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Mathematisches Institut  
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**Name:** Stefan Friedl  
**Citizenship:** German  
**Date of Birth:** March 23rd 1973  
**Research Interests:** Knot theory, low-dimensional topology,  
symplectic 4-manifolds and related algebra

## Current Position

- W2 Professor (since October 2010)  
Mathematisches Institut, Universität zu Köln, Köln, Germany

## Previous Positions

- Assistant Professor (August 2008 – September 2010)  
Department of Mathematics, University of Warwick, Coventry, United Kingdom
- CRM-ISM Postdoctoral Fellow (October 2006 - July 2008)  
Département de Mathématiques, Université du Québec à Montréal, Montréal, Canada
- G. C. Evans Instructor (July 2004 – June 2006)  
Department of Mathematics, Rice University, Houston, USA
- Postdoctoral Fellow (October 2003 – March 2004)  
Department of Mathematics, Ludwig-Maximilian University, Munich, Germany

## Education

- Ph.D., Mathematics, Brandeis University, May 2003.
- M.A., Mathematics, Brandeis University, May 2000.
- Staatsexamen für Lehramt am Gymnasium in Mathematik und Physik, Regensburg University, Germany, December 1998.

## Publications and Preprints

1. *Eta invariants as sliceness obstructions and their relation to Casson-Gordon invariants*, Algebraic and Geometric Topology, Vol. 4: 893-934 (2004).
2. *New topologically slice knots* (with Peter Teichner), Geometry and Topology, Volume 9, Paper no. 48: 2129–2158 (2005)

3. *Full signature invariants for  $L_0(F(t))$* , Proceedings of the American Mathematical Society 133: 647-653 (2005).
4.  *$L^2$ -eta-invariants and their approximation by unitary eta-invariants*, Mathematical Proceedings of the Cambridge Philosophical Society 138: 327-338 (2005).
5. *Link concordance, boundary link concordance and eta invariants*, Mathematical Proceedings of the Cambridge Philosophical Society 138: 437-460 (2005).
6. *Algorithm for finding boundary link Seifert matrices*, Journal of Knot Theory and Its Ramifications, Vol. 15, No. 5, 601–612 (2006).
7. *Thurston norm, fibered manifolds and twisted Alexander polynomials* (with Taehee Kim), Topology 45: 929-953 (2006)
8. *Reidemeister torsion, the Thurston norm and Harvey's invariants*, Pacific Journal of Mathematics 230: 271-296 (2007)
9. *Non-commutative multivariable Reidemeister torsion and the Thurston norm* (with Shelly Harvey), Algebraic and Geometric Topology 7: 755-777 (2007)
10. *Non-smoothable four-manifolds with cyclic fundamental group* (with Ian Hambleton, Paul Melvin and Peter Teichner), International Mathematics Research Notices 2007, Article ID rnm031, 20 pages
11. *Nontrivial Alexander polynomials of knots and links* (with Stefano Vidussi), Bulletin of the London Mathematical Society 39: 614–622 (2007)
12. *The parity of the Cochran-Harvey invariants of 3-manifolds* (with Taehee Kim), Transactions of the American Mathematical Society 360 (2008), 2909-2922.
13. *Symplectic  $\mathbf{S}^1 \times \mathbf{N}^3$ , surface subgroup separability, and vanishing Thurston norm* (with Stefano Vidussi), Journal of the American Mathematical Society 21 (2008), 597-610.
14. *Twisted Alexander polynomials and symplectic structures* (with Stefano Vidussi), American Journal of Mathematics 130 (2), 455–484 (2008)
15. *Twisted Alexander norms give lower bounds on the Thurston norm* (with Taehee Kim), Transactions of the American Mathematical Society 360 (2008), 4597-4618
16. *Metabelian  $SL(n, C)$  representations of knot groups* (with Hans Boden), Pacific Journal of Mathematics 238, 7–25 (2008)
17. *Twisted Alexander polynomials, symplectic 4-manifolds and surfaces of minimal complexity* (with Stefano Vidussi), Banach Center Publ. 85 (2009), 43-57
18. *New constructions of slice links* (with Tim Cochran and Peter Teichner), Commentarii Mathematici Helvetici 84, Issue 3 (2009), 617-638
19.  *$L^2$ -Betti numbers of plane algebraic curves* (with Constance Leidy and Laurentiu Maxim), Michigan Mathematical Journal, 58 (2009), no. 2, 291-301
20. *Realizations of Seifert matrices by hyperbolic knots*, Journal of Knot Theory and Its

