

# CURRICULUM VITAE

## Igor Morozov

Date of Birth: June 14, 1978

Citizenship: Russian

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(in Russian)



## OBJECTIVE

To obtain a position as a senior scientist or a scientific group leader where I can utilize my research, computing, teaching and leadership skills.

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## EDUCATION

- 2008**            **Associate professor**  
Joint Institute for High Temperatures of  
Russian Academy of Sciences  
Specialty: Plasma Physics
- 2004**            **Ph.D. in Physics and Mathematics**  
Joint Institute for High Temperatures of  
Russian Academy of Sciences  
Thesis Title: "Collisions and Plasma Waves in Nonideal Plasmas"  
Advisors: Prof. Genri E. Norman, Dr. Sergey A. Magnitskiy
- 2001 – 2004**    **Post-Graduate Studies**  
Moscow State University, Department of Physics
- 1995 – 2001**    **Graduate Studies**  
Moscow State University, Department of Physics,  
Diploma with departmental honors ("Red diploma")

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## WORK EXPERIENCE

- 2001 – Present**   **Joint Institute for High Temperatures of  
Russian Academy of Sciences (JIHT RAS)**  
Head of department (2014 – Present)  
Head of laboratory (2005 – 2014)  
Researcher (2004 – 2005)  
Junior Researcher (2001 – 2004)

*Scientific/technical duties:*

- Conduct theoretical studies in nonideal plasma physics.
- Perform computer simulations using the methods of Molecular Dynamics, Monte-Carlo and Particle-In-Cell using HPC clusters.

- Develop new computational methods for nonideal plasma physics (Wave Packet MD). Contribution to the open source LAMMPS project (<http://lammps.sandia.gov>).
- Write simulation codes in C/C++ and Fortran 90 for serial and parallel execution.
- Set up and maintain small HPC clusters.
- Set up computational Grid environment for scientific applications.
- Develop the open source C++ class library for building and running scientific applications in parallel and distributed environments (<http://gridmd.sourceforge.net>)
- Develop GPU-aware version of the Embedded Atom Method for the open source HOOMD-Blue package (<http://codeblue.umich.edu/hoomd-blue>).
- Develop user-friendly interfaces for scientific codes.
- Design and code the departmental web site (<http://www.ihed.ras.ru/norman>).
- Write articles for scientific journals (see the list below), deliver reports including invited lectures (33 articles in peer-review journals and more than 80 reports).

*Administrative duties:*

- Head of Department for Thermophysical Data (2014 – Present).
- Head of Laboratory for Supercomputing in Atomistic Simulations (2011 – 2014).
- Head of Nonideal Plasma Laboratory (2005 – 2011).
- Attract new students and employees (three of them are still working in my laboratory).
- Supervise undergraduate and PhD students (three defended master diploma).
- Search for new financial sources, write applications for grants and other funding, submit reports.
- Task leader for the contracts #499425, 1101131, 1193669 between JIHT RAS and Sandia National Laboratory, USA.
- Manage projects funded by Russian Foundation for Basic Research, Presidium of Russian Academy of Sciences, Ministry of Education and Science of the Russian Federation.
- Head of the workgroup on calculations of the JIHT scientific employee rating (2007 – Present, 14 group members).
- Secretary of the organizing committees of the International Conference on Strongly Coupled Coulomb Systems (Moscow, Russia, June 20-25, 2005, 156 participants).

**2013 – Present Higher School of Economics (National research university)**

Associate Professor

- Develop a semester course entitled “Computer simulations in natural sciences”.
- Develop a semester course entitled “High performance computing at supercomputer clusters”.
- Give lectures, conduct seminars and practical work for the courses mentioned above.

**2006 – Present Moscow Institute of Physics and Technology (MIPT)**

Associate Professor

Assistant Lecturer

- Develop a semester course entitled “Supercomputing methods in atomistic simulations”.
- Develop a one-year course entitled “Molecular modeling, parallel computations and Grid-technologies”.
- Give lectures, conduct seminars and practical work for the courses mentioned above.

**June 2011 Argonne National Laboratory, USA**

Visiting Scientist

- Conduct research of nonideal plasmas created due to unipolar arcs in microwave cavities of contemporary particle accelerators.

**2004 – 2010 Moscow State University, Department of Physics (MSU)**

Senior Teacher

- Lecturer for one-semester course for PhD students “Simulations and Supercomputing Technologies” (Chair of Polymer and Crystal Physics, 2010).
- Conduct seminars and practical work for undergraduate students for the course “Informatics and programming” (Chair of General Physics and Wave Processes, 2004 – 2007).

**1999 – 2010**      **Rostock University, Rostock, Germany**  
Visiting Scientist, Internship  
(Ten visits for the periods of three to four weeks in the given interval)

- Conduct theoretical studies and simulations of nonideal plasmas produced by shock waves, ionization of metal clusters and other processes (8 joint publications, see below).

