CURRICULUM VITAE

1. PERSONAL RECORD.

Full name: **Dr. Hovhannes Khudaverdyan**
(in most of scientific articles after 2000 'H. M.Khudaverdian', before 2000: 'O.M.Khudaverdian')

Nationality: British, Armenian
Date and place of birth: 28 May 1955, Yerevan (Armenia)

Marital status: Married with two adult sons.
Place of residence: 33 Highfield Road, Prestwich, Manchester M25 3AQ.
Languages: Armenian and Russian mother tongues, English fluent, French competent

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2. EDUCATION AND QUALIFICATIONS.

Ph.D. in Theoretical and Mathematical Physics. 1982
Thesis: *Multiplicative and Additive Functionals; their Role in Quantum Field Theory*
Advisor: Professor A.S. Schwarz.
Referees: Professor V.I. Ogievetsky, Professor Yu.I. Manin

1978–1981 *Postgraduate student*
Department of Theoretical Nuclear Physics
Moscow Physical Engineering Institute (MPEI).

M.S. in Physics (with Honors). 1978.
Thesis: On Anomalies in Quantum Field Theory.
Advisor: Professor A.S. Schwarz.

1975–1978 Department of Theoretical Nuclear Physics
Moscow Physical Engineering Institute.

1972–1975 Department of Physics
Yerevan State University.

3. PROFESSIONAL EXPERIENCE.

Current position:

Since August 2005 Senior Lecturer in Pure Mathematics, University of Manchester

Previous positions:

2001—2005	Lecturer in Pure Mathematics, UMIST (University of Manchester from 2004)
1996—2005	Senior Researcher, Laboratory of Computing Technique and Automation Joint Institute for Nuclear Research (Dubna, Russia)
Since 1985	Senior Researcher, Department of Theoretical Physics Yerevan State University (Yerevan, Armenia)
1981–1985	Junior Researcher, Laboratory of Theoretical Physics Yerevan Physics Institute (Yerevan, Armenia)

Invited guest positions:

October 2019–November 2019	Guest Professor Camille Jordan Institut of Mathemtics (L
December 2015–January 2016	Guest Professor Max-Planck-Institut für Mathematik (Bo
October-Novembre 2015	Guest Professor in I.H.E.S. (Paris)
January 2012	Guest Professor in I.H.E.S. (Paris)
October-November 2011	Guest Professor Max-Planck-Institut für Mathematik (Bo
2000	Academic Visitor, UMIST
October–November 1999	Guest Professor Max-Planck-Institut für Mathematik (Bo
Autumn 1994	Advanced Institute of Basic Sciences, (Zanjan, Iran)
1989	Visiting Researcher, Department of Theoretical Physics Geneva University (Geneva, Switzerland)

Research grants:

10-2010 and 02-2012; LMS (scheme 2) grant	supporting a visitor to UK
10-2007 and 07-2008	Royal Society grants for conferences
2000-2001	EPSRC
1996–1998,	INTAS-RFFI: European Union and Russian Foundation for Basic Research
1993–1995	International Science Foundation

Main field of scientific interest: Mathematical Physics and Differential Geometry. In particulkar my interests include Quantum Field Theory (mathematical aspects), supermanifold geometry and its application in physics and in other areas of mathematics, Poisson brackets, Lie algebroids, geometry of differential operators.

Talks on seminars (after 2000):

