

Curriculum Vitae - Dr. Christian Korff

<http://www.maths.gla.ac.uk/~ck/>

Research Interests

Mathematical Physics with a specialization in **quantum integrable systems** such as quantum spin-chains, quantum many-body systems, low-dimensional quantum field theories and exactly solvable lattice models in statistical physics **as well as their related algebraic** (Lie theory and quantum groups) **and geometric aspects** (quantum cohomology and K-theory).

Experience

Reader, School of Mathematics and Statistics, University of Glasgow **Oct 2006 - Present**

Move of tenure on a [Royal Society University Research Fellowship](#) (prestigious UK grant covering salary and research expenses). Successful application for a 3-year extension (2009 – 2012) and subsequent promotion to a readership in October 2008. Total external funding since 2002 in the amount of GBP 750,000.

Teaching. *Certificate for Academic Practice* and appointment to *Fellow of the Higher Education Academy* in 2009. Lectures for first year students (Calculus), second year students (*Financial Modeling* including computer labs) and fourth year (honours) students (*Mathematical Physics*); lecture *Mathematical Quantum Physics* for MSci students and supervision of final year projects for honours students (10) as well as summer project students (6).

Administration. Member of the Research and the Teaching Committee. Review of study leave applications, selection of postgraduate students, research and grant income initiatives, preparation for REF and course development/organisation, assessment, administrative procedures in teaching. Class Head for first and second year courses: duties involve setting up tutorials, distribution of exercise sheets, running computer labs, maintaining course webpages and chairing external examiner meetings. Member of the student staff committee for Level 1 and 2.

Supervised PhD and Master Students (3-4 positions per year for 49 academic staff)

2007-2011 Bart Vlaar (PhD), 2012-2014 Mary Clark (MSci), 2014 David Palazzo (PhD)

Lecturer, Centre for Mathematical Sciences, City University London **April 2005 – Sep 2006**

Move of tenure on a Royal Society University Research Fellowship and proleptic appointment as lecturer. Lecturing *Mathematical Methods 3* for final year students. Supervision of student honours projects and seminar organiser.

Research Fellow, Department of Mathematics, University of Edinburgh **Oct 2002 – Mar 2005**

Successful application for an [Engineering and Physical Research Council \(EPSRC\) Fellowship in the Mathematical Sciences](#) (2 years, GBP 75,000, ~ 10/year). Fellowship host: Prof Harry W. Braden. Subsequent application for a 5-year Royal Society Research Fellowship (2004, GBP 250,000). Tutoring mathematics courses for physics students.

Postdoctoral Research Associate, ITP, State University of New York at Stony Brook **Oct 2002 – Mar 2005**

Research in integrable quantum field theory and exactly solvable models in statistical mechanics at the renowned [C.N. Yang Institute for Theoretical Physics](#). Supervisor: Prof Barry M. McCoy.

Education

PhD in Theoretical Physics, Freie Universität Berlin **Jan 1998 – Sep 2000**

Graduate Research Associate of the [Sfb 288 Differential Geometry and Quantum Physics](#), Group Schrader. PhD with Summa cum Laude. Dissertation awarded the [Ernst Reuter Preises der FU Berlin](#) (2001).



Grant Portfolio

- [University Research Fellowship of the Royal Society](#) (2004-2012)
Principal Investigator. Highly competitive and prestigious research fellowship covering salary and research expenses, 1-2 in mathematics/year, **GBP 588,708**.
- [EPSRC Mathematical Sciences Small Grant](#) (2011)
Principal Investigator. Funding for international conference "Tropical Geometry and Integrable Systems", July 2011, Glasgow, **GBP 29,738**.
- [British Council Research Cooperation Award](#) Prime Minister Initiative 2 (2008-11)
Co-Investigator. British Council grant funding exchange visits of postgraduate students and researchers of the University of Tokyo and the Integrable Systems & Mathematical Physics Group at Glasgow University. Scientific partners: Profs Jimbo, Shiraishi, Tokihiro, Willox, **GBP 37,346**.
- [EPSRC Mathematical Sciences Small Grant](#) (2007)
Co-investigator. International conference ISLAND 3, Algebraic Aspects of Integrable Systems, **GBP 12,935**.
- [EPSRC Mathematical Sciences Small Grant](#) (2006)
Principal Investigator. The grant funded a visit by Prof M Jimbo (Tokyo) to City University, **GBP 5,233**.
- [EPSRC Postdoctoral Fellowship in Mathematics](#) (2002-2004)
Principal Investigator. 8-10 fellowships per year nationwide, **GBP 75,462**.
- Several smaller grants (~ **GBP 10,000**) to fund summer project students, workshops and visitors.

