

Volodymyr Vovchenko

Curriculum Vitae

University of Washington, Seattle
Institute for Nuclear Theory

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Research interests

Heavy-Ion Collisions; QCD Phase Structure; Scientific Computing and Visualization

Academic appointments

- Apr 2022–... **Research Assistant Professor**, *Institute for Nuclear Theory, University of Washington, Seattle, USA.*
Research in theoretical nuclear physics
- Feb 2020– **Research Fellow**, *Lawrence Berkeley National Laboratory, USA.*
Mar 2022 Feodor Lynen Fellowship of the Alexander von Humboldt foundation.
Research on heavy-ion phenomenology, event-by-event fluctuations, light nuclei
- Jan 2017– **Research Associate**, *Goethe University Frankfurt am Main, Germany.*
Feb 2020 Research on the QCD equation of state, hadronic interactions, heavy-ion collisions; PhD dissertation work; statistical-thermal model code `Thermal-FIST`

Education

- 2014–2018 **PhD Student**, *Goethe University Frankfurt am Main, Germany*, Grade: summa cum laude (with distinction).
Thesis: Quantum statistical van der Waals equation and its QCD applications ([link](#))
Advisor: Prof. Dr. Horst Stoecker
- 2011–2013 **Master Student**, *Taras Shevchenko National University, Kyiv, Ukraine.*
Subject: Theoretical Physics
Thesis: Evolution of the interacting hadronic system created in relativistic nuclear collisions
Advisor: Prof. Dr. Dmitry Anchishkin
- 2007–2011 **Bachelor Student**, *Taras Shevchenko National University, Kyiv, Ukraine.*
Subject: Physics

Experience

- 2014–2017 **Member of the CBM collaboration**, *GSI, Darmstadt, Germany.*
On-line event reconstruction and physics analysis for heavy-ion collisions.
- Aug 2014– **Summer student (High-Performance Computing)**, *CERN School of Computing,*
Sep 2014 *Braga, Portugal.*
Intensive lectures and exercises in various subjects of high-performance scientific computing.

Feb 2012– **Internship (Condensed Matter Physics)**, *Institut Matériaux Microélectronique Nanosciences de Provence*, Marseille, France.
Quantum chemistry calculations for molecules and polymer sheets. Theoretical description of a time-dependent transport through a quantum dot.

Honors

- 2022 IUPAP (International Union of Pure and Applied Physics) Young Scientist Prize in Nuclear Physics
- 2019 Feodor Lynen Research Fellowship of the Alexander von Humboldt foundation.
- 2018 Prize of the Association of Friends and Sponsors of Goethe University for Young Scientists for best dissertation in the natural sciences. ([link](#))
- 2018 Giersch-Excellence-Award for an outstanding doctoral thesis.
- 2016 & 2017 Giersch-Excellence-Grant for outstanding work and progress in the PhD thesis project within the past year.
- 2013 Award of the National Academy of Sciences of Ukraine for the best scientific works of young scientists and students in 2012.

Academic performance

○ Publications (as of September 9, 2022)

74 publications in peer-reviewed international journals, of which

- 2 in Physical Review Letters
- 10 in Physics Letters B
- 39 in Physical Review C
- 3 in Physical Review D
- 1 in Journal of High Energy Physics
- 1 in Computer Physics Communications

Additionally, 4 review articles, 3 submitted/accepted papers, and 29 conference proceedings. Of all the papers, 45 as first author and 5 as single author.

Total citations: 2197 (inSPIRE), 2424 (Google Scholar)

h-index: 27 (inSPIRE), 28 (Google Scholar)

○ Talks

72 talks at international conferences, workshops, and invited seminars, of which 30 were invited.

○ Funding

Feodor Lynen Research Fellowship of the Alexander von Humboldt foundation to carry out a research project on QCD phase structure at finite baryon density at the Lawrence Berkeley National Laboratory.

Teaching experience

○ Teaching experience

- Feb 2019 Lecture at the School “COST Workshop on Interplay of hard and soft QCD probes for collectivity in heavy-ion collisions”, Lund University
- Winter 2017/2018 Tutoring of the course “Statistical Physics”, Physics Department, Goethe University Frankfurt
- Winter 2016/2017 Tutoring of the course “Classical Electrodynamics”, Physics Department, Goethe University Frankfurt
- Fall 2013 Tutoring of the course “Methods of mathematical physics”, Physics Department, Taras Shevchenko National University of Kyiv
- Fall 2012 Tutoring of the course “Methods of mathematical physics”, Physics Department, Taras Shevchenko National University of Kyiv

Service for the community

○ Referee for international journals, including

- Nature Communications
- Physical Review Letters
- Physical Review C & D
- Physics Letters B
- European Physical Journal A & Plus
- International Journal of Modern Physics A & E
- Journal of Physics G
- Nuclear Physics A
- Particles
- Universe
- Acta Physica Polonica
- Chinese Physics C
- Ukrainian Journal of Physics

○ Program proposal reviewer for funding agencies

- National Science Centre Poland

Computer skills and projects

- General Numerical calculations, Monte Carlo simulations, GUI, HPC, Android development, source version control, software engineering
- Coding Extensive programming with C/C++, working knowledge of PYTHON, Java, ROOT, Fortran, scientific computing with Mathematica and Jupyter notebooks, parallel/GPU computing with CUDA and OpenCL, graphical user interface and visualization with Qt and OpenGL

- GitHub <https://github.com/vlvovch>
- Android Three Android apps for visualization of different physical systems using OpenGL: **Pendulum Studio** (4.7/5.0 rating, 50,000+ installs), **Hydrogen Atom Orbitals** (4.5/5.0, 10,000+ installs), **Quantum Harmonic Oscillator** (4.6/5.0, 10,000+ installs).
- Thermal- A documented open source C++ package for high-energy physics applications. Used
FIST in 30+ publications. (<https://github.com/vlvovch/Thermal-FIST>)
- Competitions Top 1000 finish in 2009, 2010, 2012, and 2013 Google Code Jam
- Hackathons 2nd place at Hackathon@HOLM (2016), 3rd place at Hackathon Darmstadt (2015).

