

Prof. Dr. Bernhard Johann D. Krötz

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Curriculum Vitae

- Personal information:** Born: July 16, 1970 in Weißenburg. German citizen.
Married, two children.
- Academic Positions:**
- Professor for Algebra (W3), Paderborn (since 11/2013)
 - Professor for Analysis (W2), Hannover (04/2009 - 10/2013)
 - Senior Researcher, MPIM (01/2008 - 03/2009)
 - Heisenberg fellow (09/2004 – 12/2007)
 - Assistant professor (tenure track), University of Oregon (10/2003 – 08/2004)
 - Hans Zassenhaus Assistant Professor, Ohio State (09/1999 – 09/2003)
 - Postdoc, TU Clausthal (03/1998 – 08/1999)
- Degrees in mathematics:** Habilitation (2001), Doktor (1998), Diplom (1995)
- Awards/Stipends:**
- ERC Advanced Invesitgator Grant (joint with Eric M. Opdam) (2011 – 2015)
 - Heisenberg grant (received June 2003)
 - Programme-Postdoc, MSRI (08 – 12/2001)
 - NSF grant (2001 – 2003)
 - Habilitationstipendium (received in 1999, declined)
 - Graduate student stipend, Mittag-Leffler (01 – 05/1996)
 - Graduate student stipend, Freistaat Bayern (04/1996 – 02/1998)
- Visited Institutes:** MPIM (3,5y), RIMS (6m), MSRI (5m), Mittag-Leffler (5m), Paris VI (4m), IISC (1m), IAS (1m)
- Organized matters:** Two special terms at MPIM, several international conferences, one spring school, one summer school, one autumn school.

Publications

Selecta:

1. (with Ólafsson) *The c -function for non-compactly causal symmetric spaces*, Invent. math. **149**(3) (2002), 647–659.
2. (with Gindikin and Ólafsson) *Holomorphic H -spherical distribution vectors in principal series representations*, Invent. math. **158** (3) (2004), 643–684.
3. *Domains of holomorphy for irreducible unitary representations of simple Lie groups*, Invent. math. **172** (2) (2008), 277–288.
4. (with Stanton) *Holomorphic extension of representations: (I) automorphic functions*, Ann. math. **159**(2) (2004), 641–724.
5. (with Stanton) *Holomorphic extension of representations: (II) geometry and harmonic analysis*, GAFA, Geom. funct. anal. **15** (2005) 190–245.
6. (with Opdam) *Analysis on the crown domain*, GAFA, Geom. funct. anal. **18** (2008), 1326–1421.
7. *Formal dimension for semisimple symmetric spaces*, Compositio Mathematica **125** (2001), 155–191.
8. (with Gindikin) *Invariant Stein domains in Stein symmetric spaces and a non-linear complex convexity theorem*, IMRN **2002:18** (2002), 959–971.
9. (with Otto) *Lagrangian submanifolds and moment convexity*, Trans. Amer. Math. Soc. **358** (2006), 871–891.
10. (with Gimperlein and Lienau) *Analytic factorization of Lie group representations*, J. Funct. Analysis **262** (2012), 667–681.
11. (with Bernstein) *Smooth Fréchet Globalizations of Harish-Chandra Modules*, Israel Journal of Math. **199** (1), 2014, 45–111.

Overview articles:

1. *Spherical inversion on $\mathrm{Sl}(n, \mathbb{R})$* , book review, Bull. Amer. Math. Soc. **40**(1) (2003), 137–142.
2. (mit Ólafsson) *The c -function for non-compactly causal symmetric spaces and its relations to harmonic analysis and representation theory*, Amer. Math. Soc. Transl. (2) Vol. **210** (2003), 171–193.
3. *Crown theory for the upper halfplane*, Contemp. math. **488** (2009), 147–182.

Complete list:

1. (with Neeb) *On hyperbolic cones and mixed symmetric spaces*, Journal of Lie Theory **6:1** (1996), 69–146.

