CURRICULUM VITAE

PERSONAL DATA:

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EDUCATION:

- Ph.D. in Physics (Candidate of Science in Phys. and Math.), 1993, Inst. of Physics, Belarus Academy of Science, Minsk, Belarus. Thesis title: "Induced Parametric (Quazi-Cherenkov) Radiation"
- M. Sc. in Physics, June 1985, Belarus State University, Experimental and Theoretical Physics, Moscow, Russia (USSR). Theoretical Physics, Particle and Nuclear Physics

EXPERIENCE:

All-Union Institute for Experimental Physics, Sarov, Russia (USSR)

02/1984 – 12/1986 (Junior Researcher).

Institute for Nuclear Problems, Belarus State University, Minsk, Belarus

12/1986 – Present (Senior Researcher).

Specialization (*specify)*

(i) **main field** electromagnetic waves interaction with condensed matter

(ii) **other fields** quantum field theory, laser physics, nuclear and particle physics

(iii) **current research interest**

Electromagnetic materials for microwave and THz: The theoretical and experimental research of electromagnetic response of graphene, silicone, germanene, 2D materials, topo;ogical insulators, graphene/polymer sandwich structures, ultrathin carbonateous films.

Nanocarbon and graphene based nanoelectronic devices: monomolecular light emitter in THz frequency range (nano-sized traveling wave tube, backward wave tube, nano-scaled free electron laser).

Honours, Awards, Fellowships, Membership of Professional Societies

- **Belarus State University Award named by Academician A.N.Sevchenko for the work "Electromagnetics of nanostructures"** (2011)

INTERNATIONAL RESEARCH GRANTS (on current research activity):

- **Terahertz applications of carbon nanotubes**, Bilateral Cooperation in Education and Research Project ID:BMBF 1292, Technische Universität Berlin, Project coordinator: Prof. C. Thomsen (TUB)
- **Nanocarbon based composite materials for electromagnetic applications,** from ISTC project B-1708, 2009-2012, Project manager S.A.Maksimenko, participants: A. Gusinskii (BSUIR, Belarus) I. Larionova (Biysk, Russia), V.L. Kuznetsov (Novosibirsk, Russia), A. Okotrub (Novosibirsk, Russia); collaborators: O. Shenderova (Raleigh, USA), Ph. Lambin (Namur, Belgium)
- **Nano carbon based components and materials for high frequency electronics,** EU FP7 CACOMEL project FP7-247007, Call ID "**FP7-PEOPLE-2009-IRSES**", 2010-2013, Principal Researcher: Prof. Ch. Thomsen (Institut fuer Festkoerperphysik, TUB, Berlin, Germany), team leaders S. Maksimenko, Y. Svirko (University of Joensuu,Finland), Yu.N. Shunin (University of Latvia, Institute of Solid State Physics). E. Obrazcova (A.M. Prokhorov General Physics Institute of RAS), P. Dyachkov (Kurnakov Institute of General and Inorganic Chemistry, RAS) G. Miano (Università degli Studi di Napoli Federico II, Italy)
- **Fundamental and Applied Electromagnetics of Nano-Carbons,** EU FP7 project FP7- 318617 FAEMCAR, Call ID FP7-PEOPLE-2012-IRSES, 2012-2017, Principal Researcher: **Ph. Lambin** (Facultes Universitaires Notre-Dame de la paix de Namur, Belgium**), team leaders:** Y. Banis (Vilniaus Universitetas, Lithuania), S. Bellucci (Istituto Nazionale di Fisica Nucleare, Frascati, Italia), L. P. Biró (Research Centre for Natural Sciences, Hungarian Academy of Sciences, Budapest, Hungary), L.A. Chernozatonskii (Institute for Biochemical Physics RAS, Moscow, Russia), G. I. Dovbeshko (Institute of Physics, NASU, Kiev, Ukraine), P. Kuzhir (INP BSU).
- **GRAPHENE FLAGSHIP** EU FP7 project FP7- 604391, work package 4 High frequency electronics.
- **EU Project "GRAPHENE Core 1"** - n.696656 –FETFLAGSHIP workpackage 7
- **Collective Excitations in Advanced Nanostructures** Project ID 644076 Call H2020-MSCA-RISE-2014 Programme H2020 CoExAN
- **Multifunctional Graphene-based Nanocomposites with Robust Electromagnetic and Thermal Properties for 3D-printing Application,** H2020 RISE 734164 Graphene 3D

INVITED TALK:

