CURRICULUM VITAE

Alexey Belyanin
Department of Physics & Astronomy, Texas A&M University,
College Station, TX 77843-4242
Phone: (979) 845-7785, Fax: (979) 845-2590
E-mail: belyanin@tamu.edu
http://people.physics.tamu.edu/belyanin/

Main Fields of Research

Coherent and ultrafast optical phenomena
Nonlinear optics
Physics of semiconductors, nanostructures, and novel materials
Physics of optoelectronic devices
Quantum optics and electrodynamics
Plasma physics, astrophysics, and cosmology

Education

PhD in Physics from the Institute of Applied Physics of the Russian Academy of Sciences (1995).
M.S. in Physics with honors from Nizhny Novgorod State University (1989).

Appointments

Sept. 2013-present: Professor and Associate Head, Department of Physics & Astronomy, Texas A&M University
Sept. 2010-present: Professor, Department of Physics, Texas A&M University
Sept. 2007 – 2010: Associate Professor, Department of Physics, Texas A&M University
Sept. 2003 – 2007: Assistant Professor, Department of Physics, Texas A&M University
Sept. 1999 – August 2003: Assistant Research Scientist, Department of Physics, Texas A& M University
1989-1999: Junior Research Scientist, Research Scientist, Senior Research Scientist, Institute of Applied Physics of the Russian Academy of Sciences
1992-1999: Part-time professor at Nizhny Novgorod State University

Awards and Honors

- Fellow, Optical Society of America (OSA), 2018
- Fellow, International Society for Optics and Photonics (SPIE), 2015
- Fellow, American Physical Society, 2012
- JoAnn Treat Research Excellence Award, 2007
- NSF CAREER Award, 2006
- University of Jena, Abbe School of Photonics Lectureship, 2011

- Lund University Lectureship, 2011
- Russian Academy of Science Award for Outstanding Young Investigators, 1998
- President of Russian Federation Scholarship for Outstanding Young Scientists, 1993-1996
- Open Society Fellowship, 1993-1995

Teaching Experience

- Physics 485 "Cavity QED, nanophotonics, and quantum information", 2019-2021
- Physics 309 "Modern physics", Spring 2017, 2018, 2019, 2020
- Physics 649 "Physics of optoelectronic devices", Spring 2011, 2015, 2016, 2021
- Physics 302-303 "Advanced Mechanics", Fall 2011-Spring 2014
- New graduate course Physics 689 "Physics of optoelectronic devices", Spring 2007, 2008, and 2009
- ASTR 314 "Survey of Astronomy", Texas A&M University, Spring 2010
- Physics 218 "Mechanics", Fall 2007 and 2008, Summer and Fall 2009, Summer 2010 and 2011.
- Physics 306 "Basic Astronomy", 2004-2006.
- Faculty advisor, Society of Physics Students, TAMU Chapter: Sept. 2006-present. Weekly or bi-weekly meetings with undergraduate physics majors, ~ 10 tutorial lectures per year.
- Physics 219 "Electricity and Magnetism", 2001.
- "Theoretical Mechanics", Nizhny Novgorod State University, 1994-1998.
- Public lectures, Nizhny Novgorod Planetarium, 1994-1999. Over 300 lectures. Over 20 new shows created

Funding

(i) Current grants:

AFOSR: Pico-cavity QED: a new materials platform for room-temperature control of quantum coherence, 2021-2025

NSF EAGER: Collaborative Research: Electrically Pumped Monolithic Bi-photon emitters, 2021-2022

NSF: QII – TAQS: Quantum Circuits through Symmetry-driven Valley Optoelectronics, 2019-2023

AFOSR: Nonlinear and THz studies of electro-optic and magneto-electric materials, 2014-2021

NSF: Compact room temperature operated THz emitters with scalable architecture and low electric power consumption, 2017-2020

NSF: Novel quantum cascade laser sources for terahertz sensing, 2018-2021

TAMU: T3 grant, X-grant, STRP grant, FAPESP-TAMU grant

(ii) Previous grants:

ONR: Fully Automated Quantum Cascade Laser Design Aided by Machine Learning with up to 100X Design Cycle Time Reduction, Phase I, 2020.

NSF: Quantum cascade laser sources of high-power, coherent frequency combs, 2016-2019

AFOSR: Nonlinear Optics and Electrodynamics of Systems with Massless Dirac Fermions, 2015-2018

NSF Engineering Research Center: "Mid-infrared Technologies for Health and the Environment (MIRTHE)" 2006-2016

NSF PIRE: "TERANO: Terahertz Dynamics in Nanostructures" 2011-2016

NSF: "Ultrashort pulses and frequency combs from mid-infrared quantum cascade lasers", 2012-2015.

NHARP: "Room-temperature electrically-pumped semiconductor sources of THz radiation 2010-2013"

US Dept. of Education: "FIPSE, United States-Russia Program: Improving Research and Educational Activities in Higher Education" 2010-2015

NSF PIRE: "U.S.-Japan Cooperative Research and Education: Ultrafast and Nonlinear Optics in 6.1-Angstrom Semiconductors" 2006-2011

NSF CAREER: "Active integrated nanostructure devices for infrared photonics and femtosecond pulse generation" 2006-2011

EU grant with Univ. Sheffield: "Exploring Short Wavelength Limits for High Performance Quantum Cascade Lasers" 2010-2013

NSF: "Room-temperature terahertz semiconductor Raman lasers" 2009-2012

AFOSR: "New widely tunable room temperature THz coherent sources", 2005-2008

NSF: New Types of Mid/Far-Infrared Semiconductor Lasers for CW Room-Temperature Operation, 2005-2008

AFOSR: New Mid/Far-Infrared CW Room-Temperature Semiconductor Lasers Based on Intralaser Wave Mixing, 2005-2008

DURIP 2006: Ultrafast imaging system for time-resolved studies and development of high-power mid/far-infrared semiconductor sources
Sponsor: AFOSR, 2006.

Synergistic and Outreach Activities:

Chair of the International Conference "Novel in-plane semiconductor lasers", held annually within the SPIE Symposium "Photonics West", 2008-2021.

Co-chair of the International Conference "Infrared and Terahertz Technologies for Health and Environment", held in 2005-2007 in Boston, MA, within the SPIE Symposium "Optics East".

Organizer of special sessions at the annual Winter Colloquium on the Physics of Quantum Electronics (PQE), 2003-2007, 2015, 2016, 2019

Program Committee member of the International Semiconductor Laser Conference (ISLC), 2017 and 2018.

Program Committee member of the 36th International conference "Infrared, mm, and THz waves", October 2011 (Houston).

Program Committee member of the International Quantum Cascade Laser School and Workshop, Cambridge UK, 2016.

Program Committee member of the International Symposium Fundamental & Applied Problems of Terahertz Devices & Technologies, Sendai, Japan 2016.

Faculty advisor for the Society of Physics Students, TAMU Chapter, since 2006.

