

CURRICULUM VITAE

Dr. Alexander E. Kaplan

May 5, 2007

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Research Field: *Lasers, Quantum Electronics, and Nonlinear Optics*

Education: 1967 - *Ph.D. in Physics&Math.*, ex-USSR Acad. of Sciences, Inst. of Radio-Eng.&Electronics, Moscow, and Gorky St. Univ., ex-USSR.
1955 - 1961 - *M.S. Degree in Physics*, Moscow Physical-Technical Inst. (Moscow Inst. of Physics & Technology), Moscow, ex-USSR.

Biography Listing: "American Men and Women of Science", 1980 and later Edns
"Men of Achievement", XIII Edition (London, UK), 1989 and later
"Intern. Directory of Disting. Leadership", Am. Bio. Inst., 1989 and later
"Who's Who in Sci.&Eng.", Marquis W's/W in America, 1992 and later
"Who's Who in American Education", Marquis W's/W in America
"Who's Who in America", Marquis, 1996 and later
"Who's Who in the World", Marquis 1998 and later

Employment:

Summer, 07 *Intern. Visiting Professor, Inst. of Advanced Energy, Kyoto Univ.*, Kyoto, Japan
Jan. 87 - present *Professor, Electr. & Comp. Eng. Dept., The Johns Hopkins University*, Baltimore, MD 21218.
Sept. 96 - Jan. 97 *Alexander von Humboldt Prof.*, on sabbatical leave at *the Univ. of Ulm, Quantum Phys. Dept.*, Ulm, D-89069 Germany
Sept. 82 - Dec. 86 *Professor, School of Electr. Eng., Purdue Univ.*, W. Lafayette, IN 47907.
Dec. 79 - Aug. 82 *Research Staff Member, Mass. Inst. of Technology*, F. Bitter Natl. Magnet Lab., Cambridge, MA 02139.
June - Sept. 81 *Guest Scientist, Max-Planck-Inst. für Quantenopt.*, 8046 Garching, Germany
1963 - Aug. 1979 *Research Staff Member*, various Institutes of *the ex-USSR Academy of Sciences*, Moscow, ex-USSR.
1961 - 1963 *Research Scientist*, Radio R&D Lab., Moscow County, ex-USSR.

Consulting: Bell Labs, Holmdel, N.J. (1980-81)
Los Alamos Lab., Los Alamos, NM (1981)
Honeywell Res. Center, Minneapolis, MN (1982)

Publications: Co-author of *two monographs*:
"Resonant Nonlinear Interaction of Light with Matter," Springer, 1989 (expanded&updated translation from a Russian edn. of 1976).
"Parametric Oscillators and Frequency Dividers," 1966 ("Sov. Radio," Moscow, in Russian). About 370 technical publications; see list attached.

Teaching: EE 420, Electronic & Optical Properties of Materials (1992)
EE 482, Introduction to Lasers (1993; 95; 97-2002)
EE 725, Quantum Electronics (1993; 95; 98)
EE 726, Nonlinear Optics (1984; 86; 89-91, 1994; 98; 04; 05).

EE 720, Res. Sem. Sld. St., QE, Nonl. Opt. (1988-1995, 99, 2002, 06, 07)
EE 775, Theory of Nonlinear Systems (1983)
EE 414, Fundamentals of Optical Electronics (1983)
EE 410, Fiberoptics and Photonics (1996; 97)
EE 457, Basics of quantum mechanics for engineers (1998-2007)

Supervision: Six students obtained M.S. degrees in EE (1985-98)
and advising Three students obtained Ph.D. degrees in EE (1987 and 1990)
Support & supervision of a post-doc (five post-docs from 1987)

Hosting Intern. Prof. B. Akanaev of Kazakh Natl. Univ., Kazakhstan, Fulbright Scholar;
Guest Scientists: Prof. A. Lago, Univ. Federal de S. Catarina, Brazil; Dr. I. Marzoli, Italy.

Citation Rate: About 150/year citations in 1990-2006 by other workers, according to "Science Citation Index"

Funding : Principal Investigator in the projects funded by AFOSR and other agencies;
total personal funding within last 27 years exceeded \$4,800,000.

Honors & Awards : *Fellow of the Opt. Soc. of Am.* since 1984
1996, *Alexander von Humboldt Award for senior USA scientists* by the AvH
Foundation of Germany
2005 Max Born Award of Optical Society of America

Activities as a Referee: Phys. Rev. Lett. Phys. Rev. Applied Optics
Optics Letter J. Appl. Phys. Opt. Commun.
Appl. Phys. Letters J. Opt. Soc. Am. Phys. Lett.
IEEE J. Quant. Electron.