1. K.G. Batrakov, P.P. Kuzhir, S.A. Maksimenko, Generation and propagation of electromagnetic waves in carbon nanotubes: new proposition for optoelectronics and bio-medical applications (invited), Int. Conf. on nano-materials for electronics ICNME-2006, Centre For Materials for Electronics Technology (C-MET), Pune INDIA, November 27-29, 2006
2. K.G.Batrakov, P.P.Kuzhir S.A.Maksimenko, Nano-sized electromagnetic source on the principles of Free Electron Lasers, IX International School-Seminar "The Actual Problems of Microworld Physics", Gomel, Belarus, July 23-August 3, 2007
3. S. Maksimenko, G. Slepyan, P.Kuzhir, K. Batrakov, A. Nemelentsev, M. Shuba, Terahertz and microwave applications of carbon nanotube: waveguide, antenna, traveling wave tube, composites, etc. FP7 NMP/INCO Brokerage Event, Warsaw, Poland, 17-18 September 2009
4. C1-I-02 K. Batrakov, P. Kuzhir, S. Maksimenko, A. Paddubskaya, S. Voronovich, Ph Lambin, T. Kaplas & Yu Svirko, Graphene/PMMA sandwiches for microwave applications, 17th International Symposium on the Physics of Semiconductors and Applications (ISPSA-2014), Jeju Island, Korea December 7-11, 2014 (invited)
5. Батраков К.Г., Кужир П.П., Максименко С.А., Поддубская О.Г., Волынец Н.В., Каплас Т., Свирко Ю.П., Лобет М., Рикенжер Н., Ламбин Ф., СЭНДВИЧИ ПОЛИМЕР-ГРАФЕН В СВЧ: ВЛИЯНИЯ КАЧЕСТВА CVD ГРАФЕНА НА СПОСОБНОСТЬ К ЭЛЕКТРОМАГНИТНОЙ ЭКРАНИРОВКЕ Первая российская конференция «ГРАФЕН: МОЛЕКУЛА И 2D КРИСТАЛЛ», Новосибирск 8-12 сентября 2015
6. БАТРАКОВ К.Г. , КУЖИР П.П. , МАКСИМЕНКО С.А. , PH. LAMBIN , KAPLAS T. , SVIRKO YU. ПОГЛОЩЕНИЕ ЭЛЕКТРОМАГНИТНОГО ИЗЛУЧЕНИЯ В СВЕРХТОНКИХ ГРАФЕНОВЫХ ПЛЕНКАХ: ТЕОРИЯ И ЭКСПЕРИМЕНТ, *Научная школа для молодых ученых:* Углеродные нанотрубки и графен - новые горизонты, 30 ноября - 4 декабря, 2015 Москва, Российская Федерация

7. S. Maksimenko, P. Kuzhir, K. Batrakov, S. Voronovich, T. Kaplas, Yu. Svirko, Enhanced Electromagnetic Properties of Ultrathin Pyrolytic Carbon Films in Ka-Band, **2015 International Conference on Electromagnetics in Advanced Applications** - ICEAA '15 - 17 th Edition, Turin, 7-11 September 2015
8. S. A. Maksimenko, K. G. Batrakov, P. P. Kuzhir, M. V. Shuba, G. Y. Slepyan, Electromagnetic effects in nanocarbon: modelling and device applications, XIV International Conference onQuantum Optics and Quantum Information, October 27–30, 2015, Minsk, BELARUS
9. Polina Kuzhir, Konstantin Batrakov, Sergey Maksimenko, Philippe Lambin, Tommi Kaplas, Yuri Svirko, Absorption of electromangtic radiation in ultra-thin graphene films: theory and experiment, School for Young Researchers "Carbon nanotubes and graphene; new horizons", Moscow, Prokhorov Institute of general Physics, December 1-4, 2015
10. P. Kuzhir, K. Batrakov, S. Maksimenko, A. Paddubskaya, Tommi Kaplas, Yuri Svirko, Philippe Lambin, Graphene based *microwave – THz* devices: main principles, tutorial lecture (the invited talk) School for Young Researchers "Nanocarbon for Optics and Electronics", Kaliningrad (Russia) 24 - 29 July, 2016,The Emmanuel Kant Baltic Federal University
11. Polina Kuzhir, Konstantin Batrakov, Alesia Paddubskaya, Sergey Maksimenko, Rumiana Kotsilkova, Tommi Kaplas, Yuri Svirko, Philippe Lambin, Graphene heterostructures: peculiarities of microwave and THz response, The Fifth International Workshop on Nanocarbon Photonics and Optoelectronics will be held from 1 until 5 August, 2016 at the Holiday Club Saimaa,Imatra, South Karelia, Finland.