- Ramifications, Vol. 18, No. 11, 1471–1474 (2009)
21. *A survey of twisted Alexander polynomials* (with Stefano Vidussi), in: *The Mathematics of Knots: Theory and Application (Contributions in Mathematical and Computational Sciences)*, editors: Markus Banagl and Denis Vogel (2010), p. 45–94.
  22. *Metabelian  $SL(n, C)$  representations of knot groups II: fixed points* (with Hans Boden), *Pacific Journal of Mathematics*, 249-1 (2011), 1–10.
  23. *A Criterion for HNN Extensions of Finite  $p$ -Groups to be Residually  $p$*  (with Matthias Aschenbrenner), *Journal of Pure and Applied Algebra* 215 (2011) 2280–2289
  24. *Twisted Alexander polynomials detect fibered 3-manifolds* (with Stefano Vidussi), *Annals of Mathematics*, Volume 173 (2011), 1587–1643
  25. *Residual properties of graph manifold groups* (with Matthias Aschenbrenner), *Topology and its Applications* 158 (2011) 1179–1191
  26. *Symplectic 4-manifolds with  $K = 0$  and the Lubotzky alternative* (with Stefano Vidussi), *Mathematics Research Letters* 18 (2011) 513–519
  27. *The cobordism group of homology cylinders* (with Jae Choon Cha and Taehee Kim), *Compositio Mathematica* 147 (2011), 914–942
  28. *The decategorification of sutured Floer homology* (with András Juhász and Jacob Rasmussen), *Journal of Topology* (2011) 4(2): 431–478
  29. *Twisted Alexander polynomials and fibered 3-manifolds* (with Stefano Vidussi), *Low-Dimensional and Symplectic Topology, Proceedings of Symposia in Pure Mathematics* Volume 82 (2011), 111–130.
  30. *An Injectivity Theorem for Casson-Gordon Type Representations relating to the Concordance of Knots and Links* (with Mark Powell), *Bulletin of the Korean Mathematical Society* 49 (2012), No. 2, pp. 395–409
  31. *Construction of symplectic structures on 4-manifolds with a free circle action* (with Stefano Vidussi), *Proceedings of the Royal Society of Edinburgh* 142 (2012), pp 359 - 370.
  32. *Twisted Alexander polynomials of hyperbolic knots* (with Nathan Dunfield and Nicholas Jackson), *Experimental Mathematics* 21 (2012), 329–352.
  33. *Cosmetic crossings and Seifert matrices* (with Cheryl Balm, Efstratia Kalfagianni and Mark Powell), *Communications in Analysis and Geometry* 20 (2012), 235–253.
  34. *Twisted torsion invariants and link concordance* (with Jae Choon Cha), 26 pages, to appear in *Forum Mathematicum*
  35. *Poincaré duality and degrees of twisted Alexander polynomials* (with Taehee Kim and Takahiro Kitayama) 42 pages, to be published by the *Indiana University Journal of Mathematics*

