO laser// *Instruments and Experimental Tech.* v. 41, No.3, p.388-392 (1998).
24. Gorobetz V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Study of nonlinear-optical characteristics of IR crystals for TEA CO<sub>2</sub> laser frequency conversion// *Journal of Optical Technology* v.66, No.1, p.62-67 (1999).
25. Tochitsky S.Ya., Narang R., Filip C., Clayton C.E., Marsh K.A., Joshi C. Generation of 160 ps, terawatt power CO<sub>2</sub> laser pulses// *Optics Letters* v.24, No.12, p. 1717-1719 (1999).
26. Tochitsky S.Ya., Filip C., Narang R., Clayton C.E., Marsh K.A., Joshi C. Efficient shortening of self-chirped picosecond pulses in a high-power CO<sub>2</sub> amplifier// *Optics Letters* v.26, No.11, p.813-815 (2001).
27. Filip C., Narang R., Tochitsky S.Ya., Clayton C.E., Joshi C., Optical Kerr switching technique for the production of a picosecond, multiwavelength CO<sub>2</sub> laser pulse// *Applied Optics.* v.41, No.18, p. 3743-3747 (2002).
28. Filip C., Tochitsky S.Ya., Narang R., Clayton C.E., Joshi C., Collinear Thomson scattering diagnostic system for the detection of relativistic waves in low-density plasmas// *Review of Scientific Instruments.* v.74, No.7, p. 3576-3578 (2003).
29. Filip C., Narang R., Tochitsky S.Ya., Clayton C.E., Musumeci P., Yoder R.B., Rosenzweig J.B., Pellegrini C., Joshi C., Non-resonant beat-wave excitation of

- constant phase-velocity, relativistic plasma waves for charged-particle acceleration // Phys. Rev. E. v. 69, 026404 (2004).
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  35. Tochitsky S.Ya., Sung C., Trubnick S.E., Joshi C., and Vodopyanov K.L. High-power tunable, 0.5-3 THz radiation source based on nonlinear difference frequency mixing of CO<sub>2</sub> laser lines // JOSA B. v.24, 2509-2516 (2007).
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  37. Tochitsky S.Ya., Williams O.B., Musumeci P., Sung C., Haberberger D.J., Cook A.M., Rosenzweig J.B., and Joshi C., Efficient Harmonic microbunching in the 7<sup>th</sup>-order inverse-free-electron laser interaction// Phys. Rev. STAB V. 12, 050703 (2009).
  38. Cook A.M., Tikhoplav R., Tochitsky S.Ya., Travish G., Williams O.B., Rosenzweig J.B., Observation of narrow-band Terahertz coherent Cherenkov radiation from a cylindrical dielectric-lined waveguide// Phys. Rev. Lett. V. 103, 095003 (2009).
  39. Haberberger D.J., Tochitsky S.Ya., and Joshi C., 15 Terawatt picosecond CO<sub>2</sub> laser system // Optics Express. v.18, (2010).
  40. Tsung F., Tochitsky S. Ya., Haberberger D.J., Mori W., and Joshi C., CO<sub>2</sub> laser acceleration of collimated MeV proton beams in a gas target at critical plasma density// Physics of Plasma (to be published).

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41. Bertel' I.M., Petukhov V.O., Pivovarchik V.F., Tochitsky S.Ya., Churakov V.V. A stabilized CO<sub>2</sub> laser oscillating on 600 lines in the range of 9.1-11.8  $\mu\text{m}$ // Digest of