Co-founder and organizer, Mitchell Institute Physics Enhancement Program (MIPEP): an intense 2-week summer program for high school physics teachers sponsored by the Mitchell Foundation and Texas A&M University. Every summer since 2012.

Review panelist for several NSF programs and other federal agencies: AFOSR, DARPA, ARPA-E, and ARO.

Frequent reviewer of papers submitted to Science, Nature journals, Physical Review Letters, Optics Letters, Nano Letters, Optics Express, ACS Nano, Applied Physics Letters, Physical Review A and B, and many other journals. Reviewer for McArthur Foundation.

Extensive outreach activity. Since 2003: hundreds of lectures and physics demonstrations for K-12 students, school teachers, and general public. Numerous invited lectures, demonstrations, and telescope viewing activities at the outreach programs and events on campus, such as Physics & Engineering Festival, Math Awareness Month, Saturday Morning Physics, International Year of Light, World Year of Physics, Expanding Your Horizons, Society of Hispanic Engineers, Youth Adventure Camp, Davidson Young Scholars, MIPEP, etc. Guest lectures for OSA and SPS Chapters. Some of these lectures are posted on my webpage http://faculty.physics.tamu.edu/belyanin/education.htm

Professional Societies:

- American Physical Society, Fellow
- International Society for Optics and Photonics (SPIE), Fellow
- Optical Society of America (OSA), Fellow

Publications:

- Number of papers in peer-reviewed journals: 160
- Reviews and Book Chapters: 8
- 5 US Patents
- Editor of the Proceedings of the International Conferences "Photonics West" (11 volumes) and "Optics East" (SPIE Proc. Vol. 6010 and 6386).
- Media coverage in news articles in Nature, Science, Nature Photonics, Laser Focus World, Optoelectronics Magazine, many online news servers, Aggie Daily News, College of Science News, etc.

Research Supervision:

Postdoctoral researchers:

Aleksander Wojcik: 2007-2013
Yongrui Wang: 2015-current

Graduate students:

Dmitry Pestov (co-advised with V. Kocharovsky): 2002-2004
Debin Liu: received MS in 2005
Feng Xie: received PhD in 2008 (Corning; now in Thorlab)
Venkata Chaganti: received MS in 2008
Don Smith: received PhD in 2013 (Freescale)
Yonghee Cho: received PhD in 2011 (Samsung)
Yongrui Wang received PhD in 2015 (research scientist at TAMU)
Xianghan Yao: received PhD in 2014
A. Ryan Kutayiah, 2013-2019 (PhD) (postdoc, Department of Chemistry, TAMU)

Zhongqu Long, 2014-2019 (PhD) (Google)
Sultan Almutairi, 2016-current
Qianfan Chen, 2017-current
Zicheng Wang, 2017-2019 (M.Sc.) (Software engineer at SAP)

PUBLICATIONS

Book Chapters:

1. A. Belyanin, F. Capasso, and M. Troccoli, Raman injection and inversionless intersubband lasers, Chapter 6, in: *Intersubband Transitions in Quantum Structures*, ed. by R. Paiella, McGraw-Hill, 2006, 181-236.

2. C. Gmachl, O. Malis, and A. Belyanin, Optical Nonlinearities in Intersubband Transitions and Quantum Cascade Lasers, Chapter 5, in: *Intersubband Transitions in Quantum Structures*, ed. by R. Paiella, McGraw-Hill, 2006, 237-284.

3. A. Belyanin, G.R. Welch, and M.O. Scully, Atomic Coherence Phenomena, in: *Encyclopedia of Modern Optics*, edited by Robert D. Guenther, Duncan G. Steel and Leopold Bayvel, Elsevier, Oxford, 2004, ISBN 0-12-227600-0, 247-255.

Patents:

1. Infrared generation in semiconductor lasers. Scully M.O., Belyanin A.A., Kocharovsky V.V., U.S. Patent granted on August 24, 2004 (No. 6,782,020).
2. Detecting infrared radiation. Boyd R.W., Haden C.R., Scully M.O., Belyanin A.A., Kocharovsky V.V., U.S. Patent Granted on May 4 2004 (Patent No. 6,730,910).
3. "Phase Matched Parametric Light Generation in Monolithically Integrated Intersubband Optical Devices", A. Belyanin, A.Y. Cho, C. Gmachl, O. Malis, M.L. Peabody, A.M. Sergeant, D.L. Sivco, Patent granted September 6, 2005. (Patent No. 6,940,639).
4. "Raman injection and inversionless lasers", A. Belyanin, F. Capasso, and M. Troccoli, Patent submitted to USPTO, Application 11/027,398.
5. "Method and apparatus for generating terahertz radiation", M. Belkin, F. Capasso, A. Belyanin, Patent No. 7,974,325 (2011).

Publications in peer-reviewed journals:

1. D. Kazakov, Defect-engineered ring laser harmonic frequency combs, Optica, accepted.
2. M. Tokman, Y. Wang, Q. Chen, L. Shteregas, and A. Belyanin, Generation of entangled photons via parametric down-conversion in semiconductor lasers and waveguides, Optica submitted; https://arxiv.org/abs/2108.03528.
3. M. Tokman, Q. Chen, M. Erukhimova, Y. Wang, and A. Belyanin, Quantum dynamics of open many-qubit systems strongly coupled to a quantized

electromagnetic field in dissipative cavities, Phys. Rev. A submitted; https://arxiv.org/abs/2105.14674.