**May 2000**          **Humboldt University, Berlin, Germany**  
Internship

- Conduct research of stochastic properties of nonideal plasmas.

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## AWARDS

**2007**              Award for young scientists from RAO "UES of Russia" and the Russian Academy of Sciences

**2004**              Medal and scholarship for young scientists from the Russian Academy of Sciences.

**2001 – 2004**      Winner of four student contests organized by Moscow Physical Society (three first prizes, one third prize).

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## GRANTS AND SCHOLARSHIPS

**2015-2017**      Russian Foundation for Basic Research, grant No. 15-02-08493-a "Electron dynamics in dense plasmas created by interaction of femtosecond laser pulses with nanostructured targets" (leader)

**2012-2013**      Russian Foundation for Basic Research, grant No. 12-02-33170-mol\_a\_vel "Thermodynamics and relaxation processes in many-body systems with Coulomb interaction" (leader)

**2012-2013**      Russian Foundation for Basic Research, grant No. 12-02-31783-mol\_a "Dynamics of electrons in nonuniform nonideal plasmas" (leader)

**2012**              Grant of the Governor of the Moscow Region.

**2010 – 2011**      Grant of the President of Russian Federation for young scientists.

**2008 – 2010**      Personal scholarship for young scientists from the Dynasty Foundation.

**2006 – 2008**      Joint grant from the U.S. Civilian Research & Development Foundation (CRDF) and the Russian Ministry of Science and Education.

**2006 – 2007**      Winner of the scholarship for young scientists "Best researchers of the Russian Academy of Sciences" from the Foundation for Assistance to National Science.

**2005 – 2006**      Grant of the President of Russian Federation for young scientists and their supervisors.

**2004**              Personal scholarship for PhD students from the Dynasty Foundation.

**2003 – 2009**      Support from the JIHT RAS Foundation for Young Scientists.

**1999**              Winner of the Leonhard Euler scholarship from Humboldt University, Berlin, Germany.

- 1997 – 2010** Participant of 15 projects (grants) funded by the Russian Foundation for Basic Research, leader for 3 projects.
- 1996 – 2003** Diplomas «Soros student» and «Grant of Moscow» from International Soros Science Education Program (8 grants).
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## REVIEWING AND EXPERTISE

### Reviewer for international journals:

Physics Letters A  
Journal of Physics A  
Plasma Physics and Controlled Fusion  
Contributions to Plasma Physics  
Computer Physics Communications

### Official opponent at PhD thesis defenses:

Sergey A. Kislenko, JIHT RAS, 2010  
Dmitriy S. Sitnikov, JIHT RAS, 2008

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## COMPUTER SKILLS

### Operating Systems:

Linux (system administration, advanced user)  
Microsoft Windows (system administration, advanced user)

### Programming Languages:

C/C++ (STL, boost)  
Fortran 90/77  
Perl  
Python  
HTML, PHP  
SQL (basic level)  
Basic/Visual Basic for Applications  
Pascal/Delphi  
Assembler (Intel x86)  
Wolfram Mathematica  
LaTeX

### Other skills:

Parallel programming with MPI, OpenMP, POSIX & Win32 API  
Programming Nvidia GPUs using CUDA  
Modifying foreign codes (LAMMPS, HOOMD)  
Setting up small HPC clusters, using and configuring cluster software (PBS, SLURM, Globus toolkit)

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## SPOKEN LANGUAGES

Russian mother tongue  
English fluent  
German basic

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## PUBLICATIONS IN PEER-REVIEW JOURNALS

Papers are partially available at <http://www.ihed.ras.ru/norman/personal/morozov.php#publ>