November 2019	Camille Jordan Institute of Mathematics, Lyon
May 2018	Korteweg-de Vries Instituut, Amsterdam
December 2017	I.V. Tamm Department of Theoretical Physics, Moscow
October 2017	Colloquim. Department of Mathematiques, Sheffield University
January 2017	Seminar in Geometry. Haifa University, Izrael
November 2016	Seminar in Mathem. Physics. Institute of Appl. Math. and Mech, Lviv, U
March 2016	Colloquim. Department of Mathematiques, Durham University
January 2016	Seminar in Mathematical Physics, Max Planck Institute, Bonn
November 2015	Colloquim & Séminaire. Laboratoire de Mathématiques de Reims Universit
November 2015	Séminaire "Groupes de Lie et espaces des modules". Université de Genève
October 2015	Séminaire de physique mathématique. IHES (Bures sur Yvette, Paris)
October 2015	Séminaire de géométrie et physique mathématique. Université Paris Diderc
October 2015	Colloquim. Départment de Mathematiques, Université d'Angers (France)
September 2014	Mathematical Physics Seminar in Department of Mathematics MGU (Russ
May 2014	Mathematical Physics Seminar in UCL Davis University (USA)
November 2011	Geometry Seminar in Liege University (Belgium)
November 2011	Seminar in Mathematical Physics, Max Planck Institute, Bonn
Novembre 2010	Seminar Geometrique, Physique et Symetries Luminy (Marseille, France)
Novembre 2010	Geometry Seminar in Lyon (France)
January 2010	Analysis and Geometry Seminar in Newcastle University
December 2009	Mathematics Seminar in Valencienne University (France)
December 2009	Mathematical Physics Seminar in Lille University (France)
October 2009	Geometry and Topology Seminar in Aberdeen University
May 2008	Mathematical Physics Seminar in Bordeaux University (France)
April 2008	W.Brauder Special topology seminar in Princeton University (USA)
January 2008	S.P. Novikov Geometry and Topology Seminar, V.A. Steklov Mathematical Institute (Moscow)
November 2007	Applied Mathematics Seminar in Brunel University
January 2007	All-Moscow seminar "Globus"
December 2006	Geometry seminar in Independent University
January 2006	Geometry Seminar in Edinburg University
September 2004	I.R.Shafarevitch Algebra Seminar, Steklov Institute (Moscow)
February 2004	Seminar on Mathematical Physics, University of Loughborough
December 2003	Analysis/Geometry Seminar, King's College
October 2003,	Bristol Pure Mathematics Seminar
October 2003,	Liverpool Pure Mathematics Colloquium
September 2003	I.V. Tamm Department of Theoretical Physics, Moscow
April 2003,	Geometry of differential equations Seminar, Moscow, IU
July 2002	International Workshop Quantum Gravity and Superstrings, Dubna
November 2001,	Geometry with Brackets and Quantization, Warwick
December 2000	Geometry and Theoretical Physics Seminar, King's College London
November 2000	N. Hitchin Geometry and Analysis Seminar, Oxford University
November 2000	Departmental Colloquium, Sheffield University
July 2000	International Workshop on Quantization, Warwick
April 2000	Mathematical Physics Seminar, Loughborough University
February 2000	I.V. Tamm Department of Theoretical Physics,

General audience lectures:

Lecture "Krammer rule; from Determinants to Berezinians" for students and staff of Moscow Highest School of Economy

October 28, 2014, Moscow

Invited talks on meetings (after 2000):

Russian-Armenian conference,

15 September—19 September 2019, Yerevan, Armenia

International conference SQS XIX,

26 August—31 August, 2019, Yerevan, Armenia

International conference "Algebraic topology, Combinatorics, and Mathematical Physics" in honor of Professor Buchstaber,

May 24-31, 2018, Moscow

Workshop on Supergeometry and applications 14–15 December, 2017, Luxembourg University

Invited Lecturer on FAR/ANSEF-ICTP Summer School in Theoretical Physics in Armenia. *Lecture course "Geometry of Differential operators"* Yerevan 21 August 2017—25 August 2017.

GAP XIV séminaire itinérant "Géometrie et Physique"
8—12 August, 2016,Sheffield University

Workshop on Higher Geometry and Field Theory 9–11 December, 2015, Luxembourg University

Conference "Integrability in Algebra Geometry and Physics. New Trends"
dedicated to Sasha Veselov's 60th birthday
13-17 July 2015 @ Congressi Stefano Franscini, Suisse, 14 July

Conference "Integrability and All That"
dedicated to Sasha Veselov's 60th birthday
8 – 10 May 2015, Loughborough , 10 May

Workshop "Geometry, Topology and Integrability"

October 20–26, 2014, Moscow, Skolkovo

International workshops "Supersymmetry in Integrable Systems - SIS"

SIS 14, September 11-13, 2014, Dubna, Russia

SIS 11, August 1-4, 2011, Hannover, Germany, (*Closing talk*)

SIS 10, August 24-28, 2010, Yerevan, Armenia,

Workshop "Homological Methods in Algebra,Geometry and Physics"