Professional Activities

- Referee for grant applications: [EPSRC](#), [British Council](#) and [Volkswagenstiftung](#)
- Reviewer for Journal of Mathematical Physics, Journal of Nonlinear Mathematical Physics, Journal of Physics A, Journal of Statistical Mechanics, Journal of Statistical Physics, Nuclear Physics B, Physics Letters A, SIGMA, Letters in Mathematical Physics, Communications in Mathematical Physics
- External PhD reviewer at the Universite Cergy de Pontoise (2012) and the University of Brisbane (2013)
- [Theoretical and Mathematical Physics Group](#), [Institute of Physics](#): Chair (2010-13), Honorary Secretary (2007-10), Ordinary Committee Member (2005-7). Decisions on funding applications and consultation on science policies.
- Member of the Organising Committee for Royal Society "Frontiers of Science" meeting with Russia (2012)
- [Isaac Newton Institute Correspondent](#) for the Institute of Physics (2010-11)
- Editor of two conference proceedings

Conference Organisation

- [18th UK meeting on Integrable Systems, CFT and Related Topics](#), Glasgow, April 2014
- [Combinatorial Physics](#), Cardiff University, December 2013
- [Non-equilibrium Physics and Asymmetric Exclusion Processes](#) Int'l Centre for Mathematical Sciences, Edinburgh, De 2011
- [Tropical Geometry and Integrable Systems](#), Glasgow, July 2011.
- [Geometric Aspects of Discrete and Ultra-discrete Integrable Systems](#), Glasgow, April 2009
- [ISLAND 3: Algebraic Aspects of Integrable Systems](#), Islay, June 2007
- 9th UK meeting on Integrable models & CFT, City University London, May 2005



Recent Invitations to International Conferences (since 2010)

- November 2014, [Geometry and Quantum Theory Colloquium](#), U Amsterdam, Nijmegen and Utrecht, Netherlands
- Sep 2014 [Recent Advances in Quantum Integrable Systems](#), U de Bourgogne, France (N. Kitanine, K. Kozłowski, E. Ragoucy, V. Roubtsov)
- June 2014 [Integrability and Combinatorics](#), LPTHE Jussieu, Presqu'île de Giens, France (P. Zinn-Justin, A. Ponsaing)
- May 2014 [From Macdonald Processes to Hecke algebras and quantum integrable systems](#), Institute Henri Poincaré, Paris, France (I. Corwin)
- May 2014, [Lie Theory and Mathematical Physics](#), CRM Montreal, Canada (T. Gannon, M. Lau, E. Neher, M. Okado)
- Jan 2014 [Quantum cohomology and quantum K-theory](#), Paris Diderot, France (L. Manivel, E. Vasserot)
- Apr 2012 [Hausdorff Workshop: Integrability in TFT](#), HIM Bonn, Germany (A. Klemm and K. Wendland)
- Jan 2012 [Hausdorff Workshop: Integrability - Modern Variations](#), HIM Bonn, Germany (A. Veselov, K. Wendland)
- Aug 2011 [Supersymmetry in Integrable Systems](#), Hannover, Germany (O. Lechtenfeld)
- Dec 2010 [Integrable Systems and Cluster Algebras](#), University of Tokyo, Japan (T. Tokihiro, R. Willox)
- July 2010 [Satellite Conference of Stat Phys 24](#), Brisbane, AUS (R. Brak, M. Elder, O. Foda, J. de Gier, T. Guttman, O. Warnaar)
- June 2010 [Infinite Analysis 10](#), RIMS Kyoto, Japan (M. Jimbo, A. Kuniba, T. Miwa, M. Okado)

Recent Seminars and Workshop Presentations (since 2010)

