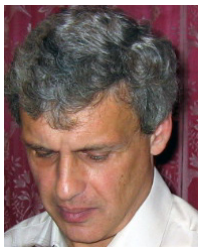
Vadim Alexandrovich Naumov [1]

Curriculum Vitae

June 19, 2025



Born February 20, 1954, Tomsk, Russia, USSR

FORMATION

1961–1969: Normal secondary school, Kemerovo City.

1969–1971: Physico-Electrotechnical Lyceum under the Kemerovo Pedagogical Institute and Extra-mural Physico-Mathematical Lyceum under the Novosibirsk State University.

1971–1976: Tomsk State University (TSU),[2] Department of Theoretical Physics (1971–1974); Moscow State University (Dubna branch), Department of Theoretical Nuclear Physics (1974–1975); TSU, Department of Quantum Electrodynamics and Field Theory (1975–1976).

- Academic year research works[3]
  - *"Superluminal velocities in special relativity"* (1973)
  - *"Goldstone mechanism in nonrelativistic quantum mechanics"* (1974),
  - *"Indefinite metrics in quantum electrodynamics"* (1975).
- Diploma of Physicist (July, 1976)
  - Title of the master thesis: *"Compton effect on the nucleon in the current algebra model with hard pions"*.
  - Thesis advisor: Dr. G. M. Radutsky (Research Institute for Nuclear Physics, Tomsk Polytechnic Institute,[4] Tomsk).

1979–1980: Moscow State University, Dubna branch, Faculty for Improvement of Skill for Higher School Lecturers in Physics (supervisor: Prof. D. V. Shirkov, LTP JINR, Dubna).

1980–1984: Institute for Nuclear Research (INR) of the Academy of Sciences of USSR (Moscow), Extra-mural postgraduate studentship (supervisor: Dr. G. V. Domogatsky, INR, Moscow).

Nov. 1988: Candidate of Phys. & Math. Sci. (PhD) in field of Physics of Atomic Nucleus and Elementary Particles (INR AN USSR, Moscow).

- Title of the PhD thesis: *"Cosmic rays and low-energy neutrinos in the Earth's atmosphere"*.
- Thesis advisor: Dr. G. V. Domogatsky (INR, Moscow).

June 1999: Degree of Senior Scientific Researcher in field of Theoretical Physics.

[1] Personal homepage: http://theor.jinr.ru/~vnaumov/.
[2] Now National Research Tomsk State University, https://en.tsu.ru/.
[3] Under the guidance of Prof. E. I. Cheglakov, TSU (untill 1974) and Dr. G. M. Radutsky, RINP TPU (since 1974).
[4] Now Tomsk Polytechnic University, https://tpu.ru/.

PROFESSIONAL POSITIONS

- Junior Researcher of the Lab. for High Energy Physics, Research Institute for Nuclear Physics, Tomsk Polytechnic Institute, Tomsk, Russia (December 1975 – June 1976).
- Lab. Assistant, Assistant Lecturer, Lecturer and then Senior Lecturer of Department of Theoretical Physics, Irkutsk State University, Irkutsk, Russia (October 1976 – March 1992).
- Researcher and then Senior Scientific Researcher of the Group for Theoretical Physics, Institute of Applied Physics (IAP), Irkutsk State University, Irkutsk, Russia (January 1981 – January 1989).
- Research Leader of the Group for Cosmic Rays and Neutrino Astrophysics, IAP, Irkutsk State University, Irkutsk, Russia (January 1981 – January 1989).
- Head of the Lab. of Theoretical Physics, IAP, Irkutsk State University, Irkutsk, Russia (January 1989 – October 1999).
- Senior Scientific Researcher at the National Institute for Nuclear Physics (INFN), Florence branch, Florence, Italy (March 1992 – October 1996).
- Research Leader of the IAP, Irkutsk State University, Irkutsk, Russia (October 1999 – June 2002).
- Associate Professor of the Department of Theoretical Physics, Irkutsk State University, Irkutsk, Russia (November 1999 – June 2002).
- Scientific Researcher at the Department of Physics, Ferrara University; Associated Scientific Researcher at INFN, Ferrara branch, Ferrara, Italy (November 2000 – November 2002).
- Senior Scientific Researcher at the Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research (JINR), Dubna, Russia (June 2002 – June 2014).
- Associate Professor of the Department of Physics and Astronomy, Florence University; Associated Scientific Researcher at INFN, Florence branch, Florence, Italy (November 2002 – October 2005, without interruption from work at JINR).
- Head of Sector of Neutrino Physics, Department "Particle and Fields" at the Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research (JINR),[5] Dubna, Russia (current, since June 2014).