- Conference "Inversion of population and lasing on atomic and molecular transitions," 1986. Tomsk, USSR, p.107.
42. Petukhov V.O., Pivovarchik V.F., Tochitsky S.Ya., Churakov V.V. A cw CO<sub>2</sub> laser oscillating simultaneously on two lines of different bands: 00<sup>0</sup>1- 10<sup>0</sup> (02<sup>0</sup>), 00<sup>0</sup>2- 10<sup>0</sup>1(02<sup>0</sup>1) and 01<sup>1</sup>1-11<sup>1</sup>0// Digest of Conference "Inversion of population and lasing on atomic and molecular transitions," 1986. Tomsk, USSR, p.161.
  43. Tochitsky S.Ya., Solodukhin A.S. A tunable cw CO<sub>2</sub> laser for diagnostic of gas lasers// Kinetic and Gas dynamic processes in nonequilibrium media, ed. Prokhorov A.M., Moscow State University, 1986, p.54-55.
  44. Bertel' I.M., Petukhov V.O., Pivovarchik V.F., Starovoitov V.S., Tochitsky S.Ya., Churakov V.V. Determination of CO<sub>2</sub> molecule vibrational temperatures based on the line overlapping of individual rotational-vibrational transitions// Digest of the 11<sup>th</sup> International Conference on Infrared and Millimeter waves, Tirrenia, Pisa, Italy. 1986. p.446-448.
  45. Churakov V.V., Petukhov V.O., Tochitsky S.Ya. Simultaneously oscillating on the arbitrary line pair of 00<sup>0</sup>1- 10<sup>0</sup> (02<sup>0</sup>), 00<sup>0</sup>2- 10<sup>0</sup>1(02<sup>0</sup>1) and 01<sup>1</sup>1-11<sup>1</sup>0 bands TEA CO<sub>2</sub> laser //Digest of the 11<sup>th</sup> International Conference on Infrared and Millimeter waves, Tirrenia, Pisa Italy. 1986. p.536-538.
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  47. Tochitsky S.Ya. Active medium optimization of a 4.3 μm TE CO<sub>2</sub> laser// Digest of IV Conference on Kinetic and Gas dynamic processes in gas media.-Krasnovidovo, USSR, 1988. p.65-66 (in Russian).
  48. Petukhov V.V., Tochitsky S.Ya., Churakov V.V. Dual-wavelength oscillation on IR transitions of inert gases and CO<sub>2</sub> in one active medium// Proceedings of 4<sup>th</sup> International conference on infrared physics. ETH. Zurich. Switzerland,1988, p.401-403.
  49. Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Oscillation in the region of 4.2-4.5 μm from a combine excited TE CO<sub>2</sub> laser: influence of nonlinear effects// Digest of IV ILS Conference, Atlanta, USA, 1988. p.88.
  50. Petukhov V.O., Tochitsky S.Ya., Trushin S.A., Churakov V.V. Powerful oscillation in 4.2-4.5 μm TE CO<sub>2</sub> laser with combined excitation// Technical Digest of 13<sup>th</sup> International Conference on Coherent and Nonlinear Optics, Minsk, Belarus, 1988, vol. 2, p.276-277.
  51. Petukhov V.O., Tochitsky S. Ya., Churakov V.V. Intensity-driven polarization switching in the optically pumped 4.3 μm CO<sub>2</sub> laser// Digest of VI ILS Conference.- Minneapolis, USA, 1990. p.29.
  52. Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Two-wavelength laser for atmosphere monitoring// Digest of the International Conference Laser Optics'90, St.Petersburg, Russia, 1990. p.165 (in Russian).
  53. Chou C.C., Tochitsky S.Ya., Shy J.T., Evenson K.M. Precision heterodyne frequency measurements of CO<sub>2</sub> sequence band laser transitions// Proceedings of the Third Conference of the Chinese Metrology Society, Taipei, Taiwan. 1994. p.120-132.
  54. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Field mechanism of simultaneous oscillation on several transition in cw CO<sub>2</sub> and CO lasers// Technical