4. J. Jiang, L. Shterengas, G. Kipshidze, A. Stein, A. Belyanin, G. Belenky, High-power narrow spectrum GaSb-based DBR lasers emitting near 2.1 μm, Opt. Lett. 46, 1967 (2021). https://doi.org/10.1364/OL.422536
5. A. Forrer, Y. Wang, M. Beck, A. Belyanin, J. Faist, and G. Scalari, Self-starting harmonic comb emission in THz quantum cascade lasers, Appl. Phys. Lett. 118, 131112 (2021). https://aip.scitation.org/doi/10.1063/5.0041339
6. X. Ju, Z. Hu, F. Huang, H. Wu, A. Belyanin, J. Kono, and X. Wang, Tunable ultrasharp terahertz plasma edge in a lightly doped narrow-gap semiconductor, Opt. Express 29, 9261 (2021).
7. Q. Chen, Y. Wang, S. Almutairi, M. Erukhimova, M. Tokman, and A. Belyanin, Dynamics and control of entangled electron-photon states in nanophotonic systems with time-variable parameters, Phys. Rev. A 103, 013708 (2021). https://journals.aps.org/pra/pdf/10.1103/PhysRevA.103.013708
8. M. May, T. Jiang, C. Du, K.-D. Park, X. Xu, A. Belyanin, and M. Raschke, Nanocavity clock spectroscopy: resolving competing exciton dynamics in WSe2/MoSe2 heterobilayers, Nano Lett. 21, 522 (2021). https://pubs.acs.org/doi/10.1021/acs.nanolett.0c03979
9. M. Tokman, M. Erukhimova, Y. Wang, Q. Chen, and A. Belyanin, Generation and dynamics of entangled fermion-photon-phonon states in nanocavities, Nanophotonics 10, 491 (2021). https://doi.org/10.1515/nanoph-2020-0353
10. M. Erukhimova, Y. Wang, M. Tokman, and A. Belyanin, Relaxation operator for quasiparticles in a solid, Phys. Rev. B 102, 235103 (2020).
11. Y. Wang and A. Belyanin, Harmonic frequency combs in quantum cascade lasers: time-domain and frequency-domain theory, Phys. Rev. A 102, 013519 (2020).
12. M. Piccardo, B. Schwarz, D. Kazakov, M. Beiser, N. Opacak, Y. Wang, S. Jha, J. Hillbrand, M. Tamagnone, W.T. Chen, A. Y. Zhu, L. L. Columbo, A. Belyanin, and F. Capasso, Frequency combs induced by phase turbulence, Nature 582, 360 (2020). News & Views: https://www.nature.com/articles/s41567-020-0945-2
13. S. Almutairi, Q. Chen, M. Tokman, and A. Belyanin, Four-wave mixing in Weyl semimetals, Phys. Rev. B. 101, 235156 (2020).
14. I.D.Tokman, Q. Chen, I.A. Shereshevsky, V.I.Pozdnyakova, I. Oladyshkin, M. Tokman, and A. Belyanin, Inverse Faraday effect in graphene and Weyl semimetals, Phys. Rev. B 101, 174429 (2020).
15. J. Jiang, L. Shterengas, A. Stein, G. Kipshidze, A. Belyanin, G. Belenky, Dual-wavelength Y-branch DBR lasers with 100 mW of CW power near 2 μm, IEEE Phot. Technology Lett. 32, 1017 (2020).
16. M. K. Alam, C. Niu, Y. Wang, We.Wang, Y. Li, C. Dai, T. Tong, X. Shan, E. Charlson, S. Pei, X.-T. Kong, Y. Hu, A. Belyanin, G. Stein, Z. Liu, J. Hu, Z. Wang, and J. Bao, Large graphene-induced shift of surface-plasmon resonances of gold

films: Effective-medium theory for atomically thin materials, Phys. Rev. Research 2, 013008 (2020).

17. Tao Feng, Leon Shterengas, Takashi Hosoda, Gela Kipshidze, Alexey Belyanin, Chu C. Teng, Jonas Westberg, Gerard Wysocki, and Gregory Belenky, Passively mode-locked 2.7 and 3.2 μm GaSb-based cascade diode lasers, IEEE/OSA Journal of Lightwave Technology 38, 1895 (2020).
18. Q. Chen, M. Erukhimova, M. Tokman, and A. Belyanin, Optical Hall effect and gyrotropy of surface polaritons in Weyl semimetals, Phys. Rev. B 100, 235451 (2019).
19. T. Jiang, V. Kravtsov, M. Tokman, A. Belyanin, and M. Raschke, Ultrafast coherent nonlinear nanooptics and nanoimaging of graphene, Nature Nanotechnology 14, 838 (2019). Media article: https://science.tamu.edu/news/2019/09/texas-am-physicist-alexey-belyanin-sheds-new-light-on-graphenes-properties-and-future-of-nanophotonic-device-design/
20. Q. Chen, A. Ryan Kutayiah, I. Oladyshkin, M. Tokman, and A. Belyanin, Optical properties and electromagnetic modes of Weyl semimetals, Phys. Rev. B 99, 075137 (2019).
21. M. Piccardo, D. Kazakov, B. Schwarz, P. Chevalier, A. Amirzhan, J. Hillbrand, S. Z. AlMutairi, Y. Wang, F. Xie, K. Lascola, S. Becker, L. Hildebrandt, R. Weih, A. Belyanin, and F. Capasso, Light and Microwaves in Laser Frequency Combs: An Interplay of Spatiotemporal Phenomena, IEEE J. Selected Topics Quant. Electron. 25 2908553 (2019).
22. N.N. Elkin, A.P. Napartovich, D.V. Vysotsky, C. Sigler, C.A. Boyle, J.D. Kirch, T. Earles, D. Botez, L.J. Mawst, and A. Belyanin, Analysis of mode competition in resonant leaky-wave coupled phase-locked arrays of mid-IR quantum cascade lasers, IEEE J. Quant. Electron. 55, 2300210 (2019).
23. M. Tokman, S. B. Bodrov, Y. A. Sergeev, A. I. Korytin, I. Oladyshkin, Y. Wang, A. Belyanin, and A. N. Stepanov, Second harmonic generation in graphene dressed by a strong terahertz field, Phys. Rev. B. 99, 155411 (2019).
24. F.C.B. Maia, B.T. O'Callahan, A.R. Cadore, I.D. Barcelos, L.C. Campos, K. Watanabe, T. Taniguchi, C. Deneke, A. Belyanin, M.B. Raschke, R.O. Freitas, Diode Behavior and Gate Voltage Control of Hybrid Plasmon-Phonon Polaritons in Graphene-Hexagonal Boron Nitride Heterostructures, Nano Lett. 19, 708 (2019).
25. M. Piccardo, M. Tamagnone, B. Schwarz, P. Chevalier, N. Rubin, Y. Wang, C.A. Wang, M.K. Connors, D. McNulty, A. Belyanin, and F. Capasso, Radio frequency transmitter based on a laser frequency comb, PNAS 116, 9181 (2019) www.pnas.org/cgi/doi/10.1073/pnas.1903534116
26. M. Piccardo, P. Chevalier, B. Schwarz, D. Kazakov, Y. Wang, A. Belyanin, and F. Capasso, Frequency-modulated combs obey a variational principle, Phys. Rev. Lett. 122, 253901 (2019).
27. M. Tokman, Z. Long, S. AlMutairi, Y. Wang, V. Vdovin, M. Belkin, and A. Belyanin, Purcell enhancement of the parametric down-conversion in two-

dimensional nonlinear materials, *Invited Paper*, Special Issue of the APL Photonics 4, 034403 (2019).