[5] URL: http://www.jinr.ru/.

TEACHING EXPERIENCE

1976–1978: Physics course at the Physics and Mathematics Lyceum at Irkutsk State University.

1976–1992: Undergraduate & graduate courses and practical training at the Department of Theoretical Physics, Faculty of Physics, Irkutsk State University:

- Higher Mathematics:
  - Linear Algebra and Analytic Geometry,
  - Differential and Integral Equations (Analytic and Numerical Methods),
  - Calculus of Variations;
- Theoretical Physics:
  - Nonrelativistic Quantum Mechanics,
  - Relativistic Quantum Mechanics,
  - Thermodynamics and Statistical Physics,
  - Quantum Theory of Many-Particle Systems (Part I: Bosons),
  - Classical Theory of Radiation,
  - Quantum Field Theory,
- Special Subjects:
  - Current Algebras in Particle Physics,
  - Particle Physics Phenomenology,
  - Cosmic Ray Physics,
  - Neutrino Astrophysics.

1981–1992: Guidance of a regular Physics Seminar for the teaching staff of the Department of Theoretical Physics, Irkutsk State University (basic items: Topological and Algebraic Methods in Physics, Advanced Quantum Mechanics, Particle Physics, Neutrino Astrophysics).

1992–1996: Graduate lectures on Selected Topics of Astroparticle Physics at Dipartimento di Fisica e Astronomia, Università degli Studi di Firenze (UniFI), Florence, Italy.

1996–2000: Graduate and postgraduate courses at the Physics Faculty, Irkutsk State University:

- Theoretical Physics:
  - Physical Kinetics,
  - Particle Transport Theory,
- Special Subjects:
  - Particle Physics Phenomenology,
  - Cosmic Ray Physics and Neutrino Astronomy.

2002–2005: Postgraduate course "Introduction to Cosmic Rays" at the Dipartimento di Fisica e Astronomia, Università degli Studi di Firenze (UniFI), Sesto Fiorentino, Florence, Italy.

2007–2024: Semester course of lectures "Elements of Neutrino Physics / Neutrino in Physics and Astrophysics" for students of 5th-6th years (master's students) of JINR-based Department of Fundamental and Applied Problems of Microworld Physics of Moscow Institute of Physics and Technology (MIPT), Physics Department of Lomonosov Moscow State University (MSU, Dubna Branch), and for postgraduates of the JINR University Center, Dubna.

BOOKS, GUIDANCE, ETC.

- Two educational supplies “Problems in Thermodynamics and Statistical Physics” (in collaboration with S. I. Sinegovsky, Irkutsk University Press, 1978, 1979).
- Textbook “Physical Kinetics” (in collaboration with A. N. Vall and A. E. Rastegin, Irkutsk University Press, 2001).
- Online textbook “Introduction to Cosmic Rays”.[6]
- Online textbook “Neutrino in Physics and Astrophysics”.[7]
- An editor of the Proceedings “Astrophysics and Microworld Physics” (together with Y. V. Parfenov and S. I. Sinegovsky, Irkutsk University Press, 1998).[8]
- An editor of the Proceedings of the “19th European Cosmic Ray Symposium” (together with O. Adriani et al.), Int. J. Mod. Phys. A **20** (2005) 6533–7077 (published as a special issue of IJMA).[9]
- Scientific guidance at Irkutsk State University, Florence University, and University Center of JINR, Dubna (13 academic-year works, 15 master theses, and 5 PhD theses).