Language skills

- Native Ukrainian, Russian
- Fluent English
- Basic German

Publication list (as of September 23, 2022)

h-index: 27 (source: inSPIRE), 29 (source: Google Scholar)
Citations: 2242 (source: inSPIRE), 2481 (source: Google Scholar)
Publication list also available at [inSPIRE](#) and [Google Scholar](#)

Journal articles

o Fluctuations of conserved charges

81. "Cooper-Frye sampling with short-range repulsion"
V. Vovchenko
arXiv:2208.13693 [hep-ph], submitted for publication
80. "Critical point particle number fluctuations from molecular dynamics"
V.A. Kuznietsov, O. Savchuk, M.I. Gorenstein, V. Koch, **V. Vovchenko**
Physical Review C 105, 044903 (2022)
79. "Correcting event-by-event fluctuations in heavy-ion collisions for exact global conservation laws with the generalized subensemble acceptance method"
V. Vovchenko
Physical Review C 105, 014903 (2022)
78. "Constraining baryon annihilation in the hadronic phase of heavy-ion collisions via event-by-event fluctuations"
O. Savchuk, **V. Vovchenko**, V. Koch, J. Steinheimer, H. Stoecker
Physics Letters B 827, 136983 (2022)
77. "Efficiency corrections for factorial moments and cumulants of overlapping sets of particles"
V. Vovchenko, V. Koch
Nuclear Physics A 1010, 122179 (2021)
76. "Particlization of an interacting hadron resonance gas with global conservation laws for event-by-event fluctuations in heavy-ion collisions"

- V. Vovchenko**, V. Koch
Physical Review C 103, 044903 (2021)
75. “Higher order conserved charge fluctuations inside the mixed phase”
R.V. Poberezhnyuk, O. Savchuk, M.I. Gorenstein, **V. Vovchenko**, H. Stoecker
Physical Review C 103, 024912 (2021)
74. “Cumulants of multiple conserved charges and global conservation laws”
V. Vovchenko, R.V. Poberezhnyuk, V. Koch
JHEP 10, 089 (2020)
73. “Connecting fluctuation measurements in heavy-ion collisions with the grand-canonical susceptibilities”
V. Vovchenko, O. Savchuk, R.V. Poberezhnyuk, M.I. Gorenstein, V. Koch
Physics Letters B 811, 135868 (2020)
72. “Critical point fluctuations: Finite size and global charge conservation effects”
R.V. Poberezhnyuk, O. Savchuk, M.I. Gorenstein, **V. Vovchenko**, K. Taradiy, V.V. Begun, L. Satarov, J. Steinheimer, H. Stoecker
Physical Review C 101, 035205 (2020)
71. “Binomial acceptance corrections for particle number distributions in high-energy reactions”
O. Savchuk, R.V. Poberezhnyuk, **V. Vovchenko**, and M.I. Gorenstein
Physical Review C 101, 024917 (2020)
70. “Critical point of nuclear matter and beam energy dependence of net proton number fluctuations”
V. Vovchenko, L. Jiang, M.I. Gorenstein, and H. Stoecker
Physical Review C 97, 024910 (2018)
69. “Conserved charge fluctuations are not conserved during the hadronic phase”
J. Steinheimer, **V. Vovchenko**, J. Aichelin, M. Bleicher, and H. Stoecker
Physics Letters B 776, 32 (2018)
68. “Non-Gaussian particle number fluctuations in vicinity of the critical point for van der Waals equation of state”
V. Vovchenko, R.V. Poberezhnyuk, D.V. Anchishkin, and M.I. Gorenstein
Journal of Physics A 49, 015003 (2016)
67. “Particle Number Fluctuations for van der Waals Equation of State”
V. Vovchenko, D.V. Anchishkin, and M.I. Gorenstein
Journal of Physics A 48, 305001 (2015)

○ Light nuclei production

66. “Coalescence, the thermal model and multi-fragmentation: The energy and volume dependence of light nuclei production in heavy ion collisions”
P. Hillmann, K. Käfer, J. Steinheimer, **V. Vovchenko**, M. Bleicher
Journal of Physics G 49, 055107 (2022)
65. “Towards solving the puzzle of high temperature light (anti)-nuclei production in ultra-relativistic heavy ion collisions”
T. Neidig, K. Gallmeister, C. Greiner, M. Bleicher, **V. Vovchenko**
Physics Letters B 827, 136891 (2022)

64. “Feeddown contributions from unstable nuclei in relativistic heavy-ion collisions”
V. Vovchenko, B. Dönigus, B. Kardan, M. Lorenz, H. Stoecker
Physics Letters B 809, 135746 (2020)
63. “Nucleosynthesis in heavy-ion collisions at the LHC via the Saha equation”
V. Vovchenko, K. Gallmeister, J. Schaffner-Bielich, C. Greiner
Physics Letters B 800, 135131 (2020)
62. “Multiplicity dependence of light nuclei production at LHC energies in the canonical statistical model”
V. Vovchenko, B. Dönigus, and H. Stoecker
Physics Letters B 785, 171 (2018)

○ **QCD equation of state**

61. “Constraining the hadronic spectrum and repulsive interactions in a hadron resonance gas via fluctuations of conserved charges”
J.M. Kartheim, V. Koch, **V. Vovchenko**, C. Ratti
Physical Review D 104, 094009 (2021)
60. “Quark Density in Lattice QC₂D at Imaginary and Real Chemical Potential”
A. Begun, V.G. Bornyakov, N.V. Gerasimeniuk, V.A. Goy, A. Nakamura, R.N. Rogalyov, **V. Vovchenko**
arXiv:2103.07442 [nucl-th], submitted for publication
59. “Traces of the nuclear liquid-gas phase transition in the analytic properties of hot QCD”
O. Savchuk, **V. Vovchenko**, R.V. Poberezhnyuk, M.I. Gorenstein, and H. Stoecker
Physical Review C 101, 035205 (2020)
58. “Critical point signatures in the cluster expansion in fugacities”
V. Vovchenko, C. Greiner, V. Koch, and H. Stoecker
Physical Review D 101, 014015 (2020)
57. “The analytic structure of thermodynamic systems with repulsive interactions”
K. Taradiy, A. Motornenko, **V. Vovchenko**, M.I. Gorenstein, and H. Stoecker
Physical Review C 100, 065202 (2019)
56. “Hagedorn bag-like model with a crossover transition meets lattice QCD”
V. Vovchenko, M.I. Gorenstein, C. Greiner, and H. Stoecker,
Physical Review C 99, 045204 (2019)
55. “Cluster Expansion Model for QCD Baryon Number Fluctuations: No Phase Transition at $\mu_B/T < \pi$ ”
V. Vovchenko, J. Steinheimer, O. Philipsen, and H. Stoecker
Physical Review D 97, 114030 (2018)
54. “Beth-Uhlenbeck approach for repulsive interactions between baryons in a hadron gas”
V. Vovchenko, A. Motornenko, M.I. Gorenstein, and H. Stoecker
Physical Review C 97, 035202 (2018)
53. “Modeling baryonic interactions with the Clausius-type equation of state”
V. Vovchenko, M.I. Gorenstein, and H. Stoecker
European Physical Journal A 54, 16 (2018)