28. J. Jiang, L. Shterengas, T. Hosoda, A. Belyanin, G. Kipshidze, G. Belenky, GaSb-based diode lasers with asymmetric coupled quantum wells, Appl. Phys. Lett. 113, 071106 (2018).
29. M. Piccardo, D. Kazakov, N. A. Rubin, P. Chevalier, Y. Wang, K. Lascola, A. Belyanin, F. Capasso, Time-dependent population inversion grating in a laser frequency comb for microwave and terahertz generation, Optica 5, 475 (2018).
30. T. Feng, L. Shterengas, T. Hosoda, A. Belyanin, G. Kipshidze, Passive mode-locking of 3.25 μm GaSb-based cascade diode lasers, ACS Photonics 5, 4978 (2018).
31. A. Ryan Kutayiah, M. Tokman, Y. Wang, and A. Belyanin, Difference frequency generation of surface plasmon-polaritons in Landau quantized graphene, Phys. Rev. B. 98, 115410 (2018).
32. M. Piccardo, P. Chevalier, S. Anand, Y. Wang, D. Kazakov, E. A. Mejia, F. Xie, K. Lascola, A. Belyanin, and F. Capasso, Widely tunable harmonic frequency comb in a quantum cascade laser, Appl. Phys. Lett. 113, 031104 (2018).
33. M. Piccardo, P. Chevalier, T. S. Mansuripur, D. Kazakov, Y. Wang, N. A. Rubin, L. Meadowcroft, A. Belyanin, and F. Capasso, The harmonic state of quantum cascade lasers: origin, control, and prospective applications (*invited review*), Optics Express 26, 9464 (2018). *Editor's Pick*.
34. P. Chevalier, M. Piccardo, S. Anand, E. A. Mejia, Y. Wang, T. S. Mansuripur, K. Lascola, A. Belyanin, and F. Capasso, Watt-level widely tunable single-mode emission by injection-locking of a multimode Fabry-Perot quantum cascade laser, Appl. Phys. Lett. 112, 061109 (2018).
35. M. Tokman, Z. Long, S. AlMutairi, Y. Wang, M. Belkin, and A. Belyanin, Enhancement of the spontaneous emission in subwavelength quasi-two-dimensional waveguides and resonators, Phys. Rev. A 97, 043801 (2018).
36. V. Kravtsov, S. AlMutairi, R. Ulbricht, A. Ryan Kutayiah, A. Belyanin, M. B. Raschke, Enhanced third-order optical nonlinearity driven by surface-plasmon field gradients, Phys. Rev. Lett. 120, 203903 (2018).
37. Z. Long, Y. Wang, M. Erukhimova, M. Tokman, A. Belyanin, Magneto-polaritons in Weyl semimetals in a strong magnetic field, Phys. Rev. Lett. 120, 037403 (2018).
38. D. Kazakov, M. Piccardo, Y. Wang, P. Chevalier, T. S. Mansuripur, Chung-En Zah, K. Lascola, A. Belyanin, F. Capasso, Self-starting harmonic frequency comb generation in a quantum cascade laser, Nature Photonics 11, 789 (2017).
39. J. König-Otto, Y. Wang, A. Belyanin, C. Berger, W. de Heer, M. Orlita, A. Pashkin, H. Schneider, M. Helm, S. Winnerl, Four-Wave Mixing in Landau-Quantized Graphene, Nano Lett. 17, 2184-2188 (2017).
40. Y. Wang, M. Tokman, and A. Belyanin, Second-order nonlinear optical response of graphene, Phys. Rev. B 94, 195442 (2016).

41. T. S. Mansuripur, C. Vernet, P. Chevalier, G. Aoust, B. Schwarz, F. Xie, C. Caneau, K. Lascola, Chung-en Zah, D. P. Caffey, T. Day, L. J. Missagia, M. K. Connors, C. Wang, A. Belyanin, and F. Capasso, Single-mode instability in standing-wave lasers: quantum cascade laser as a self-pumped parametric oscillator (*Editor's Suggestion)*, Phys. Rev. A, 94, 063807 (2016).

42. Q. Zhang, Y. Wang, W. Gao, J. D. Watson, M. J. Manfra, A. Belyanin, and J. Kono Stability of high-density two-dimensional excitons against a Mott transition in high magnetic fields probed by coherent terahertz spectroscopy, Phys. Rev. Lett. 117, 207402 (2016).

43. K. Cong, Q. Zhang, Y. Wang, G. T. Noe II, A. Belyanin, and J. Kono, Dicke superradiance in solids (*invited review*) JOSA B 33, C80 (2016).

44. M. Tokman, Y. Wang, I. Oladyshkin, A. Ryan Kutayiah, and A. Belyanin, Laser-driven parametric instability and generation of entangled photon-plasmon states in graphene, Phys. Rev B. 93, 235422 (2016).

45. D. G. Revin, M. Hemingway, Y. Wang, J.W. Cockburn, A. Belyanin, Active mode locking of quantum cascade lasers operating in external ring cavity, Nature Comm. 7, 11440 (2016).

46. B. A. Magill, K-D Park, Y. Zhou, A. Chopra, Maurya, S. Priya, M. B. Raschke, A. Belyanin, C. J. Stanton, G. A Khodaparast, Ultrafast Anisotropic Optical Response and Coherent Acoustic Phonon Generation in Polycrystalline BaTiO3-BiFeO3, Journal of Energy Harvesting and Systems Vol. 3, 229 (2016).

47. M. Tokman, Y. Wang, and A. Belyanin, Valley entanglement of excitons in monolayers of transition-metal dichalcogenides, Phys. Rev. B 92, 075409 (2015).

48. K. Cong, Y. Wang, J.-H. Kim, G. T. Noe II, S. A. McGill, A. Belyanin, and J. Kono, Superfluorescence from photoexcited semiconductor quantum wells: magnetic field, temperature, and excitation power dependence, Phys. Rev. B. 91, 235448 (2015).

49. Y. Wang, M. Tokman, and A. Belyanin, Continuous wave lasing between Landau levels in graphene, Phys. Rev. A 91, 033821 (2015).

50. Y. Wang and A. Belyanin, Generation of ultrashort pulses in actively mode-locked mid-infrared quantum cascade lasers with short gain recovery time, Optics Express 23, 4173-4185 (2015).

51. T. S. Mansuripur, G.-M. de Naurois, A, Belyanin, and F. Capasso, Lasers with distributed loss have a sublinear output power characteristic, Optica 2, 48 (2015).

52. X. Yao, M.D. Tokman, and A. Belyanin, Strong magneto-optical effects due to surface states in 3D topological insulators, Optics Express 23, 795 (2015).

53. M. D. Tokman, M. A. Erukhimova, and A. Belyanin, Nonlinear Cyclotron Acceleration of Massless Dirac Charge Carriers in Graphene and Topological Insulators, JETP Lett. 100, 390 (2014).

54. X. Yao, M.D. Tokman, and A. Belyanin, Efficient nonlinear generation of THz plasmons in graphene and topological insulators, Phys. Rev. Lett. 112, 055501 (2014).

55. Q. Zhang, T. Arikawa, E. Kato, J. L. Reno, W. Pan, J. D. Watson, M. J. Manfra, M. A. Zudov, M. Tokman, M. Erukhimova, A. Belyanin, and J. Kono, Superradiant nature of cyclotron resonance decoherence in two-dimensional electron gases, Phys. Rev. Lett. 113, 047601 (2014).

56. J.-H. Kim, G. T. Noe II, S. A. McGill, Y. Wang, A. K. Wojcik, A. Belyanin, and J. Kono, Fermi-edge superfluorescence from a quantum-degenerate electron-hole gas, Scientific Reports 3, 3283 (2013).

57. A. Wojcik, P. Malara, R. Blanchard, T. S. Mansuripur, F. Capasso, and A. Belyanin, Generation of picosecond pulses and frequency combs in actively mode locked external ring cavity quantum cascade lasers, Appl. Phys. Lett. 103, 231102 (2013).