July 23—25, 2014, London

International conference "The Modern Physics of Compact Stars and Relativistic Gravity"

September 18—21, 2013, Yerevan, Armenia *Plenary talk*

International conference "Algebraic topology and abelian functions" in honor of Professor Buchstaber,
June 18—22, 2013, Moscow

Mini-workshop on pseudogroups and differential equations
13—16 March, 2013, Tromso, Norway

Workshops on Geometry in Physics. Bialowieza, Poland,
June 2016 (*Invited talk*)
July 2011 (*Opening plenary talk*)
July 2008 (plenary talk)
July 2006 (plenary talk)
July 2003 (plenary talk)
Lectures for students at School attached to the conference–July 2012,2013

Workshop on Equivariant Quantisation
September 11 - 13, 2011, Luxembourg

Third International Conference on Geometry and Quantization GEOQUANT
September 7 - 11, 2009, Luxembourg, (*Closing talk*)

International workshops "Supersymmetry and Quantum Symmetries.
August 2015, July 2009, July 2007, and July 2005, Dubna, Russia

XVIII International Colloquium "Integrable Systems and Quantum Symmetries"
June 18—20,2009, Prague, Czech Republic

One-day Geometry workshop Lyon—Manchester—Loughborough
March 13, 2009, Loughborough

Conference "Conformal Filed Theory and Integrability",
October 2007, Nor-Amberd, Armenia *Plenary talk*

"Integrable Day" in Loughborough
November 2006, Loughborough

10-th International Conference Symmetry Methods in Physics.
13–20 August, 2003, Yerevan

International workshop "Quantum Gravity and Superstrings".
11—18 July, 2002, Dubna, Russia, *Plenary Talk.*

LMS Northern Meeting and international workshop "Quantization, deformations, and new homological and categorical methods in mathematical physics".
7-13 July 2001, Manchester

Reviewing: Mathematical Reviews (1994–1996), Zentralblatt (2000—2003)

Refereeing: Lett.Math.Phys and Journal of Math. Physics.

Editorial work: member of editorial board of the Armenian Journal of Mathematics 2008—2013.

4. TEACHING.

During my life from 1978 till now I taught different courses in Moscow, Yerevan and Manchester in Mathematical and Theoretical Physics and in Mathematics: Electrodynamics, Quantum Mechanics, Differential Geometry, Applications of Differential Geometry in Theoretical Physics, Group Theory, Homological methods in Physics, Galois Theory, Elements of Functional analysis e.t.c. Now I teach the new courses: the course "Introduction in Geometry" for second years students and the course "Riemannian Geometry" for third and forth year students.

Shortlisted in 2013 for Manchester Teaching Awards.

Supervision of research students

Last 12 years I share my PHD students with Ted Voronov. I supervised these years 8 PhD students. Five of them already finished their thesis.

One of my former PhD students (Armen Nersessian) nowdays is the leading researcher in mathematical physics in Yerevan, Armenia.

I regularly supervised projects of undergraduate and master students in Galois Theory and Differential Geometry and I supervised dissertations and projects of MSC students.

I was four times internal examiner, three times the external examiner (Aberdeen 2010, Loughborough 2012, 2013) and once the member of juri (international rapporteur in Paris-Diderot, 2016) on PHD oral examinations.

I make regularly projects with foundation year students.

5. Social Activity.

1. From 2001 I am helping on the regular basis in organising weekly sessions of Manchester Geometry Seminar

2. From 2003 till 2006 I was responsible for organising staff development proccess in our Department.

3. From 2007 till 2010 I was a member of promotion commitee in the School of Mathematics.

4. I am actively interesting in the process of mathematical education of children in UK. I prepared the talk "Euler Theorem for polyhedra" which I give during interview days for sixthformers. In March 2005 I participated in the conference "Where will the next generation of UK mathematicians come from?"

