

## CURRICULUM VITAE

### 1. Name, position, academic department

Alexander Goncharov, Professor, Dept. of Mathematics, Yale University.

### 2. Education

M.S. (Mathematics), Moscow State University, 1982.

Ph. D. (Mathematics), Moscow and Institute of Mathematics, Novosibirsk, 1987;

Scientific adviser: I.M.Gelfand.

### 3. Professional appointments

Professor of Mathematics, Yale University (July 2010 – )

Professor of Mathematics, Brown University (Fall 1999 - June 2010)

Senior Member, MSRI (Fall 2001)

Associate Professor of Mathematics, Brown University (1998 - 1999)

Visiting Scholar, MPI (Bonn) (Jan. - Aug. 1996, 1997)

Associate Professor of Mathematics, MIT ( Fall 1995 - 1997)

Lecturer, MIT ( 1993 - Spring 1995)

Senior Member, MSRI (September 1992 - May 1993)

Visiting Scholar, M.I.T. (Spring 1992, Fall 1990)

Harvard Prize Fellow, Harvard University (Fall 1991)

Researcher, USSR Academy of Sciences, Moscow (1985 - 1992).

### 4. Academic honors

European Mathematical Society Prize at the First European Congress of Mathematicians in Paris (1992).

45-minute invited talk “Polylogarithms in arithmetic and geometry” at the International Congress of Mathematicians in Zürich (August 1994)

50-minute invited talk “Multiple  $\zeta$ -values, Galois groups and geometry of modular varieties” at the Third European Congress of Mathematicians in Barcelona (July 2000)

Invited 30-minute talk “Reconstruction of objects from their projections in unknown directions,” at the 12th International Congress on Electron Microscopy in Seattle (1990).

Talks at the Arbeitstagung, Bonn - 1997, 1999, 2011.

Gold medal on 18-th International Mathematical Olympiad (1976).

## 5. Service

### *To the University*

1. DGS at the Math Department, Fall 2013.
2. PhD adviser of graduate students D. Alegretti, L. Shen, D. Wang, V. Dimitrov.
3. Member of the Graduate Programme revision Committee, Fall 2013.
4. In charge of the Arithmetic Algebraic Geometry seminar.

### *To the profession*

1. An editor of the Journal of Noncommutative Geometry.
2. One of the organisers:  
Semester on Scattering Amplitudes, Simons Center on Geometry and Physics,  
Fall 2013.

## 6. Research Grant

NSF grant DMS-1059129. 2010-2013. NSF grant DMS-13

## 7. Invited Lectures in 2012.

1. Conference “Mirror Symmetry ”, Miami, January 2013.
2. Conference “Integrable systems” in Lausanne, Switzerland, July, 2013.
3. Conference “Gelfand Centennial Conference” Moscow July 22-25, 2013.
4. Conference “Gelfand Centennial Conference: A View of 21st Century Mathematics” Boston August 28-Sept 2, 2013.
5. Conference “Celebrating the Mathematics of Pierre Deligne” Oct 5, 2013, New York.
6. Workshop on Scattering Amplitudes, Simons Center, December, 2013.