52. “Repulsive baryonic interactions and lattice QCD observables at imaginary chemical potential”
V. Vovchenko, A. Pásztor, S.D. Katz, Z. Fodor, and H. Stoecker
Physics Letters B 775, 71 (2017)
51. “Multicomponent van der Waals equation of state: Applications in nuclear and hadronic physics”
V. Vovchenko, A. Motornenko, P. Alba, M.I. Gorenstein, L.M. Satarov, and H. Stoecker
Physical Review C 96, 045202 (2017)
50. “van der Waals Interactions in Hadron Resonance Gas: From Nuclear Matter to Lattice QCD”
V. Vovchenko, M.I. Gorenstein, and H. Stoecker
Physical Review Letters 118, 182301 (2017)
49. “Limiting temperature of pion gas with the van der Waals equation of state”
R.V. Poberezhnyuk, **V. Vovchenko**, D.V. Anchishkin, and M.I. Gorenstein
Journal of Physics G 43, 095105 (2016)
48. “Mean-field approach in the multi-component gas of interacting particles applied to relativistic heavy-ion collisions”
D. Anchishkin and **V. Vovchenko**
Journal of Physics G 42, 105102 (2015)
47. “Hadron Resonance Gas Equation of State from Lattice QCD”
V. Vovchenko, D.V. Anchishkin, and M.I. Gorenstein
Physical Review C 91, 024905 (2015)

○ Dense QCD matter

46. “Enhanced dilepton emission from a phase transition in dense matter”
O. Savchuk, A. Motornenko, J. Steinheimer, **V. Vovchenko**, M. Bleicher, M.I. Gorenstein, T. Galatyuk
arXiv:2209.05267 [nucl-th], submitted for publication
45. “Equation of state for hot QCD and compact stars from a mean field approach”
A. Motornenko, J. Steinheimer, **V. Vovchenko**, S. Schramm, and H. Stoecker
Physical Review C 101, 034904 (2020)
44. “Detecting the Hadron-Quark Phase Transition with Gravitational Waves”
M. Hanauske, L. Bovard, E. Most, J. Papenfort, J. Steinheimer, A. Motornenko, **V. Vovchenko**, V. Dexheimer, S. Schramm, H. Stöcker
Universe 5, 156 (2019)
43. “Neutron Star Mergers: Probing the EoS of Hot, Dense Matter by Gravitational Waves”
M. Hanauske, J. Steinheimer, A. Motornenko, **V. Vovchenko**, L. Bovard, E.R. Most, L.J. Papenfort, S. Schramm, H. Stöcker
Particles 2, 44 (2019)
42. “Phase transitions and Bose-Einstein condensation in alpha-nucleon matter”
L.M. Satarov, I.N. Mishustin, A. Motornenko, **V. Vovchenko**, M.I. Gorenstein, and H. Stoecker
Physical Review C 99, 024909 (2019)
41. “Noncongruent phase transitions in strongly interacting matter within the quantum van der Waals model”

- R.V. Poberezhnyuk, **V. Vovchenko**, M.I. Gorenstein, and H. Stoecker
Physical Review C 99, 024907 (2019)
40. "Equations of state for real gases on the nuclear scale"
V. Vovchenko
Physical Review C 96, 015206 (2017)
39. "Quantum van der Waals and Walecka models of nuclear matter"
R.V. Poberezhnyuk, **V. Vovchenko**, D.V. Anchishkin, and M.I. Gorenstein
International Journal of Modern Physics E 26, 1750061 (2017)
38. "Bose-Einstein condensation and liquid-gas phase transition in alpha-matter"
L.M. Satarov, M.I. Gorenstein, A. Motornenko, **V. Vovchenko**, I.N. Mishustin, and H. Stoecker
Journal of Physics G 44, 12 (2017)
37. "Scaled variance, skewness, and kurtosis near the critical point of nuclear matter"
V. Vovchenko, D.V. Anchishkin, M.I. Gorenstein, and R.V. Poberezhnyuk
Physical Review C 92, 054901 (2015)
36. "Van der Waals equation of state with Fermi statistics for nuclear matter"
V. Vovchenko, D.V. Anchishkin, and M.I. Gorenstein
Physical Review C 91, 064314 (2015)
- **Freeze-out in heavy-ion collisions**
35. "Ambiguities in the hadro-chemical freeze-out of Au+Au collisions at SIS18 energies and how to resolve them"
A. Motornenko, J. Steinheimer, **V. Vovchenko**, R. Stock, H. Stoecker
Physics Letters B 822, 136703 (2021)
34. "Kinetic freeze-out temperature from yields of short-lived resonances"
A. Motornenko, **V. Vovchenko**, C. Greiner, H. Stoecker
Physical Review C 102, 024909 (2020)
33. "Canonical statistical model analysis of p-p, p-Pb, and Pb-Pb collisions at the LHC"
V. Vovchenko, B. Dönigus, and H. Stoecker
Physical Review C 100, 054906 (2019)
32. "Chemical freeze-out conditions and fluctuations of conserved charges in heavy-ion collisions within quantum van der Waals model"
R. Poberezhnyuk, **V. Vovchenko**, A. Motornenko, M.I. Gorenstein, H. Stoecker
Physical Review C 100, 054904 (2019)
31. "Monte Carlo approach to the excluded-volume hadron resonance gas in grand canonical and canonical ensembles"
V. Vovchenko, M.I. Gorenstein, and H. Stoecker
Physical Review C 98, 064909 (2018)
30. "Statistical hadron-gas treatment of systems created in proton-proton interactions at energies available at the CERN Super Proton Synchrotron"
V.V. Begun, **V. Vovchenko**, M.I. Gorenstein, and H. Stoecker
Physical Review C 98, 054909 (2018)
29. "Finite resonance widths influence the thermal-model description of hadron yields"
V. Vovchenko, M.I. Gorenstein, and H. Stoecker
Physical Review C 98, 034906 (2018)