I had four lectures for general audience in the School of Mathematics

February 2008 "Tubes formula"

November 2012 "Mean algebraico-arithmetic"

November 2013 " Chebyshev approximation and Helly's Theorem"

March 2016 "Galois theory for pedestrians; explicit formulae for cubic and quartic equations"

November 2017 "Locally Euclidean geometries and hyperblic geometry"

5. Now I am fire marshal in our School.

6. PUBLICATIONS.

1. A.V. Gayduk, O.M. Khudaverdian, A.S. Schwarz. *Multiplicative Functionals on Curves, Additive Functionals on Surfaces; their significance in QFT.* In Proceedings: "Group Theor. Methods in Physics", vol. 2, p. 201-205, Zvenigorod 1979.

2. O.M. Khudaverdian, A.S. Schwarz. *A Few Comments on the String Representation of Gauge Fields.* Phys. Lett. v. 91B (1980), p. 107-110.

3. O.M. Khudaverdian, A.S. Schwarz. *Additive and Multiplicative Functionals.* Preprint ITEP–3–1980.

4. O.M. Khudaverdian, A.S. Schwarz. *Multiplicative Functionals and Gauge fields.* Theor. Math. Phys. (in Russian), v. 46 (1981) p. 187-198 (transl. into English: p. 124-132).

5. O.M. Khudaverdian, A.S. Schwarz, Yu.S. Tyupkin. *Integral invariants for Supercanonical Transformations.* Lett. Math. Phys., v. 5 (1981), p. 517-522.

6. A.V. Gayduk, O.M. Khudaverdian, A.S. Schwarz. *Integration over Surfaces in Superspace.* Theor. Math. Phys. (in Russian), v. 52 (1982), p. 375-383 (transl. into English: p. 862-868).

7. O.M. Khudaverdian, A.S. Schwarz. *Normal Gauge in Supergravity.* Theor. Math. Phys., v. 57 (1983), p. 354-362 (transl. into English: p. 1189-1195).

8. O.M. Khudaverdian, A.V. Rosly, A.S. Schwarz. *Supergravity and Complex Geometry.* In book: News of Science and Technics. Modern Problems of Mathematics. v. 9, 1986, p. 247-284 (in Russian) (transl. into English: "Encyclopedia of Modern Mathematics", Springer-Verlag).

9. O.M. Khudaverdian, R.L. Mkrtchian, L.A. Zurabian. *On the Axial Anomalies in External Tensor Fields.* Theor. Math. Phys. v. 71 (1987) p. 393-401.

10. O.M. Khudaverdian, A.P. Nersessian. *Formulation of Hamiltonian Mechanics with Even and Odd Poisson Bracket.* Preprint EFT 1031–81(87), Yerevan (1987).

11. O.M. Khudaverdian, R.L. Mkrtchian. *Integral Invariants of Buttin Bracket.* Lett. Math. Phys. v. 18 (1989), p. 229-231 (Preprint EFI–918–69–86- Yerevan (1986)).

12. O.M. Khudaverdian, A.P. Nersessian. *Superspaces with Odd and Even Canonical Two-Forms and the Strange Superalgebra.* Izv. Acad. Nauk Arm. SSR, v. 24, No. 6, (1989) p. 288-294 (transl. into English: Soviet Journal of Contemp. Phys., v. 24 No.6, p. 22-27).

13. O.M. Khudaverdian, A.P. Nersessian. *The Supergeneralization of $CP(N)$ as Reduced Phase Space of Super-Hamiltonian Systems.* Izv. Acad. Nauk Arm. SSR, v. 25, No. 6, (1990) p. 330-337 (transl. into English: Soviet Journal of Contemp. Phys., v. 25 No.6.)

14. O.M. Khudaverdian. *Geometry of Superspace with Even and Odd Brackets.* J. Math. Phys. v. 32 (1991) p. 1934-1937 (Preprint of the Geneva University, UGVA–DPT 1989/05–613).

15. O.M. Khudaverdian, A.P. Nersessian. *Canonical Poisson Brackets of Different Grading and Strange Superalgebras.* J. Math. Phys. v. 32 (1991) p. 1938-1941 (Preprint of the Geneva University, UGVA–DPT 1989/05–614).

16. O.M. Khudaverdian, A.P. Nersessian. *Even and Odd Symplectic and Kählerian Structures on Projective Superspaces.* J. Math. Phys. v. 34 (1993), p. 5533-5548.