EXTENDED SCIENTIFIC VISITS

- Scientific visitor at the Lab. for Theoretical Physics, Joint Institute for Nuclear Research (JINR), Dubna (September 1979 – March 1980).
- Scientific visitor at the Institute for Nuclear Research of the Academy of Sciences of USSR, Moscow – Troitsk (3 to 4 months per year during the period from January 1981 to March 1992).
- Scientific visitor at the National Lab. for High Energy Physics, KEK, Tsukuba and invited professor at the Physics Department of Niigata University (November – December, 1991).
- Scientific visitor at the PPE Division of CERN, Geneva (1 to 2 months per year, starting from 1995).
- Scientific visitor at the INFN (Sezione di Firenze), Florence (1 to 2 months per year, starting from 1996).
- Invited professor at the Korea Institute for Advanced Study (KIAS), Seoul (November – December, 1998).
- Scientific visitor at KEK, Tsukuba (January – February, 2009).

[6] URL (INFN): http://hep.fi.infn.it/PAMELA/naumov/UHECR/UHECR.htm,
URL (JINR): http://theor.jinr.ru/~vnaumov/Eng/UHECR/UHECR.html.
[7] URL: http://theor.jinr.ru/~vnaumov/Eng/JINR_Lectures/NPA.html (living document).
[8] URL: http://www.api.isu.ru/school/Bsyph98/Bsyph98.htm.
[9] URL: http://www.worldscinet.com/ijmpa/20/2029/S0217751X052029.html.

PARTICIPATION IN INTERNATIONAL COLLABORATIONS

- BAIKAL NT Collaboration (1981–1992)
- NESTOR Collaboration (1992–2000)
- L3+COSMICS Collaboration (1996–2011)
- GENIE[10] Collaboration (current, since 2017).

FIELDS OF SCIENTIFIC ACTIVITY

- Neutrino Astrophysics, Cosmic Ray Physics, Particle Transport Theory:
  - Atmospheric and solar neutrinos;
  - Cosmic-ray muon and neutrino production and propagation through matter;
  - Nuclear-cascade process in the atmosphere and geomagnetic effects of cosmic rays;
  - Physics of underground/water/ice large-volume Cherenkov detectors ("neutrino telescopes").
- Particle Physics Phenomenology:
  - Neutrino oscillations in vacuum and matter;
  - Topological phases in quantum physics;
  - CP violation in quark and lepton sectors of the Standard Model;
  - Charmed particle hadroproduction;
  - Radiative and weak decays of hadrons;
  - Interactions of charged leptons, neutrinos, and SUSY particles with matter;
  - Axial structure of the nucleon;
  - Polarization phenomena in νN interactions;
  - Reactor antineutrinos;
  - Accelerator neutrino long-baseline experiments.
- Applied Mathematics and Programming:
  - Numerical methods for solution of integral and integro-differential equations;
  - Quadrature and cubature algorithms;
  - Spline interpolation algorithms.

[10] Event Generator & Global Analysis of Neutrino Scattering Data. GENIE is an informal international collaboration of scientists whose goals include: a) development and maintenance of a modern and versatile event generator framework and software tools for neutrino experiments; b) consistent, validated and efficient implementation of alternative physics models within a common platform; c) development of novel comprehensive physics models for simulating neutrino interactions; d) advanced global analysis of electron and neutrino scattering data. See URL: https://hep.ph.liv.ac.uk/~costasa/genie/index.html.

