

CURRICULUM VITAE

Alexey Belyanin

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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 highest honors from Nizhny Novgorod State University (1989).

Appointments

Sept. 2013-present: Professor and Associate Head, Department of Physics, 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, 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 Electronic Science and Technology of China, guest professor, International Summer School 2015, 2016

- 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 309 “Modern physics”, Spring 2017
- Physics 649 “Physics of optoelectronic devices”, Spring 2011, 2015, 2016
- Physics 302-303 “Advanced Mechanics”, Fall 2011-Spring 2014
- New graduate course Physics 689 “Physics of optoelectronic devices”, Spring 2007, 2008, and 2009
- Undergraduate ASTR 314 “Survey of Astronomy”, Texas A&M University, Spring 2010
- Undergraduate Physics 218 “Mechanics”, Texas A&M University, Fall 2007 and 2008, Summer and Fall 2009, Summer 2010 and 2011.
- Undergraduate Physics 306 “Basic Astronomy”, Texas A&M University, 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.
- Undergraduate Physics 219 “Electricity and Magnetism”, lectures and recitations, Texas A&M University, 2001.
- Undergraduate “Theoretical Mechanics”, lectures and recitations, Nizhny Novgorod State University, 1994-1998.
- Public lectures, Nizhny Novgorod Planetarium, 1994-1999 - over 300 lectures. Over 20 shows created

Funding

(i) Current grants:

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

AFOSR: Nonlinear and THz studies of electro-optic and magneto-electric materials, 2014-2020

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

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

(ii) Previous grants:

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”, 2008-2018.

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

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: over a hundred 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), Member
- International Committee on Space Research (COSPAR), Associate

Publications:

- Number of papers in peer-reviewed journals: over 130
- Reviews and Book Chapters: 8
- 5 US Patents
- Editor of the Proceedings of the International Conferences “Photonics West” (10 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;

Venkata Chaganti: received MS in 2008

Don Smith: received PhD in 2013

Yonghee Cho: received PhD in 2011

Yongrui Wang received PhD in 2015

Xianghan Yao: received PhD in 2014

A. Ryan Kutayah, 2013-current

Zhongqu Long, 2014-current

Sultan Almutairi, 2016-current

Undergraduate students:

Johanna Arnold (NSF REU) 2010

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., Kocharovskiy 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., Kocharovskiy 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. Sergent, 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, 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* accepted.
2. Z. Long, Y. Wang, M. Erukhimova, M. Tokman, A. Belyanin, Magneto-polaritons in Weyl semimetals in a strong magnetic field, *Phys. Rev. Lett.* submitted; <http://arxiv.org/abs/1708.05498>.
3. Y. Wang, M. Tokman, and A. Belyanin, Second-order nonlinear optical response of graphene, *Phys. Rev. B* **94**, 195442 (2016).
4. 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).
5. 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).

6. 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 \(2016\)](#).
7. K. Cong, Q. Zhang, Y. Wang, G. T. Noe II, A. Belyanin, and J. Kono, Dicke superradiance in solids (*invited review*) JOSA B, [JOSA B 33, C80 \(2016\)](#).
8. M. Tokman, Y. Wang, I. Oladyshkin, A. Ryan Kutayah, and A. Belyanin, Laser-driven parametric instability and generation of entangled photon-plasmon states in graphene, [Phys. Rev B. 93, 235422 \(2016\)](#).
9. 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 \(2016\)](#).
10. 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).
11. M. Tokman, Y. Wang, and A. Belyanin, Valley entanglement of excitons in monolayers of transition-metal dichalcogenides, [Phys. Rev. B 92, 075409 \(2015\)](#).
12. 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).
13. Y. Wang, M. Tokman, and A. Belyanin, Continuous wave lasing between Landau levels in graphene, [Phys. Rev. A 91, 033821 \(2015\)](#).
14. 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).
15. 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).
16. 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).
17. 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).
18. X. Yao, M.D. Tokman, and A. Belyanin, Efficient nonlinear generation of THz plasmons in graphene and topological insulators, [Phys. Rev. Lett. 112, 055501 \(2014\)](#).
19. 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 \(2014\)](#).

20. 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 \(2013\)](#).
21. 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).
22. 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>
23. D. Morris, L. Ren, R.S. Arvidson, A. Lutge, 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>.
24. 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>.
25. 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).
26. M. Tokman, X. Yao and A. Belyanin, Generation of entangled states in graphene in a strong magnetic field, [Phys. Rev. Lett. 110, 077404 \(2013\)](#).
27. 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).
28. 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).
29. 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 $\text{In}_x\text{Ga}_{1-x}\text{As}$ quantum wells, *Phys. Rev. B* 87, 045304 (2013); <http://arxiv.org/abs/1009.3067>.
30. 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).
31. X. Yao and A. Belyanin, Giant optical nonlinearity of graphene in a strong magnetic field, *Phys. Rev. Lett.* 108, 255503 (2012) (*Editor's Suggestion*); arXiv: 1110.4869.
32. 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).
33. 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).
 34. 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).
 35. 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).
 36. 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).
 37. D. Smith and A. Belyanin, Room-Temperature Semiconductor Coherent Smith-Purcell THz Sources, *Appl. Phys. Lett.* 98, 063501 (2011).
 38. 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).
 39. 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).
 40. 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).
 41. 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).
 42. 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).
 43. Y. D. Jho, X. Wang, D. H. Reitze, J. Kono, A. A. Belyanin, V. V. Kocharovskiy, V. V. Kocharovskiy, and G. S. Solomon, Cooperative recombination of electron-hole pairs in semiconductor quantum wells under quantizing magnetic fields *Phys. Rev. B* 81, 155314 (2010).
 44. Y. Cho and A. Belyanin, Short wavelength infrared second harmonic generation in quantum cascade lasers, *J. Appl. Phys.* 107, 053116 (2010).
 45. 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).

46. 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).
47. 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).
48. 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).
49. 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).
50. 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).
51. 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).
52. 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).
53. 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).
54. 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).
55. 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).
56. 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).
57. A.A. Belyanin, V.V. Kocharovsky, V.I. 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).

58. 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. Kocharovskiy, and V.I. Kocharovskiy, Room-temperature intracavity difference-frequency generation in butt-joint diode lasers, *Appl. Phys. Lett.* 92, 021122 (2008).
59. A.A. Biryukov, S.M. Nekorkin, B.N. Zvonkov, V.Ya. Aleshkin, A.A. Dubinov, V.I. Gavrilenko, K.V. Maremyanin, S.V. Morozov, A.A. Belyanin, V.V. Kocharovskiy, V.I. Kocharovskiy, "Experimental study of nonlinear mode mixing in dual-wavelength semiconductor lasers", *Laser Physics* 5, 684-687 (2007).
60. 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. Maremyanin, S.V. Morozov, A.A. Belyanin, V.V. Kocharovskiy, V.I. Kocharovskiy, "A multifrequency interband two-cascade laser", *Semiconductors (Physics and Technology of Semiconductors)* 41, n. 10, 1209-1213 (2007).
61. A.A. Biryukov, B.N. Zvonkov, S.M. Nekorkin, V.Ya. Aleshkin, V.I. Gavrilenko, A.A. Dubinov, K.V. Maremyanin, S.V. Morozov, A.A. Belyanin, V.V. Kocharovskiy, V.I. Kocharovskiy, "Study of interband cascade lasers with tunneling transition", *Bulletin of the Russian Academy of Sciences: Physics* 71, n. 1, 96-99 (2007).
62. 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).
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