Other Activities: Proposal reviewer for NSF, Army Basic Res. Comm., Natl. Res. Counsl,
DoE, Intl. Sc. Found. (Soros Fund), and Bintl. Sc. Fnd. (Israel+US)

Panel member and *Program Committee member* at technical conferences in
the field; *member* of PR Committee of OSA
Invited and Keynote Speaker at various technical conferences.
Organizer and Presider of a workshop on "*Quantum optical phenomena with
single particles*" at the 1986 Annual Meeting of OSA
Guest Editor for Spec. Issue of IEEE J. Quant. Electr. (July'88) on "*Quant.
and Nonl. Optics of Single Electrons, Atoms, and Ions*".
Member of a Natl. Panel on "Math. for Material Sciences", 1991-92.
Member of ASAT US-USSR Laser Verification Meeting, June'91.
Organizer&coordinator of computer professional network INFO-RUSS (1500
subs.) for academic community of emigres from ex-USSR (1991-2000)
Organizer&coordinator of the Web-list of International Nonlinear Optics
research & academic community (350 links).
Edit. Board Member for "J. of Nonlinear Optical Physics & Materials".
Edit. Board Member for Int. Journal "Optics Communications" (1997-99)

Invited Seminars: More than 140 invited lectures and seminars within the last 25 years at various
Universities and govern. & industrial labs in the USA (including MIT,
Princeton, Bell Labs, IBM, GTE and others) and abroad (Canada, France,
Germany, Austria, Italy, Israel, Spain, England, Belgium, and Russia).

Profess. Societies Membership: Optical Society of America (*Fellow*)
The American Physical Society (Member)

Citizenship: US citizen. (Born: 1938 in the ex-USSR; immigrated to the US in 1979).

Languages: English, Russian.

Selected journal papers of A. E. Kaplan within last 16 years

- [1] C. T. Law and A. E. Kaplan, "Instabilities and amplification of counterpropagating waves in a Kerr nonlinear medium", J. Opt. Soc. Am. B **8**: 58-67 (1991).
- [2] G. A. Swartzlander (JHU), D. R. Andersen, J. J. Regan (U. of Iowa), H. Yin and A. E. Kaplan (JHU), "Spatial dark-soliton stripes and grids in self-defocusing materials", Phys. Rev. Lett. **66**: 1583-1585 (1991).
- [3] C. T. Law and A. E. Kaplan, "Dispersion-related amplification in a nonlinear fiber pumped by counterpropagating waves," Opt. Lett. **16**: 461-463 (1991).
- [4] C. L. Guo, Y. J. Ding, S. Li, J. B. Khurgin, C. T. Law, A. E. Kaplan, K.-K. Law, J. Stellato, and L. A. Coldren, "Strong excitonic nonlinearity in a *pin* diode incorporating narrow asymmetric coupled quantum wells," Opt. Lett. **16**: 949-951 (1991)
- [5] P. L. Shkolnikov and A. E. Kaplan, "On the feasibility of X-ray resonant nonlinear effects in plasmas", Opt. Lett. **16**: 1153-1155 (1991)
- [6] Y. J. Ding, C. L. Guo, S. Li, J. B. Khurgin, C. T. Law, A. E. Kaplan, K.-K. Law, J. Stellato, and L. A. Coldren, "Observation of anomalously large blue shift of the excitonic transition and optical bistability in narrow asymmetric coupled quantum wells," Appl. Phys. Lett., **59**: 1025-1027 (1991).
- [7] P. L. Shkolnikov and A. E. Kaplan, "'Discharge Plasma - X-ray Laser" resonant couples for X-ray nonlinear optics," Phys. Rev. A, **44**: 6951-6953 (1991).
- [8] P. L. Shkolnikov and A. E. Kaplan, "X-ray third harmonic generation in plasmas of alkali-like ions", Opt. Lett. **16**: 1973-1975 (1991).
- [9] Y. J. Ding and A. E. Kaplan, "Nonlinear magneto-optical effects in vacuum: inhomogeneity-originated second harmonic generation in a dc magnetic field," Intern. J. Nonl. Opt. Phys. **1**:51-72 (1992).
- [10] P. L. Shkolnikov, A. E. Kaplan (JHU), and M. H. Muendel and P. L. Hagelstein (MIT), "X-ray laser frequency near-doubling and generation of tunable coherent X-rays in plasma", Appl. Phys. Lett., **61**:2001-2003 (1992).
- [11] P. L. Shkolnikov and A. E. Kaplan, "Proposal for 19.9 nm laser in Li pumped by a noncoherent X-ray pulse" JOSA B, **9**: 2128-2131 (1992).
- [12] R. H. Enns, S. S. Rangnekar (Simon Fraser Univ.), and A. E. Kaplan (JHU), "Optical switching between bistable soliton states: a theoretical review", Optical & Quantum Electronics, **24**: 1295-1314 (1992).
- [13] A. E. Kaplan, "Eigenmodes of $\chi^{(2)}$ wave-mixings: cross-induced 2-nd order nonlinear refraction", Opt. Lett. **18**: 1223-1225 (1993).
- [14] P. L. Shkolnikov, A. E. Kaplan, and A. Lago, "Phase matching for large-scale frequency upconversion in plasma", Opt. Lett., **18**: 1700-1702 (1993).
- [15] A. E. Kaplan and G. A. Swartzlander, "Self-bending of light: comment", Opt. Lett. **19**: 71 (1994).
- [16] A. E. Kaplan and P. L. Shkolnikov, "Super-dressed two-level atom: very high order harmonic generation and multi-resonances", Phys. Rev. A. **49**, 1275-1280 (1994).
- [17] E. Hudis, P. L. Shkolnikov, and A. E. Kaplan, "X-ray stimulated electronic Raman scattering in Li and He", Appl. Phys. Lett. **64**, 818-820 (1994).
- [18] A. E. Kaplan, P. L. Shkolnikov, and B. A. Akanaev, "Bright-bright 2π -Solitons in Stimulated Raman Scattering", Optics Letters **19**, 445-447 (1994).
- [19] E. Hudis and A. E. Kaplan, "Ionization-front Soliton in the X-ray Stimulated Raman Scattering" Optics Letters **19**, 616-618 (1994)
- [20] E. Hudis, P. L. Shkolnikov, and A. E. Kaplan, "X-ray stimulated electronic Raman scattering in neutral gases and inhibited ionization", JOSA B **11**, 1158-1165 (1994).