- March 2013, Topology Seminar, University of Aberdeen, UK
- February 2013, Mathematics Seminar, Warwick University, UK
- October 2012, Mathematics Seminar, Lancaster University, UK
- October 2012, Seminar, ITP, Universität Heidelberg, Germany
- June 2012 [Recent Developments in Lie Theory](#), LMS workshop, Manchester University, UK
- May 2012 [Special Functions and Integrable Systems](#), LMS Workshop, Leeds University, UK
- April 2012 Oberseminar Algebra, Universität Köln, Germany
- Mar 2012 Maximals Algebra Seminar, ICMS Edinburgh, UK
- Mar 2012 Seminar, Centre for Mathematical Sciences, City University, UK
- Dec 2012 Seminar at Department of Mathematics, UC Davis, USA
- Nov 2011 Seminar at Department of Mathematics, University of Oregon, USA
- Nov 2011 Seminar at Department of Mathematics, UC Riverside, USA
- May 2011 Mathematisches Kolloquium Universität Tübingen, Germany
- Nov 2010 Seminar at Mathematics Department, Leeds University, UK



Invited Research Visits to other Institutes

July 2014 Max Planck Institute for Mathematics, Bonn, Germany

- Host: Prof Vassily Gorbounov, research collaboration

November 2012 Mathematics Department, University of Chicago, USA

- Host: Prof Catharina Stroppel, research collaboration

Jan-Feb & Apr 2012 Hausdorff Institute, Bonn, Germany

- Invited participant of trimester programme "[Integrability in Geometry and Mathematical Physics](#)"
- Organisers: Profs Franz Pedit, Ulrich Pinkall, Iskander A. Taimanov, Alexander Veselov, Katrin Wendland

Nov 2011 Mathematics Department, UC Berkeley, USA

- Host: Prof Lauren Williams, 3 seminars on quantum cohomology and the $sl(n)$ Verlinde algebra

July 2010 Mathematics Department, University of Melbourne, Australia

- Hosts: Profs Arun Ram and Jan deGier, 2 seminars on quantum cohomology and the $sl(n)$ Verlinde algebra

June 2010 Graduate School for Mathematical Sciences, University of Tokyo

- Hosts: Profs Junichi Shiraishi and Ralph Willox, seminars on Yang-Baxter algebras and the $sl(n)$ Verlinde algebra

July 2009 University of Washington and University of British Columbia

- Hosts: Prof Paul Smith and Prof Jim Bryan, seminars on Yang-Baxter algebras and quantum cohomology

November 2008 Université Paris Sud, d'Orsay and Marne-la-Vallée, France

- Host: Prof Nicolas Thierry, seminar on Noncommutative Hall-Littlewood polynomials

April 2008 Institute for Theoretical Physics, Univ of Amsterdam, Netherlands

- Host: Dr Jean-Sebastien Caux, research visit under the *Interdisciplinary Statistical and Field Theory Approaches to Nanophysics and Low Dimensional Systems* programme

November 2007 Saclay Institute, Gif-sur-Yvette, France

- Host: Professor Philippe Di Francesco, invited research seminar and discussions

January 2007 Department of Mathematics, Osaka University, Japan

- Host: Professor Etsuro Date, invited informal lecture series

November 2006 Laboratoire de Physique, ENS de Lyon, France

- Host: Professor Jean-Michel Maillet, invited informal lecture series, funded by host