MAIN SCIENTIFIC RESULTS

- Semi-analytic methods to solve the transport equations for high-energy muon and neutrino propagation through dense and homogeneous media.
- Semi-analytic methods for calculating energy spectra and spatial distributions of the cosmic-ray secondaries, including leptons, at low, intermediate, high, and super-high energies *(taking account for scaling violation in hadron-nucleus interactions, energy losses, geomagnetic and meteorological effects, muon depolarization, $K_{\ell 3}$ form factors, etc)*.
- Calculation of the atmospheric neutrino flux at low energies and neutrino induced event rates in underground neutrino detectors.
- Evaluation of "prompt" muon and neutrino fluxes at high energies within the recombination quark-parton model and quark-gluon string model for charm hadroproduction.
- Constraints to the density of supersymmetric relativistic dark matter particles (*massive photinos*) in the Universe from the data of underground neutrino detectors.
- An extension of the Rein-Sehgal model for single pion neutrinoproduction through baryon resonances by taking account for the final lepton mass and spin.
- Adiabatic quantum-mechanical theory of neutrino oscillations in inhomogeneous media *(effects from electro-weak radiative corrections and CP violation in the leptonic sector, conditions to the nonlocal resonance in topological phases for three-neutrino oscillations in matter)*.
- A covariant quantum field-theoretical (QFT) S-matrix approach to neutrino oscillations.
- Analysis of reactor neutrino data to test predictions of the QFT approach to neutrino oscillations.

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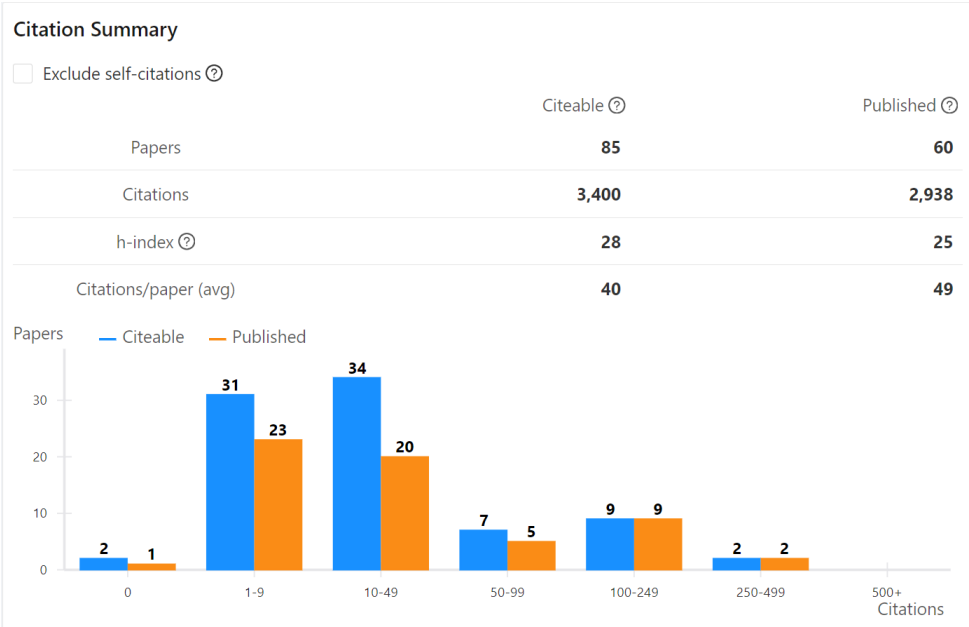

Figure 1: Current (June 19, 2025) citation summary for the articles recorded in the iNSPIRE HEP database.

Most cited articles according to the iNSPIRE HEP Database on June 19, 2025[11]