- [21] A. E. Kaplan, "Subfemtosecond Pulses in Mode-locked 2π -Solitons of the Cascade Stimulated Raman Scattering", Phys. Rev. Lett. 73: 1243-1246 (1994).
- [22] P. L. Shkolnikov, A. E. Kaplan, and A. Lago, "Phase-matching optima for high-order multiwave mixing and harmonic generation beyond perturbation limit", Optics Communications III: 93-98 (1994).
- [23] P. L. Shkolnikov, A. Lago, and A. E. Kaplan, "Optimal quasi-phase-matching for high-order harmonic generation in gases and plasma", Phys. Rev. A 50: 4461-4464 (1994).
- [24] A. E. Kaplan and E. Hudis, "Modulation-Induced Multi-Transparency, Inhibition of Dynamics and High Order Frequency Mixing in a Periodically Driven Two-level Atomic System", Laser Physics, 5: 479-485 (1995).
- [25] A. E. Kaplan and P. L. Shkolnikov, "Electromagnetic "Bubbles" and Shock Waves: Unipolar, Nonoscillating EM-Solitons", Phys. Rev. Lett. 75: 2316-2319 (1995).
- [26] A. Lago, A. T. Obeidat, A. E. Kaplan, J. B. Khurgin, P. L. Shkolnikov, and M. D. Stern, "Two-photon induced fluorescence of biological markers using optical fibers", Opt. Lett. 20: 2054-2057 (1995).
- [27] A. E. Kaplan, C. T. Law, and P. L. Shkolnikov, "X-ray Narrow-line Transition Radiation Source Based on Low-Energy Electron Beams Traversing a Multilayer Nanostructure", Phys. Rev. E., 52: 6795-6808 (1995).
- [28] A. E. Kaplan and P. L. Shkolnikov, "Subfemtosecond High-Intensity Unipolar Electromagnetic Solitons and Shock Waves", Int. J. of Nonlinear Optical Physics & Materials, 4: 831-842 (1995).
- [29] P. L. Shkolnikov, A. E. Kaplan, and A. Lago, "Phase-matching optimization of large-scale nonlinear frequency upconversion in neutral and ionized gases", JOSA B 13: 347-354 (1996).
- [30] A. E. Kaplan and P. L. Shkolnikov, "Subfemtosecond Pulses in the Multi-Cascade Stimulated Raman Scattering", JOSA B 13: 412-423 (1996).
- [31] A. E. Kaplan, S. F. Straub and P. L. Shkolnikov, "Electromagnetic bubble generation by half-cycle pulses", Opt. Lett., 22: 405-407 (1997)
- [32] P. L. Shkolnikov and A. E. Kaplan, "Laser-induced cascade particle production and nuclear reactions", J. of Nonl. Opt. Phys. & Materials, 6, 161-167 (1997).
- [33] A. E. Kaplan, S. F. Straub and P. L. Shkolnikov, "Electromagnetic bubbles: sub-cycle, near- and sub-femtosecond solitons", JOSA B, 14:3013-3024 (1997).
- [34] A. T. Obeidat, A. E. Kaplan, J. B. Khurgin and M. Stern, "Single-Fiber Two-Photon Fluoroprobe for Biological Markers", J. of Nonl. Opt. Phys. & Materials, 6: 305-312 (1997).
- [35] P. L. Shkolnikov, A. E. Kaplan, A. Pukhov and J. Meyer-ter-Vehn, "Feasibility of particle production and nuclear reactions in cascade processes initiated by a sub-terawatt femtosecond laser", Appl. Phys. Lett. 71:3471-3473 (1997).
- [36] A. E. Kaplan, "Diffraction-induced transformation of near-cycle and sub-cycle pulses" JOSA B, 15: 951-956 (1998).
- [37] A. E. Kaplan, P. Stifter, K.A.H. van Leeuwen, W. E. Lamb, Jr. and W. P. Schleich, "Intermode Traces -- Fundamental Interference Phenomenon in Quantum and Wave Physics", Physica Scripta T 76: 93-97 (1998).
- [38] I. Marrzoli, F. Saif, I. Bialynicki-Birula, O. M. Friesch, A. E. Kaplan, and W. P. Schleich, "Quantum Carpets Made Simple", Acta Physica Slovaca, 48: 1-10 (1998).
- [39] P. L. Shkolnikov, A. E. Kaplan, and S. F. Straub, " δ -ionization: stratified symmetrical electron emission and resonantly structured ionization continuum", Phys. Rev. A, 59: 490-494 (1999).
- [40] A. E. Kaplan, I. Marzoli, W. E. Lamb Jr., and W. P. Schleich, "Multimode interference: Highly regular pattern formation in quantum wave packet evolution" Phys. Rev. A, 61: 032101-(1-6) (2000).