February 2005 School for Mathematical Science, University of Tokyo, Japan

- Host: Professor Michio Jimbo, invited research stay

April 2004 Centre for Mathematical Sciences, City University London, UK

- Host: Professor Andreas Fring, research collaboration

July 2003 Fachbereich Physik, Bergische Universität Wuppertal, Germany

- Host: Professor Andreas Klümper, invited research seminars

September 1999 Universidad de Santiago de Compostela Santiago, Spain

- Host: Professor J. Luis Miramontes, invited research seminar and collaboration



Publications

Published Research Articles

1. Korff, C. (2014) [Quantum cohomology via vicious and osculating walkers](#). *Letters in Mathematical Physics*, 104 (7). pp. 771-810. ISSN 0377-9017
2. Korff, C. (2013) [Cylindric versions of specialised Macdonald functions and a deformed Verlinde algebra](#). *Communications in Mathematical Physics*, 318 (1). pp. 173-246. ISSN 0010-3616
3. Korff, C. (2010) [Noncommutative Schur polynomials and the crystal limit of the Uq sl\(2\)-vertex model](#). *Journal Of Physics A: Mathematical and Theoretical*, 43 (43). p. 434021. ISSN 1751-8113
4. Korff, C. and Stroppel, C. (2010) [The sl\(n\)k-WZNW fusion ring: a combinatorial construction and a realisation as quotient of quantum cohomology](#). *Advances in Mathematics*, 225 (1). pp. 200-268. ISSN 0001-8708
5. Korff, C. (2008) [PT symmetry of the non-Hermitian XX spin-chain: non-local bulk interaction from complex boundary fields](#). *Journal Of Physics A: Mathematical and Theoretical*, 41 (29). p. 295206. ISSN 1751-8113
6. Korff, C. (2008) [Turning the quantum group invariant XXZ spin-chain Hermitian: a conjecture on the invariant product](#). *Journal Of Physics A: Mathematical and Theoretical*, 41 (19). p. 194013. ISSN 1751-8113
7. Korff, C. and Weston, R. (2007) [PT symmetry on the lattice: the quantum group invariant XXZ spin chain](#). *Journal Of Physics A: Mathematical And Theoretical*, 40 (30). pp. 8845-8872. ISSN 1751-8113
8. Korff, C. (2007) [A Q-operator for the quantum transfer matrix](#). *Journal Of Physics A: Mathematical And Theoretical*, 40 (14). pp. 3749-3774. ISSN 1751-8113
9. Korff, C. (2006) [A Q-operator for the twisted XXX model](#). *Journal of Physics A: Mathematical and General*, 39 (13). pp. 3203-3219. ISSN 1751-8113
10. Fring, A. and Korff, C. (2006) [Non-crystallographic reduction of generalized Calogero–Moser models](#). *Journal of Physics A: Mathematical and General*, 39 (5). pp. 1115-1131. ISSN 1751-8113
11. Fring, A. and Korff, C. (2005) [Affine Toda field theories related to Coxeter groups of noncrystallographic type](#). *Nuclear Physics B*, 729 (3). pp. 361-386. ISSN 0550-3213
12. Korff, C. (2005) [A Q-operator identity for the correlation functions of the infinite XXZ spin-chain](#). *Journal of Physics A: Mathematical and General*, 38 (30). pp. 6641-6657. ISSN 1751-8113
13. Korff, C. (2005) [Auxiliary matrices on both sides of the equator](#). *Journal of Physics A: Mathematical and General*, 38 (1). pp. 47-67. ISSN 1751-8113
14. Fring, A. and Korff, C. (2004) [Exactly solvable potentials of Calogero type for q-deformed Coxeter groups](#). *Journal of Physics A: Mathematical and General*, 37 (45). pp. 10931-10949. ISSN 1751-8113
15. Korff, C. (2004) [Auxiliary matrices for the six-vertex model and the algebraic Bethe ansatz](#). *Journal of Physics A: Mathematical and General*, 37 (29). pp. 7227-7253. ISSN 1751-8113
16. Korff, C. (2004) [The twisted XXZ chain at roots of unity revisited](#). *Journal of Physics A: Mathematical and General*, 37 (5). pp. 1681-1689. ISSN 1751-8113
17. Korff, C. (2004) [Auxiliary matrices for the six-vertex model at qN = 1. II. Bethe roots, complete strings and the Drinfeld polynomial](#). *Journal of Physics A: Mathematical and General*, 37 (2). pp. 385-406. ISSN 1751-8113
18. Korff, C. (2003) [Auxiliary matrices for the six-vertex model at qN = 1 and a geometric interpretation of its symmetries](#). *Journal of Physics A: Mathematical and General*, 36 (19). pp. 5229-5266. ISSN 1751-8113
19. Korff, C. and Seaton, K.A. (2002) [Universal amplitude ratios and Coxeter geometry in the dilute A model](#). *Nuclear Physics B*, 636 (3). pp. 435-464. ISSN 0550-3213
20. Korff, C. and Roditi, I. (2002) [Quantum superalgebras at roots of unity and non-Abelian symmetries of integrable models](#). *Journal of Physics A: Mathematical and General*, 35 (24). pp. 5115-5137. ISSN 1751-8113
21. Korff, C. and McCoy, B.M. (2001) [Loop symmetry of integrable vertex models at roots of unity](#). *Nuclear Physics B*, 618 (3). pp. 551-569. ISSN 0550-3213
22. Korff, C. (2001) [Colours associated to nonsimply-laced Lie algebras and exact S-matrices](#). *Physics Letters B*, 501 (3-4). pp. 289-296. ISSN 0370-2693
23. Fring, A. and Korff, C. [Colour valued scattering matrices](#). *Physics Letters B*, 477:380-386, 2000.