PUBLICATIONS

Books:

1. S. A. Maksimenko, G. Ya. Slepyan, K. G. Batrakov, A.A. Khrushchinsky, P.P. Kuzhir, A. M. Nemilentsau, and M. V. Shuba, Electromagnetic waves in carbon nanostructures, in: "**Carbon Nanotubes and Related Structures**". Editors: V. Blank and B. Kulnitskiy, Research Signpost Publisher (2008), pp. 147-187

List of publications, since 2006 on nanoscience

1. Konstantin G, Batrakov, Polina P, Kuzhir, Sergey A, Maksimenko, Radiative instability of electron beam in carbon nanotubes, **SPIE nternational Society for Optics and Photonics**, 63280Z-63280Z-8 (2006).
2. P. P. Kuzhir, K.G. Batrakov, S.A. Maksimenko, Generation and propagation of electromagnetic waves in carbon nanotubes: new proposition for optoelectronics and bio-medical applications, **Synthesis and Reactivity in Inorganic, Metal-Organic, and Nano-Metal Chemistry**, **37** (5), 341 – 346 (2007).
3. K.G. Batrakov, P.P. Kuzhir, and S.A. Maksimenko, Toward the nano-FEL: undulator and Cherenkov mechanisms of light emission in carbon nanotubes, **Physica E 40** (5), 1065-1068 (2008).
4. K. G. Batrakov, P. P. Kuzhir and S. A. Maksimenko, Stimulated emission of electron beam in nanotube bundles, **Physica E, 40** (7) 2370-2374 (2008).
5. S.A. Maksimenko, G. Ya. Slepyan, K.G. Batrakov, A.A. Khrushchinsky, P.P. Kuzhir, A.M. Nemilentsau, M.V. Shuba, Electromagnetic waves in carbon nanostructures, **Carbon Nanotubes and Related Structures,** Research Signpost Publisher, 147-187, 2008.
6. J. Macutkevic, R. Adomavicius, A. Krotkus, D. Seliuta, G. Valusis, S. Maksimenko, P. Kuzhir, K. Batrakov, V. Kuznetsov, S. Moseenkov, O. Shenderova, A.V. Okotrub, R. Langlet and Ph. Lambin, Terahertz Probing of Onion-Like Carbon-PMMA Composite Films, **Diamond and Related Materials 17**, 1608-1612 (2008).
7. K. G. Batrakov, S.A. Maksimenko, P.P. Kuzhir and C. Thomsen, Carbon nanotube as a Cherenkov-type light emitter and free electron laser, **Phys. Rev. B 79**, 125408 (2009) arXiv:0807.3091[cond-mat.mes-hall]