58. T. Arikawa, Q. Zhang, L. Ren, A. A. Belyanin, J. Kono, Review of Anisotropic Terahertz Material Response, Journ. IR, THz, and MM Waves 34, 724 (2013); http://arxiv.org/abs/1305.1987

59. D. Morris, L. Ren, R.S. Arvidson, A. Luttge, R. H. Hauge, A. Belyanin, G. L. Woods, and J. Kono, Mid-infrared Third Harmonic Generation from Macroscopically Aligned Ultralong Single-Wall Carbon Nanotubes, Phys. Rev. B. (Rapid Communications) 87, 161405 (2013); http://link.aps.org/doi/10.1103/PhysRevB.87.161405.

60. L. Ren, Q. Zhang, C. L. Pint, A. Wojcik, M. Bunney Jr., T. Arikawa, I. Kawayama, M. Tonouchi, R. H. Hauge, A. Belyanin, and J. Kono, Collective Antenna Effects in the Terahertz and Infrared Response of Highly Aligned Carbon Nanotube Arrays, Phys. Rev. B. (Rapid Communications) 87, 161401 (2013); http://link.aps.org/doi/10.1103/PhysRevB.87.161401.

61. P. Malara, R. Blanchard, T. Mansuripur, A. Wojcik, A. Belyanin, T. Edamura, S. Furuta, K. Fujita, M. Yamanishi, P. de Natale, F. Capasso, External ring-cavity quantum cascade lasers, Appl. Phys. Lett. 102, 141105 (2013).

62. M. Tokman, X. Yao and A. Belyanin, Generation of entangled states in graphene in a strong magnetic field, Phys. Rev. Lett. 110, 077404 (2013).

63. X. Yao and A. Belyanin, Nonlinear optics of graphene in a strong magnetic field, J. Phys. Cond. Matt. (*invited review*; included in IOPselect) 25, 054203 (2013).

64. G. T. Noe, J.H. Kim, Y. Wang, A. Wojcik, S.A. McGill, C. J. Stanton, A. A. Belyanin, D. H. Reitze, and J. Kono, Generation of Superfluorescent Bursts from a Fully Tunable Semiconductor Magneto-plasma, Fortschritte der Physik (*invited article*), 61, 393-403 (2013).

65. J. Lee, G. T. Noe, Y. Wang, G. S. Solomon, C. J. Stanton, D. H. Reitze, A. A. Belyanin, and J. Kono, Renormalized energies of superfluorescent bursts from an electron-hole magnetoplasma with high gain in $In_xGa_{1-x}As$ quantum wells, Phys. Rev. B 87, 045304 (2013).

66. D. Guo, X. Chen, L. Cheng, A. Belyanin, and F.-S. Choa, Mid-infrared optical amplification and detection in quantum cascade lasers, Opt. Express 21, 30545 (2013).

67. X. Yao and A. Belyanin, Giant optical nonlinearity of graphene in a strong magnetic field, Phys. Rev. Lett. 108, 255503 (2012) (*Editor's Suggestion*).

68. C. Rödel, D. van der Brügge, J. Bierbach, M. Yeung, T. Hahn, B. Dromey, S. Herzer, S. Fuchs, A. Galestian Pour, E. Eckner, M. Behmke, M. Cerchez, O. Jäckel, D. Hemmers, T. Toncian, M. C. Kaluza, A. Belyanin, G. Pretzler, O. Willi, A. Pukhov, M. Zepf, and G. G. Paulus, Harmonic generation from relativistic plasma surfaces in ultrasteep density gradients, Phys. Rev. Lett. 109, 125002 (2012).

69. T. Arikawa, X. Wang, A. Belyanin, and J. Kono, Giant tunable Faraday effect in a semiconductor magneto-plasma for broadband terahertz polarization optics, Optics Express, 20, 19484 (2012).

70. D.G. Revin, R.S. Hassan, A.B. Krysa, Y. Wang, A. Belyanin, K. Kennedy, C.N. Atkins, and J.W. Cockburn, Spectroscopic study of transparency current in mid-infrared quantum cascade lasers, Optics Express 20, 18925 (2012).

71. G. T. Noe, J.H. Kim, Y. Wang, A. Wojcik, S.A. McGill, A. A. Belyanin, D. H. Reitze, and J. Kono, Giant superfluorescent bursts from a semiconductor magneto-plasma, Nature Physics 8, 219 (2012).

72. A. Wojcik, N. Yu, L. Diehl, F. Capasso, and A. Belyanin, Self-synchronization of laser modes and multistability in quantum cascade lasers, Phys. Rev. Lett. 106, 133902 (2011).

73. D. Smith and A. Belyanin, Room-Temperature Semiconductor Coherent Smith-Purcell THz Sources, Appl. Phys. Lett. 98, 063501 (2011).

74. C. Sun, J. Kono, Y.-H. Cho, A. K. Wojcik, A. Belyanin, and H. Munekata, Above-Bandgap Magneto-optical Kerr Effect in Ferromagnetic GaMnAs, Phys. Rev. B. 83, 125206 (2011).

75. A. Wojcik, N. Yu, F. Capasso, and A. Belyanin, Nonlinear optical interactions of laser modes in quantum cascade lasers (*Invited Review*), J. Mod. Optics, 58, 727-742 (2011).

76. A. Wojcik, N. Yu, L. Diehl, F. Capasso, and A. Belyanin, Nonlinear Dynamics of Coupled Transverse Modes in Quantum Cascade Lasers, J. Mod. Optics 57, 1892 (2010).

77. A. Wojcik, N. Yu, L. Diehl, F. Capasso, and A. Belyanin, Nonlinear coupling of transverse modes in quantum cascade lasers (*invited review*), Opt. Engineering **49**, 111114 (2010).

78. L. Ren, C. L. Pint, A. K. Wójcik, T. Arikawa, Y. Takemoto, K. Takeya, I. Kawayama, A. A. Belyanin, M. Tonouchi, R. H. Hauge, and J. Kono, Anisotropic Terahertz Dynamics of Highly-Aligned Single-Walled Carbon Nanotubes, Terahertz Science and Technology 3, 26 (2010).

79. Y. D. Jho, X. Wang, D. H. Reitze, J. Kono, A. A. Belyanin, V. V. Kocharovsky, Vl. V. Kocharovsky, and G. S. Solomon, Cooperative recombination of electron-hole pairs in semiconductor quantum wells under quantizing magnetic fields Phys. Rev. B 81, 155314 (2010).

80. Y. Cho and A. Belyanin, Short wavelength infrared second harmonic generation in quantum cascade lasers, J. Appl. Phys. 107, 053116 (2010).

81. V.-M. Gkortsas, C.Wang, L. Kuznetsova, L. Diehl, A. Gordon, C. Jirauschek, M. A. Belkin, A. Belyanin, F. Capasso and F. X. Kärtner, Dynamics of actively mode-locked Quantum Cascade Lasers, Optics Express Vol. 18, Issue 13, pp. 13616–13630 (2010).

