CURRICULUM VITAE

Name: **PROF. DR. KONSTANTIN L. IVANOV**
Date and place of birth: 10 January 1977, Novosibirsk, USSR (now Russia)
Citizenship: Russia
Affiliations: (1) Theoretical Spin Chemistry Laboratory, International Tomography Center of the Siberian Branch of the Russian Academy of Science (ITC SB RAS), Novosibirsk, Russia; (2) Novosibirsk State University (NSU), Faculty of Physics, Chair of Chemical and Biological Physics, Novosibirsk, Russia
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- **EDUCATION**

June 1998 **Bachelors degree in chemical physics;** Chair of Chemical Physics, Faculty of Physics, NSU; Thesis title: «Laser flash photolysis of Fe_{aq}^{3+} and $S_2O_8^{2-}$ in aqueous solutions with added N,N-dimethylformamide»; Scientific advisors: Dr E. M. Glebov, Prof. V. F. Plyusnin.
June 2000 **Masters degree in physics of atoms and molecules and biophysics**; Chair of Chemical and Biological Physics, Faculty of Physics, NSU; Thesis title: «Integral Encounter Theories of Multistage Reactions»; Scientific advisor: Prof. N. N. Lukzen.
20 March 2002 **Candidate of Science in Physics and Mathematics** (equivalent of PhD); defense has taken place at the Institute of Chemical Kinetics & Combustion SB RAS; thesis title: «Kinetics of diffusion-controlled reactions of radical recombination and energy and electron transfer processes»; Supervisors: Prof. R. Z. Sagdeev, Prof. N. N. Lukzen
28 May 2008 **Doctor of Science in Physics and Mathematics** (higher doctoral degree, equivalent of habilitation); defense has taken place on 17 October 2007 at the N. N. Semenov Institute of Chemical Physics (Moscow, Russia); thesis title: «Kinetics of multistage liquid phase processes involving particles with spin degrees of freedom». The degree has been officially confirmed by a decision of the Higher Attestation Committee of the Russian Federation on 28 May 2008.
March 2016 **Professor of the Russian Academy of Science**

- **RESEARCH ACTIVITIES**

Theory of hyperpolarization, i.e., CIDNP, PHIP and DNP; new experiments, which exploit LACs at low magnetic fields and LACs formed under RF-excitation; magnetic field dependent spin relaxation studies; exploiting long-lived spin order in NMR spectroscopy and imaging; developing theory of diffusion-influenced reactions in solutions.

- **VISITS TO RESEARCH GROUPS ABROAD**

1998-2000 (in total 8 months) at the Weizmann Institute of Science (Rehovot, Israel), cooperation with Prof. A. I. Burshtein
2002-2014 at the Free University of Berlin (Germany), many occasions, cooperation with Prof. H.-M. Vieth; including a one-year postdoc within the EU Bio-DNP initiative and stays as a Humboldt fellow
2003-2006 (in total 1.5 month) at the University of Oxford (UK), cooperation with Prof. P. J. Hore

2014 (1 month) at the Utrecht University (the Netherlands); cooperation with Prof. M. Baldus
2016 (3 months) at the Osaka City University (Japan); cooperation with Profs. T. Takui and K. Sato
2017 (1 month) at École Normale Supérieure (Paris, France); cooperation with Prof. G. Bodenhasuen, Prof. F. Ferrage and Dr. D. Abergel

- **FELLOWSHIPS AND AWARDS (not the full list)**

1. Invited professor of École Normale Supérieure (Paris) in 2017
2. Invited professor of the Japanese Society for the Promotion of Science (JSPS) in 2016
3. V. V. Voevodsky prize in 2012; the prize is given to young scientists of SB RAS
4. Medal of the European Academy of Science (Europea Academia Prize) in 2010
5. Alexander von Humboldt fellowship (Germany) in 2008
6. DAAD (German Service for Academic Exchanges) fellowship for researchers in 2005
7. Research stipend of the Weizmann Institute of Science (Rehovot, Israel) in 1999 and 2000

- **SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS**

2013 – present 4 PhD students at ITC SB RAS (3 defended)
2011 – present 4 Master students at NSU (3 defended)
2010 – present 8 diploma students at NSU