17. O.M. Khudaverdian, A.P. Nersessian. *On Geometry of Batalin-Vilkovisky Formalism.* Mod. Phys. Lett. A, v. 8 (1993), No. 25, p. 2377-2385.

18. O.M. Khudaverdian. *Algebras with Operator and Campbell-Hausdorff Formula.* Lett. Math. Phys., v. 35 (1995), pp.27-38.

19. O.M. Khudaverdian. *Batalin-Vilkovisky Formalism and Odd Symplectic Geometry.* In: Proceedings of International Workshop "Geometry and Integrable Systems", P.N.Pyatov and S.N.Solodukhin, eds. Word Scientific Publishing Co., 1996, p. 144-181.

20. O.M. Khudaverdian, A.P. Nersessian. *Batalin-Vilkovisky Formalism and Integration Theory on Manifolds.* J. Math. Phys., v. 37 (1996), p. 3713-3724.

21. O.M. Khudaverdian, D.A. Sahakyan. *Cohomological Aspects of Noether Theorem for Lagrangians of Classical Mechanics.* Proceedings of the conference "Secondary calculus and Cohomological Physics", Moscow, 1997, in Electronic Proceedings of EMIS, http://www.emis.proceedings/SCCP97

22. O.M. Khudaverdian. *Algebraic and Geometric Aspects of Constrained Systems.* In survey: "Collaboration JINR–YSU (1992–1997)", JINR E-98-12, Dubna (1998).

23. O.M. Khudaverdian. *Odd Invariant Semidensity and Divergence-like Operators on Odd Symplectic Superspace.* Comm. Math. Phys., v. 198 (1998), p. 591-606.

24. O.M. Khudaverdian, D.A. Sahakyan. *Double Complexes and Cohomological Hierarchy in the Space of Weakly Invariant Lagrangians of Mechanics.* Acta Applicandae Mathematicae., v. 56 (2/3), (1999), p. 181-215.

25. O.M. Khudaverdian. *Delta-Operator on Semidensities and Integral Invariants in the Batalin-Vilkovisky Geometry.* Preprint of Max-Planck-Institut für Mathematik, MPI-135 (1999), Bonn.

26. O.M. Khudaverdian. *Evolution of oscillator wave function and Fourier transformation.* In: "Symmetries and Intergrable Systems", collected papers. A.N. Sissakian, ed., Dubna, 2000, p. 269–272.

27. H.M. Khudaverdian, T.Voronov *On complexes related with calculus of variations.*, J. Geom. Phys. 44 (2-3) (2002), 221-250

28. H.M. Khudaverdian *Laplacians in odd symplectic geometry.*— In *Quantization, Poisson Brackets and Beyond*, Theodore Voronov, ed., Contemp. Math., Vol. 315, Amer. Math. Soc., Providence, RI, 2002, pp. 199-212.

29. H.M. Khudaverdian, T.Voronov *On Odd Laplace operators.*. Lett. Math. Phys. 62 (2002), 127-142

30. H.M. Khudaverdian, T.Voronov *Geometry of differential operators, and odd Laplace operators.* Russian Math. Surveys 58 (2003)

31. H.M. Khudaverdian. *Semidensities on odd symplectic supermanifold.*, Comm. Math. Phys., v. 247 (2004), pp. 353-390

32. H.M. Khudaverdian, T.Voronov On odd Laplace operators. II. In book: *Geometry, Topology and Mathematical Physics. S. P. Novikov's seminar: 2002 - 2003*, V. M. Buchstaber, I. M. Krichever, eds., *Amer. Math. Soc. Transl.* (2), Vol. 212, 2004, pp.179–205

33. H.M. Khudaverdian, T.Voronov *Geometry of differential operators, odd Laplacians, and homotopy algebras* Journal of Nonlinear Math. Phys. **11**, Supplement (2004), pp. 217–227. arXiv:math.DG/0402292

34. H.M. Khudaverdian, T.Voronov. *New facts about Berezinians.* In book: Supersymmetries and Quantum Symmetries 2005. Proceedings of International Workshop, Joint Institute of Nuclear Research, Dubna, 27-31 July 2005, E. Ivanov and B. Zupnik, eds., Dubna, 2006, 393-398, arXiv:math-ph/0512031.