36. *3-manifold groups are virtually residually  $p$*  (with Matthias Aschenbrenner), 106 pages, to be published by the Memoirs of the Amer. Math. Soc.
37. *Cobordisms to weakly splittable links* (with Mark Powell), 11 pages, to be published by the Proceedings of the American Mathematical Society.
38. *Commensurability of knots and  $L^2$ -invariants*, 16 pages, to be published by Geometry & Topology Down Under: Proceedings of the Rubinstein conference.
39. *A Vanishing Theorem for Twisted Alexander Polynomials with Applications to Symplectic 4-manifolds*, (with Stefano Vidussi), 16 pages, to be published by the Journal of the European Mathematical Society.
40. *Links not concordant to the Hopf link* (with Mark Powell), 40 pages, to be published by the Mathematical Proceedings of the Cambridge Philosophical Society.
41. *A note on the growth of Betti numbers and ranks of 3-manifold groups*, 9 pages, to be published by the International Journal of Algebra and Computation
42. *Minimal Genus on 4-manifolds with a Free Circle Action* (with Stefano Vidussi), 20 pages, submitted.
43. *The unknotting number and classical invariants I* (with Maciej Borodzik), 43 pages, submitted.
44. *The Thurston norm and twisted Alexander polynomials* (with Stefano Vidussi), 17 pages, submitted.
45. *3-manifold groups* (with Matthias Aschenbrenner and Henry Wilton), 118 pages.
46. *Metabelian  $SL(n, \mathbb{C})$  representations of knot groups, III: deformations* (with Hans Boden), 21 pages, submitted.
47. *The unknotting number and classical invariants II* (with Maciej Borodzik), 24 pages, submitted.
48. *Taut sutured manifolds and twisted homology* (with Taehee Kim), 17 pages, submitted.
49. *Metabelian  $SL(n, \mathbb{C})$  representations of knot groups IV: Twisted Alexander polynomials* (with Hans Boden), 21 pages, submitted.
50. *Virtually symplectic fibered 4-manifolds* (with İnanç Baykur), 13 pages, submitted.
51. *The virtual fibering theorem for 3-manifolds* (with Takahiro Kitayama), 23 pages, submitted.
52. *On the topology of Symplectic Calabi-Yau 4-manifolds* (with Stefano Vidussi), 12 pages, submitted.
53. *Twisted Reidemeister torsion, the Thurston norm and fibered manifolds*, 10 pages, submitted.
54. *A note on a topological approach to the  $\mu$ -constant problem in dimension 2* (with Maciej Borodzik), 6 pages, submitted.

55. *Concordance of links with identical Alexander invariants* (with Jae Choon Cha and Mark Powell), 14 pages, submitted.
56. *Kähler groups, quasi-projective groups, and 3-manifold groups* (with Alex Suciuc), 18 pages, submitted.
57. *Rank gradients of infinite cyclic covers of 3-manifolds* (with Jason DeBlois and Stefano Vidussi), 15 pages, submitted.

## Non-refereed Publications

1. *Symplectic  $S^1 \times \mathbb{N}^3$  and subgroup separability* (with Stefano Vidussi), Oberwolfach Reports, Volume 3, Issue 3 (2006), 2166 - 2168
2. *Fundamental groups of 3-manifolds* (with Matthias Aschenbrenner), Oberwolfach Reports, Volume 7, Issue 3 (2010), 2479–2482
3. *Centralizers in 3-manifold groups*, RIMS Kôkyûroku 1747 (2011), 23–34
4. *Approximations to the volume of hyperbolic knots* (with Nicholas Jackson), RIMS Kôkyûroku 1747 (2011), 35–46
5. *Cobordism on homology cylinders and combinatorial torsions* (with Jae Choon Cha and Taehee Kim), RIMS Kôkyûroku 1747 (2011) 17–22

## Teaching Experience

- Universität zu Köln
  - Topologie, Seminar über euklidische und nichteuklidische Geometrie und Proseminar über Knotentheorie, Sommersemester 2012.
  - Analysis III und Proseminar über Ebene Geometrie, Wintersemester 2011-2012.
  - Analysis II und Proseminar über Knotentheorie, Sommersemester 2011.
  - Analysis I, Wintersemester 2010-2011.
- University of Warwick
  - Manifolds, Spring 2009 and Spring 2010.
  - Introduction to Geometry, Fall 2008 and Fall 2009.
- Université du Québec à Montréal
  - Analyse II, Fall 2007.
- Rice University
  - Linear Algebra, Fall 2004 and Fall 2005.
  - Multivariable Calculus, Spring 2005 and Spring 2006.

- Geometry, Spring 2005.
- Algebraic Topology, Spring 2006.
- Brandeis University
  - Differential calculus, Fall 1999.
  - Integral Calculus, Spring 2000 – Spring 2002.

## Lecture notes

- Real Analysis I, 123 pages.
- Real Analysis II, 127 pages.
- Integration Theory, 169 pages.
- Topology, 163 pages.