## List of publications of Alexander Goncharov

### *Refereed journal articles.*

1. Goncharov, A., "Infinitesimal structures connected with Hermitian symmetric spaces," *Funct. Anal. Appl.*, **15**, n. 3, 83-84, 1981.
2. Goncharov, A., "A construction of Weil representations for some simple Lie algebras," *Funct. Anal. Appl.*, **16**, n. 3, 70-71, 1982.
3. Goncharov, A., "Generalized conformal structures," *Group Theory and Homological Algebra*, Yaroslavl State Univ. Press, 99-111, 1983.
4. Gelfand, I.M. and Goncharov, A. "On a characterization of Grassmannians," *Sov. Math. Dokl.* **34**, 189-193, 1987.
5. Gelfand, I.M. and Goncharov, A. "Reconstruction of a compactly supported function by its integrals over the lines intersecting a curve in the space" *Sov. Math. Dokl.* **34**, 373-376, 1987.
6. Goncharov, A. and Vainstein, B.K. "Determining the spatial orientation of arbitrarily arranged particles given their projections," *Dokl. Acad. Sci., USSR* **287**, n. 5, 1131-1134, 1986.
7. Goncharov, A., "Generalized conformal structures on manifolds," *Selecta Mathematica Sovietica*, **6**, n. 4, 306-340, 1987.
8. Goncharov, A., "Generalized conformal structures on manifolds," *Selecta Mathematica Sovietica*, **6**, n. 4, 306-340, 1987.
9. Goncharov, A. B., "Methods of integral geometry and determination of mutual orientations of identical particles located in the plane from their projections onto a line" *Dokl. Acad. Sci., USSR*, **293**, n. 2, 355-358.
10. Goncharov, A., "Integral geometry and 3-Dimensional reconstruction of randomly oriented particles from their electron micrographs," *Acta Applicandae Mathematicae*, **11**, 199-211, 1988.
11. Goncharov, A., "Methods of integral geometry and recovering a compactly supported function from its projections in unknown directions," *Acta Applicandae Mathematicae*, **11**, 213-222, 1988.
12. Goncharov, A., "Admissible families of k-dimensional submanifolds," *Soviet Math. Dokl.*, **300**, n. 3, 535-539, 1988.
13. Goncharov, A., "Integral geometry on surfaces in the space," *Geometry and Physics*, **4**, 571-594, 1989.
14. Goncharov, A., "Integral geometry on k-dimensional submanifolds," *Funct. Anal. Appl.*, **23**, n. 3, 11-24, 1989.

15. Gelfand M.S., Goncharov, A., "Spatial rotational alignment of identical particles given their projections: theory and practice," *Mathematical Problems of Tomography*, 97 - 122, Math. Monographs, 81, AMS, Providence, RI, 1990.
16. Goncharov, A., "Three-dimensional reconstruction of arbitrarily arranged identical particles given their projections," *Mathematical Problems of Tomography*, I.M.Gelfand, S.G.Gindikin, editors; in the Book: *Translations of Mathematical monographs*, **81**, American Mathematical Society, 67-96, 1990.
17. Goncharov, A., "Weil representation and hypergeometrical functions connected with Lagrangian Grassmannian," *Soviet Math. Dokl.*, **341**, n. **3**, 395-399, 1990.
18. Beilinson, A., Goncharov, A., Schechtman, V. and Varchenko, A., "Aomoto dilogarithm, mixed Hodge structures and motivic cohomology of pairs of triangles on the plane," in the Book: *The Grothendieck Festschrift*, Part of Series: *Progress in Mathematics*, **86**, Birkhauser, Boston, 131-172, 1990.
19. Beilinson, A., Goncharov, A., Schechtman, V. and Varchenko, A., "Projective geometry and algebraic K-theory," *Algebra and Analysis*, **6** n. **3**, 78-134, 1990.
20. Goncharov, A., "Integral geometry and subvarieties of minimal possible degree in  $CP^n$ ," *Funct. Anal. Appl.*, **24**, n. **1**, 5-20, 1990.
21. Goncharov, A., "The classical trilogarithm, algebraic K-theory of fields and Dedekind zeta functions," *Bull. of AMS*, **24**, n. **1**, 155-162, 1991.
22. Goncharov, A. "The classical polylogarithms, algebraic K-theory and  $\zeta_F(n)$ ," *Proc. of the Gelfand Seminar*, Birkhauser, 113-135, 1993.
23. Goncharov, A., "When a family of submanifolds is diffeomorphic to a family of planes," *Duke Math. Journal*, **71**, n. **1**, 317-331, 1993.
24. Goncharov, A., "Explicit construction of characteristic classes," *Advances in Soviet Mathematics*, **16**, Pt. **1**, (special volume dedicated to I.M.Gelfand's 80th birthday), 169 - 210, 1993.
25. Goncharov, A. "Admissible double bundles," In the Book: *'75 years of the Radon transform'*, Plenum Press, 1994.
26. Goncharov, A. "Polylogarithms and Motivic Galois groups," *Proceedings of the AMS Research Summer Conference "Motives", Symposium in Pure Mathematics*, **55**, 43 - 96, 1994.
27. Goncharov, A., "Geometry of configurations, polylogarithms and motivic cohomology," *Advances in Mathematics*, 1995, Vol. 114, No. 2, 1995, pp. 197-318.
28. Goncharov, A., "Chow polylogarithms and regulators," *Mathematical Research Letters*, **2**, n. **1**, 95-113. 1995.
29. Goncharov, A. "Integral geometry and D-modules". *Mathematical Research Letters*, 1995, vol 2, N 2, 415-435.