24. Castro-Alvaredo, O., Fring, A. and C. Korff. [Form factors of the homogeneous sine-Gordon models](#). *Physics Letters B*, 484(1-2):167-176, 2000.
25. Fring, A. and Korff, C. [Large and small density approximations to the thermodynamic Bethe ansatz](#). *Nuclear Physics B*, 579:617-631, 2000.
26. Fring, A., Korff, C., and Schulz, B.J. [On the universal representation of the scattering matrix of affine Toda field theory](#). *Nucl Phys B*, 567:409-453, 2000.
27. Castro-Alvaredo O., Fring, A., Korff, C. and Miramontes, J.L. [Thermodynamic Bethe ansatz of the homogeneous sine-Gordon models](#). *Nuclear Physics B*, 575:535-560, 2000.
28. Fring, A., C. Korff, Schulz, B.J. [The UV behaviour of integrable QFT's, affine Toda field theory](#). *Nucl Phys B*, 549:579-612, 1999.
29. Lang, G., Korff, C. and Schrader, R. [Two particle scattering theory for anyons](#). *J of Mathematical Physics*, 40:1831-1869, 1999.

Invited Conference Proceedings

30. Korff, C. (2011) [The \$su\(n\)\$ WZNW fusion ring as integrable model: a new algorithm to compute fusion coefficients](#). RIMS Kokyuroku Bessatsu B28 (2011) pp. 121-153; [arxiv:1106.5342](#) (refereed)
31. Korff, C. and Stroppel, C. (2009) [A combinatorial description of the \$sl\(n\)\$ fusion ring](#). Oberwolfach Reports, 6 (1). pp. 846-850. ISSN 1660-8933
32. Korff, C. (2007) PT-invariance and representations of the Temperley-Lieb algebra on the unit circle. In: Recent Advances in Quantum Integrable Systems, 11-14 Sept 2007, Annecy-le-Vieux, France; [arxiv:0712.2205](#)
33. Korff, C. (2006) Representation theory and Baxter's TQ equation for the six-vertex model. A pedagogical overview. In: Solvable Lattice Models 2004 - Recent Progress on Solvable Lattice Models, 20-23 July 2004, Kyoto, Japan; [cond-mat/0411758](#) (refereed)
34. Korff, C. (2005) Solving Baxter's TQ equation via representation theory. In: Fuchs, J. (ed.) [Noncommutative Geometry and Representation Theory in Mathematical Physics](#): Satellite Conference to the Fourth European Congress of Non-commutative Geometry and Representation Theory in Mathematical Physics, Karlstad, Sweden, July 5-10, 2004. Contemporary Mathematics (391). American Mathematical Society, Providence, USA, pp. 199-211. ISBN 9780821837184; [math-ph/0411034](#) (refereed)

Edited Conference Proceedings

35. Editors: Korff, C., Okado, M., Schief, W. and Tokihiro, T. (2010) [Proceedings of the Workshop "Geometric Aspects of Discrete and Ultra-Discrete Integrable Systems"](#) (March 30 – April 3, 2009, University of Glasgow, UK) SIGMA (2010).
36. Editors: Feigin, M., Korff, C. and Strachan, I. (2009) [Volume of selected papers arising from the conference ISLAND 3: Algebraic Aspects of Integrable Systems, Islay 2007](#). Glasgow Mathematical Journal, 51 (A). pp. 1-3. ISSN 0017-0895

Preprints

37. **With Vassily Gorbounov, Quantum Integrability and Generalised Quantum Schubert Calculus**, Preprint [arXiv:1408.4718](#)
38. **With Vassily Gorbounov, Equivariant quantum cohomology and Yang-Baxter algebras**, Preprint [arXiv:1402.2907](#)
39. A combinatorial derivation of the Racah-Speiser algorithm for Gromov-Witten invariants; Preprint [arXiv:0910.3395](#)

Numerics – Mathematica Demonstrations

40. C. Korff, Kirillov-Reshetikhin Crystals, Wolfram Demonstration Project January 2012; <http://demonstrations.wolfram.com/KirillovReshetikhinCrystals/>
41. B. Keller, C. Korff, L. Williams, Cluster Algebras, Wolfram Demonstration Project January 2012; <http://demonstrations.wolfram.com/ClusterAlgebras/>
42. Supervised summer project: Justin Paston Cooper, Cayley Graphs, Wolfram Demonstration Project October 2010; <http://demonstrations.wolfram.com/CayleyGraphsForWeylGroups/>