28. "Estimation of the freeze-out parameters reachable in a fixed-target experiment at the CERN Large Hadron Collider"
V. Begun, D. Kikoła, **V. Vovchenko**, and D. Wielanek
Physical Review C 98, 034905 (2018)
27. "Flavor-dependent eigenvolume interactions in a hadron resonance gas"
P. Alba, **V. Vovchenko**, M.I. Gorenstein, and H. Stoecker
Nuclear Physics A 974, 22 (2018)
26. "New scenarios for hard-core interactions in a hadron resonance gas"
L.M. Satarov, **V. Vovchenko**, P. Alba, M.I. Gorenstein, and H. Stoecker,
Physical Review C 95, 024902 (2017)
25. "Examination of the sensitivity of the thermal fits to heavy-ion hadron yield data to the modeling of the eigenvolume interactions"
V. Vovchenko and H. Stoecker
Physical Review C 95, 044904 (2017)
24. "Surprisingly large uncertainties in temperature extraction from thermal fits to hadron yield data at LHC"
V. Vovchenko and H. Stoecker
Journal of Physics G 44, 055103 (2017)
23. "Hadron multiplicities and chemical freeze-out conditions in proton-proton and nucleus-nucleus collisions"
V. Vovchenko, V.V. Begun, and M.I. Gorenstein
Physical Review C 93, 064906 (2016)

○ Dynamical description of heavy-ion collisions

22. "Proton number cumulants and correlation functions in Au-Au collisions at $\sqrt{s_{NN}} = 7.7 - 200$ GeV from hydrodynamics"
V. Vovchenko, V. Koch, C. Shen
Physical Review C 105, 014904 (2022)
21. "Hadron yields and fluctuations at the CERN Super Proton Synchrotron: system size dependence from Pb+Pb to p+p collisions"
A. Motornenko, V.V. Begun, **V. Vovchenko**, M.I. Gorenstein, and H. Stoecker
Physical Review C 99, 034909 (2019)
20. "Electromagnetic probes of a pure-gluon initial state in nucleus-nucleus collisions at energies available at the CERN Large Hadron Collider"
V. Vovchenko, Iu.A. Karpenko, M.I. Gorenstein, L.M. Satarov, I.N. Mishustin, B. Kämpfer, and H. Stoecker
Physical Review C 94, 024906 (2016)
19. "Entropy production in chemically nonequilibrium quark-gluon plasma created in central Pb+Pb collisions at energies available at the CERN Large Hadron Collider"
V. Vovchenko, M.I. Gorenstein, L.M. Satarov, I.N. Mishustin, L.P. Csernai, I. Kisel, and H. Stoecker
Physical Review C 93, 014906 (2016)
18. "Glueballs amass at RHIC and LHC Colliders! - The early quarkless 1st order phase transition at $T=270$ MeV - from pure Yang-Mills glue plasma to GlueBall-Hagedorn states"

H. Stoecker, K. Zhou, S. Schramm, F. Senzel, C. Greiner, M. Beitel, K. Gallmeister, M. Gorenstein, I. Mishustin, D. Vasak, J. Steinheimer, J. Struckmeier, **V. Vovchenko**, L. Satarov, Z. Xu, P. Zhuang, L.P. Csernai, B. Sinha, S. Raha, T.S. Biró, M. Panero
Journal of Physics G 43, 015105 (2016)

17. "Mean transverse mass of hadrons in proton-proton reactions"
V.Yu. Vovchenko, D.V. Anchishkin, and M.I. Gorenstein
Nuclear Physics A 936, 1-5 (2015)
16. "Time dependence of partition into spectators and participants in relativistic heavy-ion collisions"
V. Vovchenko, D. Anchishkin, and L.P. Csernai
Physical Review C 90, 044907 (2014)
15. "System-size and energy dependence of particle momentum spectra: The UrQMD analysis of p+p and Pb+Pb collisions"
V.Yu. Vovchenko, D.V. Anchishkin, and M.I. Gorenstein
Physical Review C 90, 024916 (2014)
14. "Longitudinal fluctuations of the center of mass of the participants in heavy-ion collisions"
V. Vovchenko, D. Anchishkin, and L.P. Csernai
Physical Review C 88, 014901 (2013)
13. "Hadronic Reaction Zones in Relativistic Nucleus-Nucleus Collisions"
D. Anchishkin, **V. Vovchenko**, and S. Yezhov
International Journal of Modern Physics E 22, 1350042 (2013)
12. "Pionic freeze-out hypersurfaces in relativistic nucleus-nucleus collisions"
D. Anchishkin, **V. Vovchenko**, and L.P. Csernai
Physical Review C 87, 014906 (2013)

○ QCD at finite isospin density

11. "Phase diagram of interacting pion matter and isospin charge fluctuations"
O.S. Stashko, O.V. Savchuk, R.V. Poberezhnyuk, **V. Vovchenko**, M.I. Gorenstein
Physical Review C 103, 065201 (2021)
10. "Pion Condensation in the Early Universe at Nonvanishing Lepton Flavor Asymmetry and Its Gravitational Wave Signatures"
V. Vovchenko, B.B. Brandt, F. Cuteri, G. Endrodi, F. Hajkarim, J. Schaffner-Bielich
Physical Review Letters 126, 012701 (2021)
9. "Bose-Einstein condensation phenomenology in systems with repulsive interactions"
O. Savchuk, Y. Bondar, O. Stashko, R.V. Poberezhnyuk, **V. Vovchenko**, M.I. Gorenstein, H. Stoecker
Physical Review C 102, 035202 (2020)