## Teaching Awards

- Teaching Award at Brandeis University 2001.
- Lehrpreis der Mathematisch-Naturwissenschaftlichen Fakultät der Universität zu Köln für das Wintersemester 2011/2012.

## Doctoral Students

- Irida Altman, expected degree July 2013, jointly supervised with Saul Schleimer (University of Warwick)
- Matthias Nagel

## Meetings organized

- Co-organizer of the ‘Dehn Filling and Cannon-Thurston Days’, University of Warwick, May 2009
- Co-organizer of student meeting, as part of the annual DMV-meeting, September 2011

## Committee work

- Faculty search committee, University of Cologne, 2012

- Teacher's training committee, University of Cologne, 2011-

## Extended research stays

- *University of California at San Diego*, May 2003
- *University of Edinburgh*, June 2004
- *University of Edinburgh*, September and October 2006
- *MSRI, Berkeley*, March and April 2011
- *Université de Paris 7*, March 2012

## Selection of invited talks

- *Minimal genus surfaces in 4-manifolds with a free circle action*,  
Topology and Groups, Berlin, June 2012
- *Symplectic 4-manifolds of the form  $S^1 \times N$* ,  
Chern Centennial Conference, MSRI, October 2011
- *Lecture series on 3-manifold groups*,  
Münster, July 2011
- *Twisted Alexander polynomials and the Thurston norm*,  
Interactions of contact, symplectic and low dimensional topology, Banff, March 2011
- *3-manifold groups*,  
NRW topology meeting, Bonn, November 2010
- *Slice knots*,  
Kolloquium, Münster, November 2010
- *3-manifold groups*,  
Topology meeting, Oberwolfach, September 2010
- *Twisted invariants of 3-manifolds*,  
Twisted topological invariants and topology of low-dimensional manifolds, Akita, Japan, September 2010
- *Symplectic 4-manifolds and fibered 3-manifolds*,  
Geometric Topology and Riemannian Geometry, Bangalore, India, August 2010
- *3-manifold groups are residually  $p$* ,  
Group Actions in Topology and Geometric Group Theory, Poznan, Poland, June 2010
- *Symplectic 4-manifolds and fibered 3-manifolds*,  
Mathematical Sciences Research Institute, Berkeley, USA, April 2010
- *Twisted torsion of hyperbolic 3-manifolds*,  
Joints AMS-KMS meeting, Seoul, Korea, December 2009

- *Symplectic 4-manifolds and fibered 3-manifolds*,  
Georgia International Topology Conference, Athens Georgia, May 2009
  - *Les variétés fibrées de dimension trois et les variétés symplectiques de dimension quatres*,  
Nantes, May 2009
  - *Les variétés fibrées de dimension trois et les variétés symplectiques de dimension quatres*,  
Paris VII, May 2009
  - *Symplectic 4-manifolds and fibered 3-manifolds*,  
Swiss Knots 2009, Fribourg Switzerland, April 2009
  - *Virtual properties of 3-manifold groups*,  
ETH Zürich, Switzerland, April 2009
  - *Symplectic 4-manifolds and fibered 3-manifolds*,  
University of Southern California, April 2009
  - *The Alexander polynomial of sutured manifolds*,  
Brandeis University, April 2009
  - *Symplectic 4-manifolds and fibered 3-manifolds*,  
Harvard University, April 2009
  - *Symplectic 4-manifolds and fibered 3-manifolds*,  
The 5th East Asian School of Knots and Related Topics, January 2009
  - *Symplectic 4-manifolds and fibered 3-manifolds*,  
“The Mathematics of Knots: Theory and Application”, Heidelberg, December 2008
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- *Symplectic 4-manifolds and fibered 3-manifolds*,  
Cambridge University, November 2008
  - *Symplectic 4-manifolds and fibered 3-manifolds*,  
Oxford University, October 2008
  - *Symplectic 4-manifolds and fibered 3-manifolds*,  
Hebrew University, July 2008
  - *Symplectic 4-manifolds and fibered 3-manifolds*,  
Conference in honour of Ranicki’s 60th birthday, Münster, June 2008
  - *Symplectic 4-manifolds and fibered 3-manifolds*,  
Conference ‘50 years after Fox and Milnor’, Waltham, June 2008
  - *Symplectic 4-manifolds with a free circle action*,  
Yale University, February 2008
  - *Symplectic 4-manifolds and Grothendieck’s problem*,  
Hebrew University, Jerusalem, January 2008