- digest of Conference on Lasers and Electro-Optics Europe, (CLEO/Europe 94 ), Amsterdam, The Netherlands, 28 August - 2September, 1994, p.142.
55. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V., Fomin A.I., Jakimovich V.N. Second harmonic conversion of cw CO<sub>2</sub> laser radiation in AgGaSe<sub>2</sub>// Technical Digest of the 15<sup>th</sup> International Conference on Coherent and Nonlinear Optics, St.Petersburg, Russia, 1995. Vol.2, p.235-236.
  56. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Stabilized CW CO<sub>2</sub> (CO) laser with automatic tuning over oscillation lines for monitoring of air pollutants// Proceedings of SPIE (LALS'94), 1995, vol.2370, pp.640-644.
  57. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. TEA CO<sub>2</sub> laser tunable over the lines of regular and nontraditional bands designed for lidar systems// Proceedings of SPIE (LALS'94) ,1995, vol.2370, pp.632-639.
  58. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V., Fomin A.I., Jakimovich V.N. CO<sub>2</sub> laser with a frequency doubling in the nonlinear output mirror// Digest of the 8th International Conference Laser Optics'95 , St.Petersburg, Russia, 1995. p.157-158.
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  60. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. TEA CO laser monitoring of air pollutants on the hot band lines in the range of 10.8 -11.4 μm// Digest of the 6th International Conference on Laser Applications in Life Sciences, Jena, Germany, 23/9-27/9, 1996, P2-30.
  61. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. A comparative study of AgGaSe<sub>2</sub> and ZnGeP<sub>2</sub> for frequency doubling of CW CO<sub>2</sub> laser radiation// Advance Program of International Conference LASERS'97, December 15-19, New Orleans, USA.
  62. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Tunable over lines of regular and non-regular bands CO<sub>2</sub> LIDAR/DIAL for environmental monitoring// Advance Program of International Conference LASERS'97, December 15-19, New Orleans, USA.
  63. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Multiwavelength CO laser for remote probing gas pollutants in atmosphere// Digest of International Conference on Optical Methods in Ecology, St.Petersburg, Russia, 1997. p.57 (in Russian).
  64. Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Sulfur dioxide remote detection using a 9 μm CO<sub>2</sub> laser// Proceedings of the International Conference on LASERS'98, Tucson, AZ, December 7-11, 1998, ed. by Corcoran V.J., McLean, VA, USA, Society Opt. & Quantum Electron.1999, pp. 301-306.
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  66. Bertel' I.M., Gorobets V.A., Petukhov V.O., Tochitsky S.Ya., Churakov V.V. Sulfur dioxide remote detection using a CO<sub>2</sub> laser// Book of abstracts of the International

- Seminar "CO<sub>2</sub> lasers - physics and applications", Gdansk-Sopot, 17-20 October 1998, pp.70-71.
67. Jakimovich V.N., Tochitsky S.Ya., Petukhov V.O., Gorobets V.A., V.I.Konstantinov, Growth and characterisazion of nonlinear optical crystals for the mid-infrared region// Book of abstracts of the 12<sup>th</sup> International Conference on Crystals Grows, August 1998, Jerusalem, Israel, p. 264.
  68. Roth M., Angert N., Tseitlin M., Wang G, Han T.P.J., Gallagher H.J., Barilo S.N., Kurnevich L.A., Petukhov V.O., Tochitsky S.Ya., Gorobets V.A. and Leonyuk N.I. New NLO Solids: Borates, Phosphates, Phosphides, Selenides// E-MRS 1999 Spring Meeting, Strasbourg, France, June 1-4, 1999, Abstracts, K801.
  69. Roth M., Angert N., Tseitlin M., Wang G, Han T.P.J., Gallagher H.J., Barilo S.N., Kurnevich L.A., Petukhov V.O., Tochitsky S.Ya., Gorobets V.A., Leonyuk N.I. and Koporulina E.V. Novel Borate, Phosphate, Phosphide and Selenide Crystals for Non-Linear Optical Applications// The 5th IUMRS Intern. Conference on Advanced Materials, Beijing, China, June 13-18, 1999, Abstracts, Vol.1, p.544.
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