82. X. Wang, A. A. Belyanin, S. A. Crooker, D. M. Mittleman, and J. Kono, Interference-Induced Terahertz Transparency in a Magneto-plasma in a Semiconductor, Nature Physics, 6, 126 (2010).

83. M. Geiser, C. Pflugl, A. Belyanin, Qi Jie Wang, N. Yu, T. Edamura, M. Yamanishi, H. Kan, M. Fischer, A. Wittmann, J. Faist, and F. Capasso, Gain competition in dual wavelength quantum cascade lasers, Opt. Express 18, 9900 (2010).

84. C.Y. Wang, L. Kuznetsova, V. M. Gkortsas, L. Diehl, F. X. Kärtner, M.A. Belkin, A. Belyanin, X. Li, D. Ham, H Schneider, P. Grant, C. Y. Song, S. Haffouz, Z. R. Wasilewski, H.C. Liu, and F. Capasso, Mode-locked pulses from mid-infrared quantum-cascade lasers, Opt. Express, 17, 12929 (2009).

85. N. Yu, A. Belyanin, J. Bao, and F. Capasso, Controlled modification of Erbium lifetime by near-field coupling to metallic films, New Journal Of Physics, 11, 015003 (2009).

86. M.A. Belkin, Q.J. Wang, C. Pflügl, F. Capasso, A. Belyanin, S. Khanna, E. Linfield, High temperature operation of terahertz quantum cascade laser sources (*invited review*), IEEE Journal of Sel. Topics in Quantum Electronics, 15, 952 (2009).

87. N. Yu, L. Diehl, E. Cubukcu, D. Bour, S. Corzine, G. Höfler, A. K. Wojcik, K .B. Crozier, A. Belyanin, and F. Capasso, Coherent Coupling of Multiple Transverse Modes in a Quantum Cascade Laser, Phys. Rev. Lett., 102, 013901 (2009).

88. C. Pflügl, M. Belkin, Qi Jie Wang, M. Geiser, A. Belyanin, M. Fischer, A. Wittmann, J. Faist, and F. Capasso, Surface-emitting terahertz quantum cascade laser source based on intracavity difference-frequency generation, Appl. Phys. Lett. 93, 161110 (2008).

89. M. A. Belkin, F. Capasso, F. Xie, A. Belyanin, M. Fischer, A. Wittman, and J. Faist, Room temperature terahertz quantum cascade laser source based on intracavity difference-frequency generation, Appl. Phys. Lett. 92, 201101 (2008).

90. A. Wojcik, F. Xie, Y. Cho, V. Chaganti, A. Belyanin, and J. Kono, Mid/far-infrared photodetectors based on quantum coherence in coupled quantum wells, J. Modern Optics, 55, 3305 (2008).

91. Y. D. Jho, J. Lee, G.D. Sanders, C. Stanton, D. H. Reitze, J. Kono, A. Belyanin, Superfluorescence from magnetically formed quantum dots: the excitation pulse-width dependence, Journ. Opt. Soc. of Korea 12, 57 (2008).

92. A. Gordon, C.Y. Wang, L. Diehl, F. X. Kärtner, A. Belyanin, D. Bour, S. Corzine, G. Höfler, H. C. Liu, H. Schneider, T. Maier, M. Troccoli, J. Faist, and F. Capasso,

Multimode regimes in quantum cascade lasers: From coherent instabilities to spatial hole burning, Phys. Rev. A, 77, 053804 (2008).

93. A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, V.A. Kukushkin, A.V. Andrianov, V.Ya. Aleshkin, A.A Dubinov, Mode-locked dual-wavelength heterolasers for terahertz generation via intracavity wave mixing, Acta Physica Polonica A 113, 869 (2008).

94. B.N. Zvonkov, A.A. Biryukov, A.V. Ershov, S.M. Nekorkin, V.Ya. Aleshkin, V.I. Gavrilenko, A.A. Dubinov, K.V. Maremyanin, S.V. Morozov, A.A. Belyanin, V.V. Kocharovsky, and Vl.V. Kocharovsky, Room-temperature intracavity difference-frequency generation in butt-joint diode lasers, Appl. Phys. Lett. 92, 021122 (2008).

95. A.A. Biryukov, S.M. Nekorkin, B.N. Zvonkov, V.Ya. Aleshkin, A.A. Dubinov, V.I. Gavrilenko, K.V. Marem'yanin, S.V. Morozov, A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, “Experimental study of nonlinear mode mixing in dual-wavelength semiconductor lasers”, Laser Physics 5, 684-687 (2007).

96. A.A. Biryukov, B.N. Zvonkov, S.M. Nekorkin, P.B. Demina, N.N. Semenov, V.Ya. Aleshkin, V.I. Gavrilenko, A.A. Dubinov, K.V. Maremiyaninov, S.V. Morozov, A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, "A multifrequency interband two-cascade laser", Semiconductors (Physics and Technology of Semiconductors) 41, n. 10, 1209-1213 (2007).

97. A.A. Biryukov, B.N. Zvonkov, S.M. Nekorkin, V.Ya. Aleshkin, V.I. Gavrilenko, A.A. Dubinov, K.V. Maremiyaninov, S.V. Morozov, A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, "Study of interband cascade lasers with tunneling transition", Bulletin of the Russian Academy of Sciences: Physics 71, n. 1, 96-99 (2007).

98. 68. F. Xie, V. R. Chaganti, D. Smith, A. Belyanin, F. Capasso, and C. Gmachl, Nonlinear Optics with Quantum Cascade Lasers, Laser Physics, 17, 672 (2007).

99. J. Bao, N. Yu, F. Capasso, T. Mates, M. Troccoli, and A. Belyanin, Controlled modification of erbium lifetime in silicon dioxide with metallic overlayers, Appl. Phys. Lett. 91, 131103 (2007).

100. M. Belkin, F. Capasso, A. Belyanin, D. L. Sivco, A. Y. Cho, D. C. Oakley, C. J. Vineis, and G. W. Turner, Terahertz Quantum Cascade Laser Source Based on Intra-Cavity Difference-Frequency Generation, Nature Photonics, 1, 288 (2007).

101. A.A. Biryukov, B.N. Zvonkov, S.M. Nekorkin, P.B. Demina, N.N. Semenov, V.Ya. Aleshkin, V.I. Gavrilenko, A.A. Dubinov, K.V. Maremiyaninov, S.V. Morozov, A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, “Nonlinear mode mixing in dual-wavelength semiconductor laser with tunnel junction”, Applied Physics Letters, 90, 171106 (2007).

102. V.A. Kukushkin, V.Ya. Aleshkin, A.A. Belyanin, A.A Dubinov, V.V. Kocharovsky, Vl.V. Kocharovsky, and M.O. Scully, “Difference-Frequency Pulse Generation in Quantum-Well Heterolasers”, Laser Physics, v. 17. 688 (2007).