8. K. G. Batrakov, P. P. Kuzhir, S. A. Maksimenko, Cherenkov synchronism: non-relativistic electron beam in multi-walled nanotube and multi-layer graphene, **Physica B: Condensed Matter**, **405**(14) 3050-3053 (2010), doi:10.1016/j.physb.2010.01.047 [TerACaN, CACOMEL,BMBF, F08R-009]
9. K.G. Batrakov, O.V. Kibis, P.P. Kuzhir, S.A. Maksimenko, M. Rosenau da Costa, M.E. Portnoi, Mechanisms of terahertz emission from carbon nanotubes, **Physica B: Condensed Matter**, **405**(14)**,** 3054–3056 (2010) doi:10.1016/j.physb.2010.01.048 [TerACaN, CACOMEL, F08R-009]
10. Batrakov, K.G., Kibis, O.V., Kuzhir, P.P., Da Costa, M.R., Portnoid, M.E., Erratum: Terahertz processes in carbon nanotubes (**Journal of Nanophotonics** (2010) 4 (041665)) (2010) Journal of Nanophotonics 4 (1) doi: 10.1117/1.3452318
11. Batrakov, K.G., Kibis, O.V., Kuzhir, P.P., Rosenau Da Costa, M., Portnoi, M.E. Terahertz processes in carbon nanotubes, (2010) **Journal of Nanophotonics** 4 (1) Cited 12 times. doi: 10.1117/1.3436585
12. Konstantin G Batrakov, Vasily A Saroka, Sergey A Maksimenko, Christian Thomsen, Plasmon polariton deceleration in graphene structures, Journal of Nanophotonics, 6(1), 061719-061719 (2012).
13. K. Batrakov, P. Kuzhir, S. Maksimenko, A. Paddubskaya, S. Voronovich, T. Kaplas, and Yu. Svirko, Enhanced microwave shielding effectiveness of ultrathin pyrolytic carbon films, **Applied Physics Letters, 103, 073117 (2013);** doi: 10.1063/1.48186802013 (published online 16 August 2013) [BY-NanoERA, CACOMEL, F11arm-006]
14. H.K. Avetissian, G.F. Mkrtchian, K.G. Batrakov, S.A. Maksimenko, A Hoffmann, Multiphoton resonant excitations and high-harmonic generation in bilayer graphene, Physical Review B, 88(16), 165411 (2013)
15. H.K. Avetissian, G.F. Mkrtchian, K.G. Batrakov, S.A. Maksimenko, A Hoffmann, Nonlinear theory of graphene interaction with strong laser radiation beyond the Dirac cone approximation: Coherent control of quantum states in nano-optics, Physical Review B, 88(24), 245411 (2013).
16. V.A. Saroka, K.G. Batrakov, L.A. Chernozatonskii, Edge-modified zigzag-shaped graphene nanoribbons: Structure and electronic properties, **Physics of the Solid State**, 56(10), 2135-2145 (2014).
17. Sofia Voronovich, Alesya Paddubskaya, Konstantin Batrakov, Polina Kuzhir, Sergey Maksimenko, Tommi Kaplas, Yuri Svirko, Electromagnetic properties of Graphene-like films in Ka-band, Manuscript ID applsci-51803, **Appl Sci.** 2014, 4, 255-264; doi:10.3390/app4020255 [EU FP7 projects CACOMEL FP7-247007 and FP7-PEOPLE-2013-IRSES-610875 NAmiceMC]
18. K. Batrakov, P. Kuzhir, S. Maksimenko, A. Paddubskaya, S. Voronovich, Ph Lambin, T. Kaplas & Yu Svirko, Flexible transparent graphene/polymer multilayers for efficient electromagnetic field absorption, *Scientific Reports* 4,Article number:7191 doi:10.1038/srep07191 2014.
19. V.A. Saroka, K.G. Batrakov, V.A. Demin, L.A. Chernozatonskii, Band gaps in jagged and straight graphene nanoribbons tunable by an external electric field, **Journal of Physics: Condensed Matter**, 27(14), 145305 (2015).
20. K. Batrakov, P.Kuzhir, S. Maksimenko, N. Volynets, S.Voronovich, A. Paddubskaya, G. Valusis, T. Kaplas, Yu. Svirko, and Ph. Lambin, Enhanced microwave-to-terahertz absorption in Graphene, Appl.Phys. Lett. 108, 123101 (2016) http://dx .doi.org/10.1063/ 1.4944531
21. A. Paddubskaya, N. Valynets, P. Kuzhir, K. Batrakov, S. Maksimenko, R.Kotsilkova, H. Velichkova, I. Petrova, I. Biró, K. Kertész, G. I. Márk, Z. E. Horváth, L. P. Biró, Electromagnetic and Thermal proper-

ties of 3D Printed Multilayered Nano-carbon / Poly(lactic) Acid Structures, Journal of Applied Physics **119**, 135102 (2016); doi: 10.1063/1.4945576

22. Tommi Kaplas, Yuri Svirko, Konstantin Batrakov, Polina Kuzhir, Sergey A Maksimenko, Microwave Properties of Ultrathin Pyrolytic Carbon Films, **Fundamental and Applied Nano-Electromagnetics**, Springer Netherlands, 239-250 (2016).

23. Philippe Lambin, Michael Lobet, Konstantin Batrakov, Polina Kuzhir, Electrodynamics of graphene/polymer multilayers in the GHz frequency domain, **Fundamental and Applied Nano-Electromagnetics**, Springer Netherlands, 45-67 (2016).

24. V.A. Saroka, K.G. Batrakov, Zigzag-Shaped Superlattices on the Basis of Graphene Nanoribbons: Structure and Electronic Properties, **Russian Physics Journal**, 59(5), 633-639 (2016).

25. K. G. Batrakov, A. G. Paddubskaya, N. I. Valynets, S. P. Voronovich-Solonevich, P. P. Kuzhir, S. A. Maksimenko, T. Kaplas, and Yu. Svirko, MICROWAVE ABSORPTION IN GRAPHENE FILMS: THEORY AND EXPERIMENT, Journal of Applied Spectroscopy, Vol. 83, No. 4, September, 2016 (Russian Original Vol. 83, No. 4, July–August, 2016) DOI 10.1007/s10812-016-0342-x