- [41] A. E. Kaplan and Y. J. Ding, "Field-gradient-induced second-harmonic generation in magnetized vacuum" *Phys. Rev. A*, 62, 043805-(1-9) (2000).
- [42] A. E. Kaplan and P. L. Shkolnikov, "Lasetron: a proposed source of powerful nuclear-time-scale electromagnetic bursts", *Phys. Rev. Lett.* 88, 074801-(1-4), (2002).
- [43] A. E. Kaplan and P. L. Shkolnikov, "Reply to Comment on "Lasetron: a proposed source of powerful nuclear-time-scale electromagnetic bursts", *Phys. Rev. Lett.*, 89, 199502 (2002).
- [44] A. E. Kaplan and P. L. Shkolnikov, "Reply to Comment on "Lasetron: a proposed source of powerful nuclear-time-scale electromagnetic bursts", *Phys. Rev. Lett.*, 89, 279502 (2002).
- [45] A. E. Kaplan, B. Y. Dubetsky, and P. L. Shkolnikov, "Shock-shells in Coulomb explosion of nanoclusters", *Phys. Rev. Lett.*, 91, 143401(1-4) (2003).
- [46] A. E. Kaplan, "The long and the short of it... Time: how much of the cosmological time-scale do we control and use?", *NATURE*, 431, 633 (2004)
- [47] A. E. Kaplan and P. L. Shkolnikov, "Radiation efficiency of water-window Cherenkov sources using atomic shell resonances", *Appl. Phys. Letts.*, 86, 024107 (1-3) (10 Jan., 2005)
- [48] A. E. Kaplan and S. G. Zykov, "Coherency saturation in periodic structures with randomization", *JOSA B*, 22, 547-555 (March, 2005)
- [49] A. E. Kaplan and A. L. Pokrovsky, "Fully relativistic theory of the ponderomotive force in an ultraintense standing wave", *Phys. Rev. Lett.*, 95, 053601(1-4) (29 July, 2005)
- [50] A. L. Pokrovsky and A. E. Kaplan, "Relativistic reversal of the ponderomotive force in a standing laser wave", *Phys. Rev. A*, 72, 043401(1-12) (11 October, 2005).
- [51] A. E. Kaplan and B. Ya. Zeldovich, "Free-space terminator and coherent broad-band black-body interferometry", *Optics Letters*, 31, 335-337 (February 1. 2006).
- [52] A. E. Kaplan, "In the middle of nowhen: The long and short of time", *Optics & Photonics News (OPN)*, 17, 28-33 (February, 2006).
- [53] A. E. Kaplan, "Tribute to an Unknown Physicist", *Optics & Photonics News (OPN)*, 17, 34-39, (September, 2006).
- [54] A. L. Pokrovsky, A. E. Kaplan, and P. L. Shkolnikov, "Transition radiation in metal-metal multi-layer nanostructures as a medical source of hard-Xray radiation", *J. Appl. Phys.*, 100, 044328(1-8), (September, 2006)