35. H.M. Khudaverdian, T.Voronov. *Berezinians, Exterior Powers and Recurrent Sequences.*— Lett. Math. Phys. (Berezin memorial volume), 74 (2005), 201-228 (arXiv:math.DG/0309188)

36. H.M. Khudaverdian, T.Voronov. *On generalized symmetric powers and a generalization of Kolmogorov-Gelfand-Buchstaber-Rees theory.* Russian Mathematical Survey, **62** (3), 623—625, 2007, arXiv:math.RA/0612072.

37. H.M. Khudaverdian. *Tube formula, Berezinians and Dwork formula.* Journal of Geometry and Symmetry in Physics, v10, 2007, pp.29–40, arXiv:math.-phys.0707.1893

38. H.M. Khudaverdian, T.Voronov. *Operators on superspaces and generalizations of the Gelfand-Kolmogorov theorem.* In: XXVI Workshop on Geometric Methods in Physics. Bialowieza, Poland, 1 - 7 July 2007. AIP Conference Proceedings 956, Melville, New York, 2007, p. 149-155. arXiv:0709.4402 [math-ph].

39. H.M. Khudaverdian, T.Voronov. *Differential forms and odd symplectic geometry.* Amer. Math. Soc. Transl (2) Vol 224, 2008 pp.159—171

40. H.M. Khudaverdian, T.Voronov. *Higher Poisson brackets and differential forms.* In: Geometric Methods in Physics. AIP Conference Proceedings 1079, American Institute of Physics, Melville, New York, 2009, 203-215. arXiv:0808.3406v2 [math-ph].

41. A. Borovik, O.M. Khudaverdian. *Merkator projection, logarithm and...(in Russian)* Matematiqeskoe Prosvewe- nie no. 14 (2010), 58–82.

42. H.M. Khudaverdian, T.Voronov. *A short proof of Buchstaber—Rees Theorem.* Phil. Trans. R. Soc. A. **369** (1939) (2011), pp.1334–1345

43. H.M. Khudaverdian, T.Voronov. *Geometry of differential operators of second order, the algebra of densities, and groupoids* J. Geom. Phys. **64** (February 2013), 31–53, math-arXiv:1210.0784.

44 A.Biggs, H.M.Khudaverdian "Operator pencil passing through a given operator" J. Math.Phys. **54**, 123503 (2013), math-arXive:1301.6625

45. H.M.Khudaverdian, T.Voronov "Geometric constructions on the algebra of densities" Amer.Math. Soc. Trans, volume **254**, 2014
math-arXiv:1310.0784.

46. H.M.Khudaverdian "Kaluza-Klein theory revisited: projective structures and differential operators on algebra of densities", Journal of Physics: Conference Series **496**, 2014, 012032 math-arXive 1312-5208

47. A.Biggs, H.M. Khudaverdian "Operator pencils on the algebra of densities" Proceedings of Steklov Institute, 2014, volume 286, pp. 33–54 (in Russian pp.40–64)

48 H.M.Khudaverdian, M.Peddie "Odd Symmetric Tensors, and an Analogue of the Levi-Civita Connection for Odd Symplectic Supermanifold", Yerevan University Journal. Physics & Mathematics, 3, p. 25—31, 2016, math-arXive: 1607.03439

49, H.M.Khudaverdian, M.Peddie "Odd laplacians; geometrical meaning of potential, and modular class", Lett. in Math. Phys., **107**,7, pp. 11951214 (2017), math-arXive 1509-05586

50 H.M.Khudaverdian, R.Mkrtchyan "Universal volume of groups and anomaly of Vogel's symmetry", Lett. in Math.Phys., (2017), **107**, 8, 1491—1514, math-arXive 1602.00337

51 H.M.Khudaverdian, R.L.Mkrtchyan "Diophantine equations, Platonic solids, McKay correspondence, equivelar maps and Vogel's universality", Geometry and Physics, 114, (2017), 8590, math-arXiv:1604.06062

52 H.M.Khudaverdian, T.T. Voronov "Thick morphisms, higher Koszul brackets and ", L_∞ algebroids" math.arxiv

53 H.M.Khudaverdian, T.T. Voronov "Thick morphisms on supermanifolds, quantum mechanics and spinor representation", Geometry and Physics, (2019),