○ Machine Learning

8. "Machine learning based approach to fluid dynamics"
K. Taradiy, K. Zhou, J. Steinheimer, R.V. Poberezhnyuk, **V. Vovchenko**, H. Stoecker
arXiv:2106.02841 [physics.comp-ph], submitted for publication

○ Condensed matter physics

7. “A new approach to time-dependent transport through an interacting quantum dot within the Keldysh formalism”
V. Vovchenko, D. Anchishkin, J. Azema, P. Lombardo, R. Hayn, and A.-M. Daré
Journal of Physics: Condensed Matter 26, 015306 (2014)
6. “Simulation of percolation threshold in composites filled with conducting particles of various morphologies”
L. Vovchenko and **V. Vovchenko**
Materialwissenschaft und Werkstofftechnik 42, 70-74 (2011)

○ Reviews

5. “The BEST framework for the search for the QCD critical point and the chiral magnetic effect”
X. An *et al.*
Nuclear Physics A 1017, 122343 (2022)
4. “Hadron resonance gas with van der Waals interactions”
V. Vovchenko
International Journal of Modern Physics E 29, 2040002 (2020)
3. “Dynamics of critical fluctuations: Theory – phenomenology – heavy-ion collisions”
M. Bluhm *et al.*
Nuclear Physics A 1003, 122016 (2020)
2. “PANDA as midrapidity detector for a future HESR Collider at FAIR”
L. Frankfurt, M. Strikman, A. Larionov, A. Lehrach, R. Maier, H. Hees, C. Spieles, **V. Vovchenko**,
H. Stoecker
European Physical Journal A 56, 171 (2020)

○ Computer programs

1. “Thermal-FIST: A package for heavy-ion collisions and hadronic equation of state”
V. Vovchenko and H. Stoecker
Computer Physics Communications 244, 295 (2019)

Contributions to conference proceedings

27. “Fluctuations of conserved charges in hydrodynamics and molecular dynamics”
V. Vovchenko
arXiv:2209.08233 [nucl-th], *SQM 2022 Proceedings*
26. “Proton number cumulants and correlation functions from hydrodynamics and the QCD phase diagram”
V. Vovchenko, V. Koch, C. Shen
arXiv:2208.02571 [nucl-th], *Quark Matter 2022 Proceedings*
25. “Phenomenological developments for event-by-event fluctuations of conserved charges”
V. Vovchenko
arXiv:2110.02446 [nucl-th], *CPOD 2021 Proceedings*

24. "Thermal-model-based characterization of heavy-ion-collision systems at chemical freeze-out"
J.M. Karthein, P. Alba, V. Mantovani-Sarti, J. Noronha-Hostler, P. Parotto, I. Portillo-Vazquez,
V. Vovchenko, V. Koch, C. Ratti
EPJ Web of Conferences **259**, 11010 (2022), *SQM2021 Proceedings*
23. "Net-particle number fluctuations in a hydrodynamic description of heavy-ion collisions"
V. Vovchenko, V. Koch, C. Shen
EPJ Web of Conferences **259**, 10011 (2022), *SQM2021 Proceedings*
22. "Exploring the QCD phase diagram with fluctuations"
V. Koch and **V. Vovchenko**
Acta Physica Polonica B: Proceedings Supplement **52**, 203 (2021), *60th Cracow School Proceedings*
21. "Exploring the QCD phase diagram with fluctuations"
V. Koch, **V. Vovchenko**, and R.V. Poberezhnyuk
Acta Physica Polonica B: Proceedings Supplement **14**, 363 (2021)
20. "QCD equation of state at vanishing and high baryon density: Chiral Mean Field model"
A. Motornenko, **V. Vovchenko**, J. Steinheimer, S. Schramm, and H. Stoecker
Nuclear Physics A **1005**, 121836 (2021), *Quark Matter 2019 Proceedings*
19. "Equation of state of QCD matter within the Hagedorn bag-like model"
V. Vovchenko, M.I. Gorenstein, C. Greiner, and H. Stoecker
Springer Proceedings in Physics **250**, 361 (2020), *SQM 2019 Proceedings*
18. "Phase Transitions and Bose-Einstein Condensation in Alpha-Nucleon Matter"
L.M. Satarov, I.N. Mishustin, A. Motornenko, **V. Vovchenko**, M.I. Gorenstein, and H. Stoecker
Ukrainian Journal of Physics **64**, 745 (2019)
17. "MAGIC - how MATter's extreme phases can be revealed in Gravitational wave observations and in relativistic heavy Ion Collision experiments"
M. Hanauske, L. Bovard, J. Steinheimer, A. Motornenko, **V. Vovchenko**, S. Schramm, V. Dexheimer, J. Papenfort, E.R. Most, and H. Stoecker
Journal of Physics: Conference Series **1271**, 012023 (2019), *Kruger 2018 Proceedings*
16. "Matter And Gravitation In Collisions of heavy ions and neutron stars: equation of state"
A. Motornenko, J. Steinheimer, **V. Vovchenko**, S. Schramm, and H. Stoecker
PoS **CORFU2018** (2019) 150, *CPOD 2018 Proceedings*
15. "QCD equation of state at finite baryon density with fugacity expansion"
V. Vovchenko, J. Steinheimer, O. Philipsen, and H. Stoecker
PoS **CORFU2018** (2019) 199, *CPOD 2018 Proceedings*
14. "QCD at high density: Equation of state for nuclear collisions and neutron stars"
A. Motornenko, **V. Vovchenko**, J. Steinheimer, S. Schramm, and H. Stoecker
Nuclear Physics A **982**, 891 (2019), *Quark Matter 2018 Proceedings*
13. "Lattice-based QCD equation of state at finite baryon density: Cluster Expansion Model"
V. Vovchenko, J. Steinheimer, O. Philipsen, A. Pasztor, Z. Fodor, S.D. Katz, and H. Stoecker
Nuclear Physics A **982**, 859 (2019), *Quark Matter 2018 Proceedings*