- **TEACHING ACTIVITIES (not the full list)**

2008 Lectures and practical lessons for PhD and Master students on "Advanced methods in magnetic resonance spectroscopy" / Free University of Berlin, Department of Physics
2012, 2014 Lecturer at the international summer schools on "Spin hyperpolarization" for young scientists / 2012 – Leiden (the Netherlands), 2014 – Marseille (France)
2012, 2013 Lectures on NMR spectroscopy and spin hyperpolarization for young scientists / NSU, Faculties of Physics and Natural Sciences
2013 – present Lectures and practical lessons for diploma students on "Physics and chemistry of atoms and molecules" / NSU, Faculty of Physics
2013 – present Research seminars for young scientists on Magnetic Resonance Spectroscopy / ITC, NSU
2015-2018 Invited lecturer at the Volkswagen schools for young researchers on "NMR theory" / Schloss Colditz and Schloss Windischleuba (Germany)
from 2016 Lectures on Advanced Chemical Kinetics for MS students / NSU
from 2019 Lectures on Advanced NMR for MS students / NSU

- **ORGANISATION OF SCIENTIFIC MEETINGS (not the full list)**

2009 Russian-Austrian Workshop "Exploiting spin coherence of radical pairs for detection of elusive radical species", Novosibirsk, Russia / Organizing committee member
2010 Russian-German Workshop "Spin Hyperpolarization: Physical Principles and Techniques", Novosibirsk, Russia / Organizer
2012 Lorenz-Center Workshop "Hot Topics in Spin Hyperpolarization", Leiden, the Netherlands / Organizer
2013 Conference of the Siberian Alexander von Humboldt alumni association (Humboldt-Kolleg) "Magnetic Resonance as a Tool for Interdisciplinary Research", Novosibirsk / Organizer
2014 COST Meeting on Relaxation and Hyperpolarization Theory, Southampton, UK / Co-chairman
2015 COST Meeting on Relaxation and Hyperpolarization Theory, Institut Henry Poincare, Paris,

France / Co-chairman

2016 Conference of the Siberian Alexander von Humboldt alumni association (Humboldt-Kolleg) "Energy Conversion: from Nature to Technology", Novosibirsk / Organizer

2018 International School for Young Scientists "Magnetic Resonance and Magnetic Phenomena in Chemical and Biological Physics", Roshchino, Leningrad region (Russia) / Organizer

2019 Spin Chemistry Meeting, St. Petersburg / Chairman

- **INSTITUTIONAL RESPONSIBILITIES**

2013 – 2015 Leader of the Working Group "Theoretical understanding of hyperpolarization strategies" (together with Dr. Alberto Rosso) within the COST Action TD1103; European Network for Hyperpolarization Physics and Methodology in NMR and MRI.

from 2014 Expert of the Russian Science Foundation

from 2015 Secretary of the subdivision "Hyperpolarization in magnetic resonance" of the AMPERE Society

2016 Guest Editor of a special issue of *Zeitschrift für Physikalische Chemie*, dedicated to the 80th anniversary of Prof. Kev Salikhov

2016-2018 Coordinator of the PhD program at the Faculty of Physics of NSU

from 2018 Editorial board member of "Molecular Physics"

from 2019 Topical editor of "Magnetic Resonance"

- **MEMBERSHIPS OF SCIENTIFIC SOCIETIES**

2004 – present Member of the International EPR society

2013 – present Member of the International Spin Chemistry Committee

from 2016 Scientific committee member of the international conference "Hyperpolarized Magnetic Resonance"

- **FUNDING ID (in recent years)**

2012 – present Five grants from the Russian Foundation for Basic Research (RFBR); subjects: developing new methods for manipulating nuclear spin hyperpolarization; analyzing and exploiting long-lived spin order in biomolecules

2014-2016 2 grants of the Russian Science Foundation; subject: understanding reaction and spin dynamics behind PHIP and SABRE experiments

2014-2015 Grant of the President of RF; subject: developing the role of LACs in formation and transfer of spin hyperpolarization

- **PUBLICATIONS**

Altogether, about 130 scientific papers in peer-reviewed journals (including 5 reviews); 4 book chapters.
Most important publications:

1. K. L. Ivanov, N. N. Lukzen, A. B. Doktorov, A. I. Burshtein. «Integral Encounter Theories of Multistage Reactions. I. Kinetic Equations». *J. Chem. Phys.*, **114**, 1754-1762 (2001)
2. K. Miesel, K. L. Ivanov, A. V. Yurkovskaya, H.-M. Vieth. «Coherence transfer during field-cycling NMR experiments», *Chem. Phys. Lett.*, **425**, 71-76 (2006)
3. K. L. Ivanov, A. V. Yurkovskaya, H.-M. Vieth. «Coherent transfer of hyper-polarization in coupled spin systems at variable magnetic field», *J. Chem. Phys*., **128**, 154701 (2008)
4. S. E. Korchak, K. L. Ivanov, A. V. Yurkovskaya, H.-M. Vieth. «Para-hydrogen induced polarization in multi-spin systems studied at variable magnetic field», *Phys. Chem. Chem. Phys.*, **11**, 11146-11156 (2009); Hot article, cover paper

5. A. S. Kiryutin, S. E. Korchak, K. L. Ivanov, A. V. Yurkovskaya, H.-M. Vieth. «Creating long-lived spin states at variable magnetic field by means of photo-Chemically Induced Dynamic Nuclear Polarization», *J. Phys. Chem. Lett.,* **3**, 1814-1819 (2012)
6. A. S. Kiryutin, A. V. Yurkovskaya, R. Kaptein, H.-M. Vieth, K. L. Ivanov, «Evidence for Coherent Transfer of Para-Hydrogen Induced Polarization at Low Magnetic Fields», *J. Phys. Chem. Lett.*, **4**, 2514-2519 (2013)
7. A. N. Pravdivtsev, A. V. Yurkovskaya, H.-M. Vieth, R. Kaptein, K. L. Ivanov, «Level anti-crossings are key to understanding para-hydrogen induced hyperpolarization in SABRE experiments», *ChemPhysChem* **14** (14), 3327-3331 (2013)
8. K. L. Ivanov, A. N. Pravdivtsev, A. V. Yurkovskaya, H.-M. Vieth, R. Kaptein. «The role of level anti-crossings in nuclear spin hyperpolarization», *Prog. NMR Spectrosc.*, **81**, 1-36 (2014)
9. A. N. Pravdivtsev, A. V. Yurkovskaya, N. N. Lukzen, H.-M. Vieth, K. L. Ivanov. «Exploiting Level Anti-Crossings (LACs) in the rotating frame for transferring spin hyperpolarization», *Phys. Chem. Chem. Phys*., **16**, 18707-18719 (2014); cover paper
10. A. N. Pravdivtsev, A. V. Yurkovskaya, N. N. Lukzen, K. L. Ivanov, H.-M. Vieth. «Highly efficient polarization of spin-1/2 insensitive NMR nuclei by adiabatic passage through level anti-crossings», *J. Phys. Chem. Lett.*, **5**, 3421-3426 (2014)
11. A. N. Pravdivtsev, A. V. Yurkovskaya, H.-M. Vieth, K. L. Ivanov. «Spin mixing at level anti-crossings in the rotating frame makes high-field SABRE feasible», *Phys. Chem. Chem. Phys.,* **16**, 24672-24675 (2014)
12. D. Mance, P. Gast, M. Huber, M. Baldus, K. L. Ivanov. «The magnetic field dependence of cross-effect dynamic nuclear polarization under Magic Angle Spinning», *J. Chem. Phys*., **142**, 234201 (2015)
13. A. S. Kiryutin, A. V. Yurkovskaya, H.-M. Vieth, K. L. Ivanov. «Long-lived spin states as a source of contrast in magnetic resonance spectroscopy and imaging», *J. Magn. Reson.* **261**, 64-72 (2015)
14. A. N. Pravdivtsev, A. S. Kiryutin, A. V. Yurkovskaya, H.-M. Vieth, K. L. Ivanov. «Robust conversion of singlet spin order in coupled spin-1/2 pairs by adiabatically ramped RF-fields» *J. Magn. Reson*., **273**, 56-64 (2016), J. Magn. Reson. cover paper
15. S. Pylaeva, K. L. Ivanov, M. Baldus, H. Elgabarty, D. Sebastiani. «The Molecular Mechanism of Overhauser-DNP in Insulating Solids», *J. Phys. Chem. Lett.*, **8**, 2137-2142 (2017)
16. A. S. Kiryutin, G. Sauer, A. V. Yurkovskaya, H.-H. Limbach, K. L. Ivanov, G. Buntkowsky, «Para-Hydrogen allows ultra-sensitive indirect NMR detection of catalytic hydrogen complexes», *J. Phys. Chem. C*, **121**, 9879-9888 (2017)
17. S. Paul, A. S. Kiryutin, J. Guo, K. L. Ivanov, J. Matysik, A. V. Yurkovskaya, X. Wang. «Magnetic field effect in natural cryptochrome explored with model compound», *Sci. Rep.*, **7**, 11892 (2017)
18. O. B. Morozova, A. V. Yurkovskaya, H.-M. Vieth, D. V. Sosnovsky, K. L. Ivanov. «Light-induced spin hyperpolarization in condensed phase», *Mol. Phys*., **115**, 2907-2943 (2017), invited review, cover paper
19. D. Guarin, S. Marhabaie, A. Rosso, D. Abergel, G. Bodenhausen, K. L. Ivanov, D. Kuzbach. «Elucidating DNP Mechanisms via the Cross Talk between Spin Reservoirs», *J. Phys. Chem. Lett.*, **8**, 5531–5536 (2017)