		citations
1.	E. V. Bugaev, A. Misaki, V. A. Naumov, T. S. Sinegovskaya, S. I. Sinegovsky, and N. Takahashi, *Atmospheric muon flux at sea level, underground, and underwater*, Phys. Rev. D **58** (1998) 054001; arXiv:hep-ph/9803488.	**499**
2.	The L3 Collaboration (P. Achard *et al.*), *Measurement of the atmospheric muon spectrum from 20 to 3000 GeV*, Phys. Lett. B **598** (2004) 15–32; arXiv:hep-ex/0408114.	**263**
3.	E. V. Bugaev and V. A. Naumov, *On the interpretation of the Kamiokande neutrino experiment*, Phys. Lett. B **232** No. 3 (1989) 391–397.	**221**
4.	T. K. Gaisser, M. Honda, K. Kasahara, H. Lee, S. Midorikawa, V. A. Naumov, and T. Stanev, *Comparison of atmospheric neutrino flux calculations at low energies*, Phys. Rev. D **54** (1996) 5578–5584; arXiv:hep-ph/9608253.	**175**
5.	E. V. Bugaev, V. A. Naumov, S. I. Sinegovsky, and E. S. Zaslavskaya, *Prompt leptons in cosmic rays*, Nuovo Cimento **12 C**, No. 1 (1989) 41–73.	**154**
6.	G. Fiorentini, V. A. Naumov, and F. L. Villante, *Atmospheric neutrino flux supported by recent muon experiments*, Phys. Lett. B **510**, No. 1–4 (2001) 173–188; arXiv:hep-ph/0103322.	**153**
7.	K. S. Kuzmin, V. V. Lyubushkin, and V. A. Naumov, *Quasielastic axial-vector mass from experiments on neutrino-nucleus scattering*, Eur. Phys. J. C **54** (2008) 517–538; arXiv:0712.4384 [hep-ph].	**119**
8.	K. S. Kuzmin, V. V. Lyubushkin, and V. A. Naumov, *Lepton polarization in neutrino nucleon interactions*, Mod. Phys. Lett. A **19** (2004) 2815–2829; arXiv:hep-ph/0312107.	**112**
9.	The GENIE Collaboration (L. Alvarez-Ruso *et al.*), *Recent highlights from GENIE v3*, Eur. Phys. J. ST **230** (2021) 4449–4467; arXiv:2106.09381 [hep-ph].	**108**
10.	V. A. Naumov, *Three neutrino oscillations in matter, CP violation and topological phases*, Int. J. Mod. Phys. D **1** (1992) 379–399; KEK-Preprint-91-176.	**101**
11.	The GENIE Collaboration (J. Tena-Vidal *et al.*), *Neutrino-nucleon cross-section model tuning in GENIE v3*, Phys. Rev. D **104** (2021) 072009; arXiv:2104.09179 [hep-ph].	**101**
12.	D. V. Naumov and V. A. Naumov, *A Diagrammatic treatment of neutrino oscillations*, J. Phys. G **37** (2010) 105014; arXiv:1008.0306 [hep-ph].	**82**
13.	V. A. Naumov and L. Perrone, *Neutrino propagation through dense matter*, Astropart. Phys. **10** (2-3) (1999) 239–252; arXiv:hep-ph/9804301.	**77**
14.	V. A. Naumov, *Atmospheric muons and neutrinos*, in *Proceedings of the 2nd Workshop on Methodical Aspects of Underwater/Ice Neutrino Telescopes. Hamburg, Germany*, August 15–16, 2001, edited by R. Wischnewski (DESY-PROC-2002-01, DESY, Germany, 2002), pp. 31–46; arXiv:hep-ph/0201310.	**63**
15.	A. V. Akindinov *et al.*, *Letter of interest for a neutrino beam from Protvino to KM3NeT/ORCA*, Eur. Phys. J. C **79** (2019) 758; arXiv:1902.06083 [physics.ins-det].	**58**

[11] Articles 2, 16 and 17 were published as part of international experimental collaborations, article 15 Article 15 was prepared by an international initiative group ("P2O protocollaboration"), http://theor.jinr.ru/NeutrinoOscillations/P2O.html.

16. K. S. Kuzmin, V. V. Lyubushkin, and V. A. Naumov, *Axial masses in quasielastic neutrino scattering and single-pion neutrinoproduction on nucleons and nuclei*, Acta Phys. Polon. B **37** (2006) 2337–2348; arXiv:hep-ph/0606184. **56**

17. The L3 Collaboration (P. Achard *et al.*), *Measurement of the shadowing of high-energy cosmic rays by the Moon: A search for TeV-energy antiprotons*, Astropart. Phys. **23** (2005) 411–434; arXiv:astro-ph/0503472. **54**

18. The Baikal NT Collaboration (L. A. Belolaptikov *et al.*), *The lake Baikal deep underwater detector*, Nucl. Phys. B (Proc. Suppl.) **19** (1991) 388–395. **52**