1. R.G. Bystryi, I.V. Morozov. Electronic oscillations in ionized sodium nanoclusters // *J. Phys. B*. 2015. V. 48. P. 015401.
2. I.A. Valuev, I.V. Morozov. Managing Dynamical Distributed Applications with GridMD Library // *Lecture Notes in Computer Science*. 2015. V. 9158. P. 272-289.
3. Ya.S. Lavrinenko, I.V. Morozov, S.A. Pikuz, I.Yu. Skobelev. Reflectivity and imaging capabilities of spherically bent crystals studied by ray-tracing simulations // *J. Phys. Conf. Ser.* 2015. V. 653. P. 012027.
4. I.A. Valuev, I.V. Morozov. Extension of the Wave Packet Molecular Dynamics method towards the accurate quantum simulations of electron dynamics // *J. Phys. Conf. Ser.* 2015. V. 653. P. 012153.
5. R.G. Bystryi, Ya.S. Lavrinenko, A.V. Lankin, I.V. Morozov, G.E. Norman, I.M. Saitov. Pressure fluctuations in nonideal nondegenerate plasma // *High Temperature*. 2014. V. 52. Issue 4. P. 475-482.
6. P.E. Grabowski, A. Markmann, I.V. Morozov, I.A. Valuev, C.A. Fichtl, D.F. Richards, V.S. Batista, F.R. Graziani, M.S. Murillo. Wave packet spreading and localization in electron-nuclear scattering // *Phys. Rev. E*. 2013. V. 87. P. 063104.
7. I.V. Morozov, G.E. Norman, Z. Insepov, J. Norem. "Sheath parameters for non-Debye plasmas: Simulations and arc damage" // *Phys. Rev. ST Accel. Beams*. 2012. V. 15. P. 053501.
8. I.V. Morozov, I.A. Valuev. Improvement of Wave Packet Molecular Dynamics using Packet Splitting // *Contrib. Plasma Phys.* 2012. V. 52. P. 140-144.
9. T. Raitza, G. Röpke, H. Reinholz, I. Morozov. Spatially resolved dynamic structure factor of finite systems from molecular dynamics simulations // *Phys. Rev. E*. 2011. V. 84. P. 036406.
10. I.V. Morozov, I.A. Valuev. Automatic Distributed Workflow Generation with GridMD Library // *Computer Physics Communications*. 2011. V. 182. P. 2052–2058.
11. I.V. Morozov, A.M. Kazennov, R.G. Bystryi, G.E. Norman, V.V. Pisarev, V.V. Stegailov. Molecular dynamics simulations of the relaxation processes in the condensed matter on GPUs // *Computer Physics Communications*. 2011. V. 182. P. 1974–1978.
12. A.Ya. Faenov, A.V. Lankin, I.V. Morozov, G.E. Norman, S.A. Pikuz Jr, I.Yu. Skobelev. Nonequilibrium nonideal nanoplasma generated by a fast single ion in condensed matter // *Plasma Phys. Control. Fusion*. 2009. V. 51. P. 124025.
13. T. Raitza, H. Reinholz, G. Röpke, I. Morozov, E. Suraud. Laser excited expanding small clusters: Single time distribution functions // *Contributions to Plasma Physics*. 2009. V. 49. P. 496-506.
14. A.Ya. Faenov, A.V. Lankin, I.V. Morozov, G.E. Norman, S.A. Pikuz Jr, I.Yu. Skobelev. Strongly coupled nonequilibrium nanoplasma generated by a fast single ion in solids // *Contributions to Plasma Physics*. 2009. V. 49. P. 467.
15. T. Raitza, H. Reinholz, G. Roepke, I.V. Morozov. Collision frequency of electrons in laser excited small clusters // *J. Phys. A*. 2009. V. 42. P. 214048.
16. I.V. Morozov, I.A. Valuev. Localization constraints in Gaussian wave packet molecular dynamics of nonideal plasmas // *J. Phys. A*. 2009. V. 42. P. 214044.
17. A.V. Lankin, I.V. Morozov, G.E. Norman, S.A. Pikuz Jr., I.Yu. Skobelev. Solid-density plasma nanochannel generated by a fast single ion in condensed matter // *Phys. Rev. E*. 2009. V. 79. P. 036407.
18. H. Reinholz, T. Raitza, G. Roepke, I.V. Morozov. Optical and Transport Properties in Dense Plasmas Collision frequency from bulk to cluster // *Int. J. Mod. Phys. B*. 2008. V. 22. P. 4627-4641.
19. Morozov I.V., Norman G.E., Smyslov A.A. Volumetric Relaxation in Simple Liquid: Molecular Dynamics Simulation // *High Temperature*. 2008. V. 46. No. 6. P. 768–774.
20. Lankin A.V., Morozov I.V., Norman G.E., Skobelev I.Yu. Relaxation of the condensed media after excitation by a single fast heavy ion // *Doklady Physics*. 2008. V. 53. No 3. P. 122-127.
21. Morozov I.V., Norman G.E., Skobelev I.Yu. On the Relaxation of a Medium after Excitation with Single Fast Heavy Ions // *Journal of Experimental and Theoretical Physics (JETP)*. 2008. V. 106. No. 3. P. 608-622.