- *Equivariant intersection forms of 4-manifolds*,  
University of Waterloo, Waterloo, November 2007
- *New examples of topologically slice knots*,  
McMaster University, Hamilton, November 2007
- *Equivariant intersection forms of 4-manifolds*,  
University of Massachusetts at Amherst, October 2007
- *Symplectic 4-manifolds and fibered 3-manifolds*,  
Workshop on 3-manifold geometry and topology, University of Warwick, UK, July 2007
- *Symplectic 4-manifolds of the form  $S^1 \times N$* ,  
Postnikov memorial conference, June 2007, Bedlewo, Poland
- *Equivariant intersection forms of 4-manifolds*,  
University of California at Riverside, May 2006
- *Symplectic 4-manifolds with a free circle action*,  
BIRS workshop, Banff, April 2007
- *Commensurability and  $L^2$ -invariants*,  
Columbia University, New York, April 2007
- *Symplectic 4-manifolds with free circle action*,  
BIRS workshop, Banff, March 2007
- *Sur les produits  $\mathbf{S}^1 \times \mathbf{N}^3$  symplectiques*,  
Institut de Mathématiques de Jussieu (Paris), October 2006
- *Symplectic Products and subgroup separability*,  
University of Glasgow, October 2006
- *Symplectic  $\mathbf{S}^1 \times \mathbf{N}^3$  and subgroup separability*,  
Oberwolfach workshop on 4-manifolds, August 2006
- *Symplectic Products, degenerate Thurston norm and subgroup separability*,  
PCMI workshop on low-dimensional topology, Park City, July 2006
- *Symplectic Products and Fibered Manifolds*,  
First Louisiana-Texas-Topology-Retreat, Baton Rouge, March 2006
- *New examples of topologically slice knots*,  
Conference on the Algebraic K- and L-theory of infinite groups, Edinburgh, June 2005
- *Thurston norm, fibered manifolds and twisted Alexander polynomials*,  
University of California at Berkeley, May 2005.
- *Thurston norm, fibered manifolds and twisted Alexander polynomials*,  
Conference on Low-Dimensional Topology, University of Virginia, Charlottesville, December 2004.

- *Eta invariants as sliceness obstructions*,  
Topology Seminar, University of Texas at Austin, November 2004.
- *New examples of topologically slice knots*,  
Workshop on Knots and their Manifold Stories, BIRS, Canada, May 2004.
- *New examples of topologically slice knots*,  
Topology Seminar, Indiana University, Bloomington, August 2004.
- *New examples of topologically slice knots*,  
Topology Seminar, McMaster University, March 2004.
- *New examples of topologically slice knots*,  
Topology Seminar, University of Edinburgh, February 2004.
- *Eta invariants as sliceness obstructions*,  
Topology Seminar, University of Göttingen, December 2003.
- *Eta invariants as sliceness obstructions*,  
Topology Seminar, University of California at San Diego, June 2003.
- *Eta invariants as sliceness obstructions*,  
AMS Meeting (#985), Special session on Geometric Topology, Bloomington, IN,  
April 2003.

## Language Skills

Fluent in German and English.  
 Good knowledge of French.  
 Reading proficiency in Italian and Spanish.  
 Basic knowledge of Czech and Hebrew.

## Referee for the following journals

Algebraic and Geometric Topology  
 Annali della Scuola Normale Superiore  
 Bulletin of the Malaysian Mathematical Sciences Society  
 Duke Mathematical Journal  
 Experimental Mathematics  
 Geometry and Topology  
 Indiana University Mathematics Journal  
 Journal of Knot Theory and its Ramifications  
 Journal of the European Mathematical Society  
 Journal of Topology  
 Mathematische Zeitschrift

Pacific Journal of Mathematics  
Proceedings of the American Mathematical Society