20. I. V. Zhukov, A. S. Kiryutin, A. V. Yurkovskaya, Y. A. Grishin, H.-M. Vieth, K. L. Ivanov. «Field-cycling NMR experiments in an ultra-wide magnetic field range: relaxation and coherent polarization transfer», *Phys. Chem. Chem. Phys.*, **20**, 12396-12405 (2018), cover paper
21. D. V. Sosnovsky, N. N. Lukzen, H.-M. Vieth, G. Jeschke, D. Gräsing, P. Bielytskyi, J. Matysik, K. L. Ivanov. «Magnetic field and orientation dependence of solid-state CIDNP», *J. Chem. Phys.*, **150**, 094105 (2019)
22. K. F. Sheberstov, A. S. Kiryutin, C. Bengs, J. T. Hill-Cousins, L. J. Brown, R. C. D. Brown, G. Pileio, M. H. Levitt, A. V. Yurkovskaya, K. L. Ivanov. «Excitation of singlet-triplet coherences in pairs of nearly equivalent nuclear spins», *Phys. Chem. Chem. Phys.*, **21**, 6087-6100 (2019)
23. O. B. Morozova, K. L. Ivanov. «Time-resolved CIDNP of biologically important molecules», *ChemPhysChem*, **20**, 197-215 (2019)
24. D. A. Barskiy, S. Knecht, A. V. Yurkovskaya, K. L. Ivanov. «SABRE: Chemical kinetics and spin dynamics of the formation of hyperpolarization», *Prog. NMR Spectrosc.*, **114-115**, 33-70 (2019)
25. A. S. Kiryutin, A. V. Yurkovskaya, K. L. Ivanov, H.-M. Vieth. «Fast field-cycling NMR experiments with hyperpolarized spins», in "Field-Cycling NMR Relaxometry: Instrumentation, Model Theories and Applications", edited by Rainer Kimmich, New Developments in NMR No. 18, Royal Society of Chemistry, **chapter 21**, pp. 512-562 (2019)

- **COOPERATIONS**

Prof. Alexander B. Doktorov (Institute of Chemical Kinetics and Combustion SB RAS)

Prof. Leonid V. Kulik (Institute of Chemical Kinetics and Combustion SB RAS)

Prof. Geoffrey Bodenhausen, Prof. Fabien Ferrage, Dr Daniel Abergel (École Normale Supérieure, Paris, France)

Prof. Gerd Buntkowsky (Technische Universität Darmstadt, Germany)

Prof. Jörg Matysik (Universität Leipzig, Germany)

Prof. Dmitry Budker (Universität Mainz, Germany)

Prof. Malcolm H. Levitt, Dr. Giuseppe Pileio (University of Southampton, UK)

Prof. Takeji Takui, Prof. Kazunobu Sato (Osaka City University, Japan)

Prof. Marc Baldus (Utrecht University, the Netherlands)

Prof. P. K. Madhu (Tata Institute of Fundamental Research, India)