30. Goncharov, A. "Polylogarithms in arithmetic and geometry," *Proc. of Intern. Congr. of Mathematicians*, (Zürich, 1994), 1995, vol 1, 374-387.
31. Goncharov, A. "Deninger's conjecture on  $L$ -function of elliptic curve at  $s = 3$ ". Special volume dedicated to Manin's 60-th birthday (1997). 37 pages.
32. Goncharov, A. "Differential equations and Integral geometry". *Advances in Math.*, vol. 131, N2, (1997).
33. Goncharov, A., Levin A. "Zagier's conjecture on  $L(E, 2)$ ". *Inventiones Math.*, vol 132, (1998), 393-432.
34. Goncharov, A. "The double logarithm and Manin's complex for modular curves" *Mathematical Research Letters*, 1997, vol. 4, No 1, 1-20.
35. Goncharov, A. "Mixed elliptic motives" *Galois representations in Arithmetic Algebraic geometry*, (Durham 1996), London Math. Soc. Lecture Note Ser., vol. 254, Cambridge University Press, 1998. 147-221.
36. Goncharov, A., "Multiple polylogarithms, cyclotomy and modular complexes" *Mathematical Research Letters*, 1998, vol. 5, No 3, 497-516.
37. Goncharov, A., "Volumes of hyperbolic manifolds and mixed Tate motives", *Journal of Amer. Math. Soc.* vol. 12, (1999), N2, 569-618.
38. Goncharov, A. "Geometry of the trilogarithm and the motivic Lie algebra of a field". *Regulators in analysis, geometry and number theory*, 127–165, *Progr. Math.*, 171, Birkhauser Boston, Boston, MA, 2000
39. Goncharov, A. Zhao, J. "Grassmannian trilogarithms" *Compositio Math.* 127, (2001) N1, pp. 83-108.
40. Goncharov, A. "Explicit regulator maps on the polylogarithmic motivic complexes" In: *Motives, Polylogarithms and Hodge theory. Proceedings of the Irvine conference on Polylogarithms*, International Press Lecture Series 3, (2002). p. 245-277.
41. Goncharov, A. "The dihedral Lie algebras and Galois symmetries of  $\pi_1^l(P^1 \setminus \{0, \infty\} \cup \mu_N)$ ". *Duke Math. J.*, vol 100, N3, (2001), pp. 397-487. math.AG/0009121.
42. Goncharov, A. "Multiple  $\zeta$ -values, Galois groups, and geometry of modular varieties". *European Congress of Mathematics*, Vol. I (Barcelona, 2000), 361–392, *Progr. Math.*, 201, Birkhauser, Basel. math.AG/0204102.
43. Goncharov, A., Manin Yu. I. "Multiple zeta-motives and moduli spaces  $M_{0,n}$ " *Compositio Mathematica*, 140 (2004), 1-14. math.AG/0204102.
44. Goncharov A. "Euclidean scissor congruence groups and mixed Tate motives over dual numbers" *Math. Res. Letters*, 11 (2004), vol. 6. 10001-10013. ArXiv: math.AG/0401354,
45. Goncharov, A. "Galois symmetries of fundamental groupoids and noncommutative geometry" *Duke Math. J.* 128 (2005), no. 2, 209–284.