12. "Hadron thermodynamics from imaginary chemical potentials"
A. Pásztor, P. Alba, R. Bellwied, S. Borsányi, Z. Fodor, J. Günther, S. Katz, C. Ratti, V. Mantovani Sarti, J. Noronha-Hostler, P. Parotto, I. Portillo Vazquez, **V. Vovchenko**, and H. Stoecker
EPJ Web of Conferences **175**, 07046 (2018), *Lattice 2017 Proceedings*
11. "Final state hadronic rescattering with UrQMD"
J. Steinheimer, **V. Vovchenko**, J. Aichelin, M. Bleicher, and H. Stoecker
EPJ Web of Conferences **171**, 05003 (2018), *SQM 2017 Proceedings*
10. "van der Waals Interactions and Hadron Resonance Gas: Role of resonance widths modeling on conserved charges fluctuations"
V. Vovchenko, P. Alba, M.I. Gorenstein, and H. Stoecker
EPJ Web of Conferences **171**, 14006 (2018), *SQM 2017 Proceedings*
9. "Surprises for the Chemical Freeze-out Lines from the New Data in p+p and A+A Collisions"
V.V. Begun, **V. Vovchenko**, and M.I. Gorenstein
Acta Physica Polonica B: Proceedings Supplement **10**, 467 (2017), *CPOD 2016 Proceedings*
8. "Critical fluctuations in models with van der Waals interactions"
V. Vovchenko, D.V. Anchishkin, M.I. Gorenstein, and R.V. Poberezhnyuk, and H. Stoecker
Acta Physica Polonica B: Proceedings Supplement **10**, 753 (2017), *CPOD 2016 Proceedings*
7. "Analysis of hadron yield data within hadron resonance gas model with multi-component eigen-volume corrections"
V. Vovchenko and H. Stoecker
Journal of Physics: Conference Series **779**, 012078 (2017), *SQM 2016 Proceedings*
6. "Updates to the p+p and A+A chemical freeze-out lines from the new experimental data"
V.V. Begun, **V. Vovchenko**, and M.I. Gorenstein
Journal of Physics: Conference Series **779**, 012080 (2017), *SQM 2016 Proceedings*
5. "Hydrodynamic modeling of a pure-gluon initial scenario in high-energy hadron and heavy-ion collisions"
V. Vovchenko, L.G. Pang, H. Niemi, Iu.A. Karpenko, M.I. Gorenstein, L.M. Satarov, I.N. Mishustin, B. Kämpfer, and H. Stoecker
PoS **BORMIO2016** (2016) 039, *Bormio 2016 Proceedings*
4. "Study of hard core repulsive interactions in an hadronic gas from a comparison with lattice QCD"
P. Alba, **V. Vovchenko**, and H. Stoecker
Journal of Physics: Conference Series **736**, 012022 (2016), *WWND 2016 Proceedings*
3. "Undersaturation of quarks at early stages of relativistic nuclear collisions: the hot glue initial scenario and its observable signatures"
H. Stoecker, M. Beitel, T.S. Biró, L.P. Csernai, K. Gallmeister, M.I. Gorenstein, C. Greiner, I.N. Mishustin, M. Panero, S. Raha, L.M. Satarov, S. Schramm, F. Senzel, B. Sinha, J. Steinheimer, J. Struckmeier, **V. Vovchenko**, Z. Xu, K. Zhou, P. Zhuang
Astronomische Nachrichten **336**, 744 (2015)

2. "Evolution of the hadronic system created in relativistic nucleus-nucleus collisions"
D.V. Anchishkin, A.O. Muskeyev, **V.Yu. Vovchenko**, and S.N. Yezhov
Problems of Atomic Science and Technology **57**, 115-120 (2012)
1. "The space-time structure of relativistic nucleus-nucleus collisions"
D. Anchishkin, A. Muskeyev, **V. Vovchenko**, and S. Yezhov
Uzhgorod University Scientific Herald. Series: Physics (Visnyk Uzhgorodskogo Universytetu) **29**, 129-134 (2011)

———— List of talks (as of September 24, 2022)

73. "Probing the QCD phase structure with proton number fluctuations in heavy-ion collisions"
Talk at Nuclear Theory Lunch Seminar at LBNL, Sep 7, 2022, Lawrence Berkeley National Laboratory, Berkeley, USA
72. "QCD phase structure from fluctuations of conserved charges"
Colloquium at Theoretical Physics Colloquium, hosted by Prof. Igor Shovkovy at the Arizona State University (online), Jul 13, 2022
71. "QCD phase structure from fluctuations in heavy-ion collisions"
Colloquium at HFHF Nuclear Physics Colloquium, Jun 30, 2022, Frankfurt am Main, Germany
70. "Proton number cumulants in heavy-ion collisions from hydrodynamics and the search for the QCD critical point"
Invited talk at BITP seminar (online), Jun 22, 2022, Kyiv, Ukraine
69. "Fluctuations of conserved charges in hydrodynamics and molecular dynamics"
Plenary talk at "Strangeness in Quark Matter 2022" conference (online), Jun 15, 2022, Busan, South Korea
68. "Hadronic resonance production in a partial chemical equilibrium model"
Invited talk at ALICE Week, Jun 7, 2022
67. "Proton number cumulants and correlation functions from hydrodynamics and the QCD phase diagram"
Talk at "Quark Matter 2022" conference (online), Apr 6, 2018, Krakow, Poland
66. "QCD Phase Structure at Finite Baryon Density"
Invited talk at "The 1st workshop on Physics at High Baryon Density", Mar 19, 2022
65. "Critical point particle number fluctuations from molecular dynamics"
Invited talk at "BES-Tea Seminar Series" (online), Mar 11, 2022
64. "QCD phase structure at finite baryon density from heavy-ion collisions"
Invited talk at "Juniors Day at STAR 2022" (online), Feb 14, 2022
63. "Off-equilibrium production of light nuclei in heavy-ion collisions"
Invited talk at MIAPP programme "Antinuclei in the Universe" (online), Feb 11, 2022, MIAPP, Munich, Germany
62. "Unveiling the Properties of Strongly Interacting Matter under Extreme Conditions"
Colloquium at "University of Houston", Feb 1, 2022, University of Houston, TX, USA