103. C. Y. Wang, L. Diehl, A. Gordon, C. Jirauschek, F. X. Kartner, A. Belyanin, D. Bour, S. Corzine, G. Haoer, M. Troccoli, J. Faist, and Federico Capasso, Coherent

Instabilities in a Semiconductor Laser with Fast Gain Recovery, Phys. Rev. A (Rapid Communications), 75, 031802 (2007).

104. Y. D. Jho, X. Wang, X. Wei, J. Kono, D. H. Reitze, A. A. Belyanin, V. V. Kocharovsky, Vl. V. Kocharovsky and G. S. Solomon, Superfluorescence from Dense Electron-Hole Plasmas under High Magnetic Fields: Spectral Behavior and Dependence on Strain and Pulse Duration, J. Modern Optics, v. 53, no. 16/17, 2325, 2006.

105. A. Belyanin, V. Kocharovsky, M.O. Scully, E. Fry, and F. Capasso, Quantum electrodynamics of accelerated atoms in free space and in cavities, Phys. Rev. A, 74, 023807, 2006.

106. A. Belyanin, Y.D. Jho, X. Wang, J. Kono, D.H. Reitze, X. Wei, G.S. Solomon, Superfuorescence from Dense Electron-Hole Plasmas in High Magnetic Fields, *J. Phys.*: Conf. Ser. vol. 51, 403 (2006).

107. Y. D. Jho, X. Wang, X. Wei, J. Kono, D. H. Reitze, A. A. Belyanin, V. V. Kocharovsky, Vl. V. Kocharovsky and G. S. Solomon, Cooperative Recombination of a Quantized Electron-Hole Plasma, Phys. Rev. Lett., 96, 237401 (2006); selected for the July 2006 issue of Virtual Journal of Ultrafast Science.

108. M. Belkin, M. Troccoli, L. Diehl, F. Capasso, A. Belyanin, D.L. Sivco, A.L. Cho, Quasi-phase matching of second-harmonic generation in quantum cascade lasers by Stark shift of electronic resonances, Appl. Phys. Lett., 88, 201108 (2006).

109. A Gomez-Iglesias, D. Wasserman, C. Gmachl, A. Belyanin, and D.L. Sivco, Stimulated electronic Anti-Stokes Raman emission in Quantum Cascade lasers, Appl. Phys. Lett., 87, 261113 (2005); selected for the January 2006 issue of the Virtual Journal of Ultrafast Science.

110. M. Troccoli, A. Belyanin, F. Capasso, E. Cubukcu, D. L. Sivco, and A.Y. Cho, Raman Injection Laser, Nature, 433, 845 (2005).

111. A. Belyanin, F. Xie, D. Liu, F. Capasso, and M. Troccoli, Coherent nonlinear optics with quantum cascade structures, Journal of Modern Optics, 52, 2293 (2005).

112. A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, D.S. Pestov, and M.O. Scully, Far-infrared few-cycle-pulse generation in quantum-well heterostructures under femtosecond laser pumping, Acta Physica Polonica A 107, 151-157 (2005).

113. O. Malis, A. Belyanin, C. Gmachl, D. L. Sivco, M. L. Peabody, A. M. Sergent, A. Y. Cho, Improvement of second-harmonic generation in QC lasers with true phase-matching, Appl. Phys. Lett., 84, 2721 (2004).

114. T.S. Mosely, A. Belyanin, C. Gmachl, D.L. Sivco, M.L. Peabody, and A.Y. Cho, Third Harmonic Generation in a Quantum Cascade Laser with Monolithically Integrated Resonant Optical Nonlinearity, Optics Express, 12, 2972 (2004).

115. O. Malis, A. Belyanin, D.L. Sivco, J. Chen, A.M. Sergent, C. Gmachl, and A.Y. Cho, Milliwatt second-harmonic generation in Quantum Cascade lasers with modal phase-matching, Electron. Lett., 40, 1586 (2004).

116. A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, V.A. Kukushkin, “Photon absorption in a magnetized vacuum and formation of cyclotron-annihilation lines in gamma-ray emission of neutron stars”, Advances in Space Research, 33 (4), 620-624 (2004).

117. D. G. Esaev, M. B. M. Rinzan, S. G. Matsik, A. G. U. Perera, H. C. Liu, B. N. Zvonkov, V. I. Gavrilenko, and A. A. Belyanin, "High performance single emitter homojunction interfacial workfunction far infrared detectors", Journal of Applied Physics, vol.95, 512-519 (2004).

118. C. Gmachl, N. Owschimikow, A. Belyanin, A. M. Sergent, D.L. Sivco, M. L. Peabody, F. Capasso, and A.Y. Cho, Temperature dependence and single-mode tuning behavior of Second Harmonic Generation in Quantum Cascade Lasers, Appl. Phys. Lett., 84, 2751 (2004).

119. M.O. Scully, V. Kocharovsky, A. Belyanin, E. Fry, and F. Capasso, Reply: Enhancing acceleration radiation from ground-state atoms via cavity quantum electrodynamics, Phys. Rev. Lett. 93, 129302 (2004).

120. D. Pestov, A. Belyanin, V. Kocharovsky, Vl. Kocharovsky, and M.O. Scully, Mid/far-infrared few-cycle-pulse emission via resonant mixing in semiconductor heterostructures, Journal of Modern Optics, 51, 2523 (2004).

121. N. Owschimikow, C. Gmachl, A. Belyanin, V. Kocharovsky, D.L. Sivco, R. Colombelli, F. Capasso, and A.Y. Cho, Resonant second-order nonlinear optical processes in Quantum Cascade lasers, Phys. Rev. Lett. 90, 043902. (2003).

122. C. Gmachl, A. Belyanin, D.L. Sivco, Milton L. Peabody, N. Owschimikow, A. M. Sergent, F. Capasso, and A.Y. Cho, Optimized second harmonic generation in quantum cascade lasers, IEEE Journal of Quant. Electron., 39, 1345 (2003).

123. M. Scully, V. Kocharovsky, A. Belyanin, E. Fry, and F. Capasso, Enhancing acceleration radiation from ground-state atoms via cavity quantum electrodynamics, Phys. Rev. Lett. 91, 243004 (2003).

124. A.A. Belyanin, D. Deppe, V.V. Kocharovsky, Vl.V. Kocharovsky, D.S. Pestov, and M.O. Scully, New semiconductor laser design and exploratory investigation of the terahertz frequency range, Physics-Uspekhi 46, 986-992 (2003).

125. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, D.S. Pestov, Novel schemes and prospects of superradiant lasing in heterostructures, Laser Physics 13, No.2, 161-167 (2003).

126. A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, D.S. Pestov, Laser transistors for multi-frequency generation in the infrared range, Bull. Rus. Acad. Sciences, Physics, 67, 262 (2003).

127. A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Resonance parametric generation of IR radiation on intersubband transitions in quantum-well heterostructures, Bull. Rus. Acad. Sciences, Physics, 66, 247-249 (2003).