46. Goncharov, A. “Polylogarithms, regulators and Arakelov motivic complexes”  
J. Amer. Math. Soc. 18 (2005), no. 1, 1–60.
47. Deligne P., Goncharov, A. “Groupes fondamentaux motiviques de Tate mixte”  
Ann. Sci. cole Norm. Sup. (4) 38 (2005), no. 1, 1–56.
48. Goncharov A. “Regulators” Algebraic K-theory handbook. Springer (2005),  
vol 1, 295-351. ArXiv: math.NT/0407308
49. Fock V., Goncharov A. “Moduli spaces of local systems and higher Teichmüller  
theory”. Publications Mathematiques de l’IHES. v. 103 (2006) 1-211. ArXiv:  
math.AG/0311149.
50. Fock V., Goncharov A. “Cluster X-varieties, amalgamation and Poisson-Lie  
groups”. Algebraic Geometry and Number Theory, In honor of Vladimir Drin-  
feld’s 50th birthday, Birkhauser, (2006) Boston. 27-68. ArXiv: math.RT/0508408.
51. Gangl H., Goncharov A., Levin A.. “Multiple logarithms and trees”. In:  
“Frontiers in Number Theory, Physics and Geometry” II: 759–774, Springer,  
Berlin, 2007.
52. Fock V., Goncharov A. “Convex projective structures on surfaces” Advances  
in Math. vol 208 (2007) 249-273. ArXiv: math.DG/0405348.
53. Fock V., Goncharov A. “Dual Teichmüller and lamination spaces”. Handbook  
of Teichmüller theory. Volume 1. IRMA Lectures in Mathematics and Theoret-  
ical Physics 11. European Mathematical Society. 647-684. math.DG/0510312.
54. Goncharov A.B., “Pentagon relation for the quantum dilogarithm and quan-  
tized  $\mathcal{M}_{0,5}$ ”. Progress in Mathematics, Vol 256, 413-426. (2007) Birkhauser  
Verlag Basel/Switzerland, arXiv:0706.4054.
55. Fock V., Goncharov A.B. “Cluster ensembles, quantization and the diloga-  
rithm II. The intertwiner” Special volume dedicated to Yu. I. Manin’s 70th  
birthday. Birkhauser Verlag Basel/Switzerland, (2008) 559-678, arXiv:math/0702398.
56. Goncharov A. “Euler complexes and geometry of modular varieties”. Geomet-  
ric Analysis and Functional Analysis. Geometry and Functional Analysis. Vol  
12, (2007) 1873-1914. ArXiv: math.NT/0510310.
57. Gangl H., Goncharov A., Levin A.. “Multiple polylogarithms, polygons, trees  
and algebraic cycles”. Proceedings of the Seattle conference on Algebraic  
geometry. Proceedings of Symposia in Pure Mathematics. Volume 80, Part 2,  
547-594.
58. Fock V., Goncharov, A. “The quantum dilogarithm and representations of  
quantum cluster varieties”. Inventiones Mathematicae. 175, 223-286 (2009).
59. Fock V., Goncharov A. “Cluster ensembles, quantization and the dilogarithm”  
Annales Scientifiques L’Ecole Normal Superier, 2009. 58 pages. ArXiv: math.AG/0311245.

60. Goncharov A. “Hodge Correlators II”. Moscow Mathematics Journal. Special issue dedicated to P. Deligne. 2010. 49 pages. arXiv:0807.4855.
61. “Classical Polylogarithms for Amplitudes and Wilson Loops” Alexander B. Goncharov, Marcus Spradlin, C. Vergu, Anastasia Volovich: 11 pages, Phys.Rev.Lett.105:151605, 2010, arXiv:1006.5703
62. Fock V.V., Goncharov A.B.: “Cluster  $\mathcal{X}$ -varieties at infinity”. Moscow Math Journal. To appear. 21 pages. arXiv:1104.0407.
63. Goncharov, A.B., Kenyon R.: “Dimers and cluster integrable systems”. Annales Scientifiques L’Ecole Normal Superier, 2013, arXiv:1107.5588. 78 pages.
64. Goncharov A.B.: “ A simple construction of Grassmannian polylogarithms”. arXiv:0908.2238. 26 pages, Advances in Mathematics, April 2013.

*Papers submitted to journals – also available in the ArXive.*

65. Goncharov A.B.: “Hodge correlators” arXiv:0803.0297. 104 pages. Submitted.
66. Goncharov, A.B.: “Hidden Hodge symmetries and Hodge correlators”. 9 pages Proceedings of the Arbeitstagung. MPI Bonn June 2011. arXiv:1107.5710. 9 pages,
67. Arkani-Hamed N., Bourjaily J., Cachazo F., Goncharov A.B., Postnikov A., Trnka J.: “Scattering Amplitudes and the Positive Grassmannian” arXiv:1212.5605 154 pages, Submitted.
68. Dimofte T., Gabella M., Goncharov A. B.: “K-Decompositions and 3d Gauge Theories”, arXiv:1301.0192, 134 pages.

*Preprints available in the ArXive.*

69. Goncharov, A. “Periods and mixed Tate motives” arXiv:math.AG/0202154, 103 pages.
70. Goncharov, A. “Multiple polylogarithms and mixed Tate motives” arXiv:math/0103059, 87 pages.