61. "Charge fluctuations in isobar collisions and connections with lattice QCD"
Invited talk at "RBRC Workshop: Physics Opportunities from the RHIC Isobar Run" (online), Jan 27, 2022, Brookhaven National Laboratory, NY, USA
60. "Treatment of fluctuations for comparison with experiment"
Invited talk at Online seminar of series III on "RHIC Beam Energy Scan: Theory and Experiment" 2021, Nov 30, 2021
59. "QCD phase structure from fluctuations in heavy-ion collisions: Connecting theory to experiment"
Invited talk at "STAR Collaboration Meeting" (online), Sep 22, 2021, Rutgers, The State University of NJ, Piscataway, USA
58. "Proton Cumulants, Correlation Functions and Hydrodynamics"
Invited talk at "RHIC Beam Energy Scan and Beyond" workshop (online), Aug 17, 2021, Lawrence Berkeley National Laboratory, Berkeley, USA
57. "Fluctuation Measurements and Global Conservation Laws in the BES Program"
Invited talk at "RHIC & AGS Annual Users' Meeting 2021" conference (online), Jun 8, 2021, Brookhaven National Laboratory, Upton, USA
56. "Net-particle number fluctuations in a hydrodynamic description of heavy-ion collisions"
Talk at "Strangeness in Quark Matter 2021" conference (online), May 18, 2021, Brookhaven National Laboratory, Upton, USA
55. "Phenomenological developments for event-by-event fluctuations of conserved charges"
Invited plenary talk at "Critical Point and Onset of Deconfinement 2021" conference (online), Mar 16, 2021, Lawrence Berkeley National Laboratory, Berkeley, USA
54. "Pion Condensation in the Early Universe at Nonvanishing Lepton Flavor Asymmetry"
Talk at LBNL NSD Staff Meeting (online), Jan 26, 2021, Lawrence Berkeley National Laboratory, Berkeley, USA
53. "Probing the QCD equation of state with fluctuations of conserved charges"
Invited talk at XXXII International (ONLINE) Workshop on High Energy Physics "Hot problems of Strong Interactions", Nov 12, 2020, Protvino, Russia
52. "Pion condensation in the early Universe at nonvanishing lepton flavor asymmetry"
Invited talk at CERN Heavy Ion Group Seminar (online), Oct 30, 2020, CERN, Switzerland
51. "Pion condensation in the early Universe at nonvanishing lepton flavor asymmetry"
Talk at Nuclear Theory Lunch Seminar at LBNL, Oct 29, 2020, Lawrence Berkeley National Laboratory, Berkeley, USA
50. "Connecting grand-canonical cumulants of conserved charges to experiment"
Invited talk at ALICE Workshop on Event-by-Event fluctuations (online), Sep 15, 2020, CERN, Switzerland
49. "Recent results on light nuclei production in extended thermal model descriptions"
Invited talk at HENPIC seminar (online), Jun 25, 2020

48. "Nuclear clusters in an off-equilibrium thermal model"
Invited talk at Mini-Workshop "Origin of nuclear clusters in hadronic collisions" (online), May 19, 2020, CERN, Switzerland
47. "Connecting fluctuation measurements in heavy-ion collisions with the grand-canonical susceptibilities"
Invited talk (online) at NA61 theory seminar, May 7, 2020
46. "Connecting fluctuation measurements in heavy-ion collisions with the grand-canonical susceptibilities"
Invited seminar talk at UH Nuclear Theory journal club (online), May 4, 2020, University of Houston, Houston, USA
45. "Nucleosynthesis and resonance production via the Saha equation"
Talk at Nuclear Theory Lunch Seminar at LBNL, Mar 25, 2020, Lawrence Berkeley National Laboratory, Berkeley, USA
44. "Statistical-thermal model: Applications using Thermal-FIST"
Invited talk at "3rd EMMI Workshop: Anti-matter, hyper-matter and exotica production at the LHC", Dec 2, 2019, University of Wroclaw, Poland
43. "(Anti-)Nucleosynthesis in the Little and the Big Bang"
Invited blackboard talk at "Collider Cross Talk", Aug 8, 2019, CERN, Switzerland
42. "Statistical-thermal FIST package"
Talk at "ALICE Physics Week 2019", Jul 23, 2019, Czech Technical University, Prague, Czech Republic
41. "Nucleosynthesis in heavy-ion collisions at the LHC via the Saha equation"
Talk at "Palaver", Jul 1, 2019, Institut für Theoretische Physik, Frankfurt am Main, Germany
40. "Equation of state of QCD matter within the Hagedorn bag-like model"
Talk at "Strangeness in Quark Matter 2019", Jun 13, 2019, Bari, Italy
39. "Towards the equation of state of hot QCD at finite baryon density"
Talk at "New Trends in High-Energy Physics 2019", May 13, 2019, Odessa, Ukraine
38. "Towards the QCD equation of state at finite density"
Talk at Nuclear Theory Lunch Seminar at LBNL, May 2, 2019, Lawrence Berkeley National Laboratory, Berkeley, USA
37. "Equations of state at finite baryon density"
Invited talk at EMMI Rapid Reaction Task Force "Dynamics of critical fluctuations: theory – phenomenology – HIC", April 8, 2019, GSI, Darmstadt, Germany
36. "Phase transition at finite density and the cluster expansion in fugacities"
Talk at EMMI Workshop "Probing the Phase Structure of Strongly Interacting Matter: Theory and Experiment", Mar 27, 2019, GSI, Darmstadt, Germany
35. "Multiplicity dependence of particle production at the LHC in (canonical) statistical model"
Talk at COST Workshop on "Interplay of hard and soft QCD probes for collectivity in heavy-ion collisions", Feb 27, 2019, Lund, Sweden