22. I. Morozov, I. Valuev, Distributed Applications From Scratch: Using GridMD Workflow Patterns // Lecture Notes in Computer Science (LNCS). 2007. V. 4489. P. 199–203.
23. Kuksin A.Yu., Morozov I.V., Norman G.E., Stegailov V.V., Valuev I.A. Standards for Molecular Dynamics Modelling and Simulation of Relaxation // Molecular Simulation. 2005. V. 31. № 14–15. P. 1005-1017.
24. Morozov I., Reinholz H., Roepke G., Wierling A., Zwicknagel G. Molecular dynamics simulations of optical conductivity of dense plasmas // Phys. Rev. E. 2005. V. 71. P. 066408.
25. Morozov I.V., Norman G.E. Collisions and plasma waves in nonideal plasmas // Journal of Experimental and Theoretical Physics (JETP). 2005. V. 100. No. 2. P. 370-384.
26. Reinholz H., Morozov I., Roepke G., Millat Th. Internal versus external conductivity of a dense plasma: Many-particle theory and simulations // Phys. Rev. E. 2004. V. 69. P. 066412.
27. Kuksin A.Yu., Morozov I.V., Norman G.E., Stegailov V.V. Standard of Molecular Dynamics Modeling and Simulation of Relaxation in Dense Media // Lecture Notes in Computer Science (LNCS). 2004. V. 3039. P. 596–603.
28. Reinholz H., Zaporoghets Yu., Mintsev V., Fortov V., Morozov I., Roepke G. Frequency-Dependent Reflectivity of Shock Compressed Xenon Plasmas // Phys. Rev. E. 2003. V. 68. P. 036403.
29. Morozov I.V., Norman G.E., Valuev A.A., Valuev I.A. Nonideal plasma as non-equilibrium media // Journal of Physics A. 2003. V. 36. P. 8723–8732.
30. Morozov I.V., Norman G.E. Non-Exponential dynamic relaxation in strongly nonequilibrium nonideal plasmas // Journal of Physics A. 2003. V. 36. P. 6005–6012.
31. Magnitskiy S.A., Morozov I.V., Norman G.E., Valuev A.A. Anomalous reflectivity from nonideal plasma // Journal of Physics A. 2003. V. 36. P. 5999–6004.
32. Reinholz H., Roepke G., Morozov I.V., Mintsev V.B., Zapapoghets Yu.B., Fortov V.E., Wierling A. Density profile in shock wave fronts of partially ionized xenon plasmas // Journal of Physics A. 2003. V. 36. P. 5991–5997.
33. Morozov I.V., Norman G.E., Stegailov V.V. Dynamic and Stochastic Properties of Molecular Systems: from Simple Liquids to Enzymes // Lecture Notes in Computer Science (LNCS). 2002. V. 2331. P. 1137–1146.
34. Morozov I.V., Norman G.E., Valuev A.A. Stochastic Properties of Nonideal Plasmas // Phys. Rev. E. 2001. V. 63. P. 36405-1–9.
35. Morozov I.V., Norman G.E., Valuev A.A. K-entropy (average Lyapunov exponent), dynamics and chaos for particle trajectories. Molecular dynamics simulation for electron-ion strongly coupled plasmas. // J. de Physique IV, France. V. 10. March 2000. Pr5. P. 251–254.
36. Morozov I.V., Norman G.E., Valuev A.A. K-Entropies of Electrons and Ions in Nonideal Plasmas // Contrib. Plasma Phys. 1999. V. 39. № 4. P. 307–311.
37. Morozov I.V., Norman G.E., Valuev A.A. Divergence of particle trajectories in electron-ion plasmas // J. Tech. Phys. 1999. V. 40. P. 61–65.
38. Valuev A.A., Morozov I.V., Norman G.E. Langmuir waves and ion sound in nonideal plasma. Molecular dynamic simulations // Doklady Physics. 1998. V. 43. P. 608-611.

+ 36 publications in conference proceedings.

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## INVITED LECTURES

1. Morozov I.V. Molecular dynamics simulations in physics (mini-course) // Scientific School “High Performance Computing”, Nalchik, Russia, January 21-30, 2013.
2. Morozov I.V. Atomistic simulations on supercomputers using open source codes (invited lecture) // International School “Computer simulation of advanced materials”, Moscow, Russia, July 16–21, 2012.
3. Morozov I.V. Molecular dynamics simulations in physics (mini-course) // Scientific School “High Performance Computing”, Nalchik, Russia, January 22-30, 2012.

4. Morozov I.V. Molecular dynamics simulations on GPUs // International Scientific School “High Performance Computing in Grid-systems for applied numerical modeling”, MIPT, Dolgoprudny, Russia, August 21-30, 2011.
5. Morozov I.V. “Molecular dynamics simulations of condensed matter using graphical processing units” // Scientific School “Nanomaterials for Space Technologies”, MIEM, Moscow, Russia, December 1-3, 2010.
6. Morozov I.V. “Collisions and Plasma Waves in Nonideal Plasmas” // International Conference on Strongly Coupled Coulomb Systems, Moscow, Russia, July 20–25, 2005.
7. Morozov I.V. “Many-Particle Theory and Simulations of Coulomb Systems” // DAAD Summerschool “Modelling of Strongly Correlated Many-Particle Systems”, Ekaterinburg, Russia, 2-19 сентября 2004г, Ekaterinburg, Russia, 2004.

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## **PERSONAL INTERESTS**

Classical music, literature, sports (running, cycling, skiing, table tennis).