128. F.A. Aharonyan, A. Belyanin, E.V. Derishev, V.V. Kocharovsky, Vl.V. Kocharovsky, Constraints on the extremely high energy cosmic ray accelerators from classical electrodynamics, Phys. Rev. D 66, 023005 (2002).

129. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, M.O. Scully, Three-terminal semiconductor laser for wave mixing, Phys. Rev. A, 65, 053824 (2002).

130. A. Belyanin, F. Capasso, V.V. Kocharovsky, Vl.V. Kocharovsky, Coherent radiation from neutral molecules moving above the grating. Phys. Rev. Lett., 88, 053602 (2002).

131. A.A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, D.S. Pestov, Optical superradiance and pulsed IR generation in quantum-well heterolasers under cw pumping, Bull. Russian Acad. Sciences, 66, 365 (March 2002).

132. A. Belyanin, E.V. Derishev, Formation and dynamics of self-sustained neutron haloes in disk accreting sources, Astronomy and Astrophysics, 379, L25-L29 (2001).

133. A. Belyanin, E.V. Derishev, Formation and dynamics of neutron haloes in disk accreting black holes, Astrophysics and Space Science, 276, 241-242 (2001).

134. A. Belyanin, F. Capasso, V. V. Kocharovsky, Vl. V. Kocharovsky, and M.O. Scully, Infrared generation in low-dimensional semiconductor heterostructures via quantum coherence, Phys. Rev. A 63, 053803 (2001).

135. A. Belyanin, C. Bentley, F. Capasso, O. Kocharovskaya, and M.O. Scully, Inversionless lasing with self-generated driving field, Phys. Rev. A 64, 013814 (2001).

136. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, D.S. Pestov, One- and two-colour superradiant lasing in magnetized quantum-well heterostructures, Nanotechnology, 12, 581-584 (2001).

137. A. Belyanin, F. Capasso, V.V. Kocharovsky, Vl.V. Kocharovsky, D.S. Pestov, M.O. Scully, Resonant parametric generation of infrared radiation on intersubband transitions in low-dimensional semiconductor heterostructures, Nanotechnology, 12, 450-452 (2001).

138. A. Belyanin, E.V. Derishev, V.V. Kocharovsky, Vl.V. Kocharovsky, The effect of free neutrons on the dynamics and radiation of astrophysical plasmas. Radiophysics and Quantum Electronics, 44, 10-21 (2001).

139. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, D.S. Pestov, Superradiance under continuous pumping in a heterolaser with cyclotron quantum dots. Radiophysics and Quantum Electronics, 44, No.1,2, 43-53 (2001).

140. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Annihilation-cyclotron features of magnetized vacuum in the MeV emission from neutron stars, Radiophysics and Quantum Electronics, 44, No.1,2, 59-65 (2001).

141. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Superfluorescence in magnetized quantum wells, Bull. Russian Acad. Sciences, 64, 253-257 (Feb. 2000).

142. A. Belyanin, E.V. Derishev, Prospects for detection of primordial black holes captured in cold dark matter haloes around massive objects. Astronomy and Astrophys. 343, 1-9 (1999).

143. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, N. Kalugin, Feasibility of femtosecond superradiant laser based on GeSi quantum-wells, Bull. Russian Acad. Sciences Physics, 63, 369-373 (Feb. 1999).

144. A. Belyanin, Formation of jets in Galactic superluminal sources, Astrophys. Lett. & Communications, 38, 245-248 (1999).

145. A. Belyanin, Optically thick super-Eddington winds in Galactic superluminal sources, Astronomy and Astrophys. 344, 199-204 (1999)

146. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Soft gamma-ray emission from plasma winds around evaporating primordial black holes, Astrophys. Lett. & Communications, 38, 281-284 (1999).

147. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Superradiant generation of femtosecond pulses in quantum-well heterostructures, JEOS Part B (Quantum & Semiclass. Optics), 10, L13-L19 (1998).

148. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Gamma-ray bursts from the final stage of primordial black hole evaporations, Advances in Space Research, 22, 1111-1114 (1998).

149. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Superradiant regime of femtosecond pulse generation in quantum-well and quantum-dot semiconductor lasers, Bull. Russian Acad. Sciences, 62, 372-383 (Feb. 1998).

150. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Generation of gamma-ray bursts as a result of primordial black hole evaporation. Radiophysics and Quantum Electronics, 41, 9-25 (1998).

151. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Inhibited spontaneous emission and electromagnetic instability of an atom in the near zone from the surface of an active medium. Computers Math. Applic. 34, 795-805 (1997).

152. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Cooperative coherent phenomena in annihilating electron-positron and electron-hole plasmas in a strong magnetic field. Computers Math. Applic. 34, 845-880 (1997).

153. A.A. Belyanin, R.F. Van Oss, Pair production near accreting black holes. Advances in Space Research, 19, 113-116 (1997).

154. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Collective QED processes of electron-hole recombination and electron-positron annihilation in a strong magnetic field. JEOS Part B (Quantum and Semiclassical Optics), 9, 1-44 (1997).

155. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Atomic dynamics near the surface of an active medium: electromagnetic instability and suppression of spontaneous emission. Journ. of Techn. Phys., 1997, 38, 181-184 (1997).

156. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Reversal of radiation reaction force and instability of the ground state of an atom located above the surface of an active medium. Phys. Rev. Lett., 76, 3285-3288 (1996).

157. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Explosive amplification of electromagnetic field in a magnetized flow of accelerated electron oscillators. Belyanin A.A., Kocharovsky V.V., Kocharovsky Vl.V. Phys. Rev. E, 53, 5338-5349 (1996).

158. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Gamma-ray bursts from the final stage of primordial black hole evaporations. Mon. Notices of the Royal Astron. Society, 283, 626-634 (1996).

159. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Modified spontaneous transitions and electromagnetic instability of the ground state of a molecule due to near field in the vicinity of an active medium. Laser Physics, 5, 1164-1170 (1996).

160. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Yu.M. Mironov, Mode superradiance of free electron-hole pairs in semiconductor magnetooptics. Laser Physics, 5, 1121-1132 (1995).

161. R.F. Van Oss, A. Belyanin, Annihilation lines from accreting black holes. Astron. and Astrophys., 302, 154-164 (1995).

162. A. Belyanin, V.V. Zheleznyakov, VLA data constraints on the Galactic Centre annihilation line source 1E1740.7-2942. Astron. and Astrophysics, 287, 782-788 (1994).

163. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Recombination superradiance in semiconductors. Laser Physics, 2, 952-964 (1992).

164. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Superradiance phenomenon in semiconductor magnetooptics. Solid State Commun., 80, 243-246 (1991).

165. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Collective annihilation of electron-positron plasma in a strong magnetic field. JETP, 72, 70-79 (1991).

166. A. Belyanin, V.V. Kocharovsky, Vl.V. Kocharovsky, Collective electron-positron annihilation. Phys. Lett. A, 149, 258-264 (1990).