34. "Statistical thermal model"
Invited lecture at COST Workshop on "Interplay of hard and soft QCD probes for collectivity in heavy-ion collisions", Feb 26, 2019, Lund, Sweden
33. "Hadron gas and repulsive interactions"
Invited talk at MIAPP Programme "Interface of effective field theories and lattice gauge theory", Oct 30, 2018, Garching bei München, Germany
32. "Recent thermal model developments: The(rmal-)FIST package"
Invited talk at ECT* Workshop "Observables of Hadronization and the QCD Phase Diagram in the Cross-over Domain", Oct 16, 2018, Trento, Italy
31. "QCD equation of state at finite baryon density with fugacity expansion"
Talk at "Critical Point and Onset of Deconfinement 2018" conference, Sep 28, 2018, Corfu Island, Greece
30. "Thermal model fits: an overview"
Invited talk at "Light up 2018 – An ALICE and theory workshop", Jun 14, 2018, CERN, Meyrin, Switzerland
29. "QCD equation of state at finite baryon density with Cluster Expansion Model"
Talk at "XQCD 2018" conference, May 21, 2018, Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany
28. "Lattice-based QCD equation of state at finite baryon density: Cluster Expansion Model"
Talk at "Quark Matter 2018" conference, May 16, 2018, Palazzo del Casinó, Venice, Italy
27. "Exploring the QCD Phase Diagram with Fluctuation Observables"
Invited talk at "3rd CBM - China Workshop", Apr 16, 2018, Yichang International Hotel, Yichang, China
26. "Critical point of nuclear matter and beam energy dependence of net proton number fluctuations"
Invited talk at "NA61/SHINE Analysis/Software/Calibration Meeting", Feb 20, 2018, Monbachtal, Germany
25. "Baryon number fluctuations and singularities at real and complex baryochemical potential"
Invited talk at EMMI Workshop "Constraining the QCD Phase Boundary with Data from Heavy Ion Collisions", Feb 12, 2018, GSI, Darmstadt, Germany
24. "Quantum van der Waals equation and its applications"
Invited Physics Seminar @uni.lu, Jan 26, 2018, University of Luxembourg, Luxembourg City, Luxembourg
23. "Cluster expansion model for baryon number fluctuations in QCD"
Talk at "Zimányi-COST Winter School on Heavy Ion Physics 2017", Dec 8, 2017, Budapest, Hungary
22. "Cluster expansion model for QCD baryon number fluctuations"
Talk at "Palaver", Nov 27, 2017, Institut für Theoretische Physik, Frankfurt am Main, Germany

21. "Recent thermal model developments and connection of (anti-)nuclei to critical observables"
Invited talk at "2nd EMMI Workshop: Anti-matter, hyper-matter and exotica production at the LHC", Nov 6, 2017, Turin, Italy
20. "Baryonic excluded volume and its role in QCD equation of state at imaginary chemical potential"
Invited seminar at BITP, Aug 31, 2017, Bogolyubov Institute for Theoretical Physics, Kyiv, Ukraine
19. "Non-Gaussian moments of fluctuations of conserved charges: Applications for strongly interacting matter"
Invited talk at "10th Bolyai-Gauss-Lobachevsky conference on Non-Euclidean Geometry and its Applications", Aug 24, 2017, Gyöngyös, Hungary
18. "van der Waals Interactions in Hadron Resonance Gas: From Nuclear Matter to Lattice QCD"
Talk at "Critical Point and Onset of Deconfinement 2017", Aug 7, 2017, Stony Brook, NY, USA
17. "van der Waals Interactions and Hadron Resonance Gas: From Nuclear Matter to Lattice QCD"
Talk at "Strangeness in Quark Matter 2017", Jul 14, 2017, Utrecht, the Netherlands
16. "van der Waals Interactions in Hadron Resonance Gas: From Nuclear Matter to Lattice QCD"
Invited talk at "NA61 Theory Seminar", Jun 1, 2017
15. "van der Waals Interactions in Hadron Resonance Gas: From Nuclear Matter to Lattice QCD"
Talk at Palaver, May 22, 2017, Institut für Theoretische Physik, Frankfurt am Main, Germany
14. "Influence of Van der Waals interactions between hadrons on observables from heavy-ion collisions and lattice QCD"
Talk at "DPG Spring Meeting 2017", Mar 29, 2017, Münster, Germany
13. "Van der Waals interactions in Hadron Resonance Gas: From nuclear matter to lattice QCD"
Talk at "Zimanyi Winter School on Nuclear Physics 2016", Dec 7, 2016, Budapest, Hungary
12. "Role of van der Waals interactions in hadron systems: from nuclear matter to lattice QCD"
Talk at "38th International School of Nuclear Physics: Nuclear matter under extreme conditions – Relativistic heavy-ion collisions", Sep 19, 2016, Erice, Sicily, Italy
11. "Analysis of hadron yield data within HRG model with multi-component eigenvolume corrections"
Talk at "Strangeness in Quark Matter 2016", Jun 28, 2016, Berkeley, CA, USA
10. "Critical fluctuations in models with van der Waals interactions"
Talk at "Critical Point and Onset of Deconfinement 2016", May 30, 2016, Wroclaw, Poland
9. "Electromagnetic probes of a pure-gluon initial state in nucleus-nucleus collisions at LHC"
Talk at "Transport Meeting", May 24, 2016, Institut für Theoretische Physik, Frankfurt am Main, Germany
8. "Sensitivity of thermal fits to heavy-ion yield data to the modeling of eigenvolume interactions"
Talk at "Palaver", May 2, 2016, Institut für Theoretische Physik, Frankfurt am Main, Germany
7. "Van der Waals equation on a nuclear scale"
Talk at "FIGSS Seminar", Apr 25, 2016, Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany

6. "Extraction of moments of net-particle event-by-event fluctuations in the CBM experiment"
Talk at "DPG Spring Meeting 2016", Mar 15, 2016, Darmstadt, Germany
5. "Van der Waals equation: event-by-event fluctuations, quantum statistics and nuclear matter"
Talk at "Transport Meeting", Jun 10, 2015, Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany
4. "Event-by-event extraction of kinetic and chemical freeze-out properties in the CBM experiment"
Talk at DPG Spring Meeting 2015, Mar 23, 2015, Heidelberg, Germany
3. "Time dependence and fluctuations of partition into spectators and participants in heavy-ion collisions"
Talk at VI Young Scientists Conference "Problems of Theoretical Physics", Nov 25, 2014, Kyiv, Ukraine
2. "On-line Extraction of Model Parameters"
Talk at "Fifth International Workshop for Future Challenges in Tracking and Trigger Concepts", May 13, 2014, FIAS, Frankfurt am Main, Germany
1. " D^{*+} reconstruction in C-C collisions at 25A GeV in the CBM experiment"
Talk at "GSI Summer Student Program 2011", Sep 21, 2011, GSI, Darmstadt, Germany