2. (with Neeb and Ólafsson) *Spherical Representations and Mixed Symmetric Spaces*, Representation Theory **1** (1997), 424–461.
3. *On Hardy and Bergman spaces on complex Ol'shanskiĭ semigroups*, Math. Ann. **312** (1998), 13–52.
4. *The Plancherel Theorem for Biinvariant Hilbert Spaces*, Publ. RIMS **35** (1999), Kyoto Univ., 91–122.
5. *Equivariant embeddings of Stein domains sitting in complex semigroups*, Pacific J. of Math. **189** (1) (1999), 55–73.
6. *Norm estimates for unitary highest weight modules*, Ann. Inst. Fourier **49**(4) (1999), 1241–1264.
7. (with Hilgert) *Representations, characters and spherical functions associated to causal symmetric spaces*, J. Funct. Anal., **169** (1999), 357–390.
8. (with Hilgert) *Weighted Bergman spaces associated to causal symmetric spaces*, manuscripta math. **99**(2) (1999), 151–180.
9. (with Hilgert) *The Plancherel Theorem for invariant Hilbert spaces*, Math. Z. **37**(1) (2001), 31–59.
10. *On the dual of complex Ol'shanskiĭ semigroups*, Math. Z. **237**(3) (2001), 505–529.
11. *Formal dimension for semisimple symmetric spaces*, Compositio Mathematica **125** (2001), 155–191.
12. (with Neeb and Ólafsson) *Spherical Functions on Mixed Symmetric Spaces*, Representation Theory **5** (2001), 43–92.
13. (with Ólafsson) *The c -function for non-compactly causal symmetric spaces*, Invent. math. **149**(3) (2002), 647–659.
14. (with Neeb) *Spherical unitary highest weight representations*, Trans. Amer. Math. Soc. **354** (2002), 1233–1264.
15. (with Gindikin) *Complex crowns of Riemannian symmetric spaces and non-compactly causal symmetric spaces*, Trans. Amer. Math. Soc. **354** (2002), 3299–3327.
16. (with Gindikin) *Invariant Stein domains in Stein symmetric spaces and a non-linear complex convexity theorem*, IMRN **2002:18** (2002), 959–971.
17. (with Otto) *Vanishing properties of analytically continued matrix coefficients*, Journal of Lie Theory **12:2** (2002), 409–421.
18. *Spherical inversion on $Sl(n, \mathbb{R})$* , book review, Bull. Amer. Math. Soc. **40**(1) (2003), 137–142.
19. (with Ólafsson) *The c -function for non-compactly causal symmetric spaces and its relations to harmonic analysis and representation theory*, Amer. Math. Soc. Transl. (2) Vol. **210** (2003), 171–193.
20. (with Gindikin und Ólafsson) *Hardy spaces for non-compactly causal symmetric spaces and the most continuous spectrum*, Math. Ann. **327** (1) (2003), 25–66.
21. (with Achab and Betten) *Discrete group actions on Stein domains in complex groups*, Forum Math. **16**(1) (2004), 37–68.
22. (with Stanton) *Holomorphic extension of representations: (I) automorphic functions*, Ann. math. **159**(2) (2004), 1–84.
23. (with Otto) *A convexity property for the $SO(2, \mathbb{C})$ -double coset decomposition in $SL(2, \mathbb{C})$ with applications to spherical functions*, Math. Z., **247**(2) (2004), 303–318.
24. *A convexity property for real orbits in complexified Riemannian symmetric spaces*, Math. Research Letters **11**, no. **2-3** (2004), 197–211.
25. (with Gindikin and Ólafsson) *Holomorphic H -spherical distribution vectors in principal series representations*, Invent. math. **158** (3) (2004), 643–684.
26. (with Stanton) *Holomorphic extension of representations: (II) geometry and harmonic analysis*, GAFA, Geom. funct. anal. **15** (2005) 190–245.
27. (with Ólafsson and Stanton) *The image of the heat kernel transform on Riemannian symmetric spaces of the non-compact type*, IMRN, Int. Math. Res. Not. 2005, no. **22**, 1307–1329.

28. (with Thangavelu and Xu) *The heat kernel transform for the Heisenberg group*, J. Funct. Analysis, **225** (2005), no. **2**, 301–336
29. (with Kunze and Stanton) *The Bochner measure and holomorphic extension of elementary spherical functions*, Vestnik Tambov Univ. **10** (**4**) (2005), 371–389.
30. (with Otto) *Lagrangian submanifolds and moment convexity*, Trans. Amer. Math. Soc. **358** (2006), 871–891.
31. (with Otto) *A refinement of the complex convexity theorem via symplectic techniques*, Proc. Amer. Math. Soc. **134** (**2**) (2006), 549–558.
32. (with Gindikin and Ólafsson) *Horospherical model for the holomorphic discrete series and horospherical Cauchy transform*, Compositio Math. **142** (2006), 983–1008.
33. (with Gindikin and Ólafsson) *Holomorphic horospherical transform on non-compactly causal spaces*, IMRN Volume **2006** (2006), Article ID 76857, 47 p.
34. *Corner view on the crown domain*, Japanese J. Math. **2** (2007), 303–311.
35. *A novel characterization of the Iwasawa decomposition of a simple Lie group*, in Springer LNP **723: Basic Bundle Theory and K-Cohomology Invariants** by Husemöller et al., 195–201 (2007)
36. *Domains of holomorphy for irreducible unitary representations of simple Lie groups*, Invent. math. **172** (**2**) (2008), 277–288 .
37. (with Thangavelu and Xu) *Heat kernel transform on nilmanifolds associated to the Heisenberg group*, Revista Matemática Iberoamericana **24** (**1**) (2008), 243–266.
38. (with Opdam) *Analysis on the crown domain*, GAFA, Geom. funct. anal., **18** (2008), 1326–1421.
39. (with Schlichtkrull) *Normal forms of real quadratic forms*, Archiv der Mathematik **92** (**2**) (2009), 129–136.
40. *Horospherical transform on real symmetric varieties: kernel and cokernel*, Funct. Anal. Appl. **43** (**1**) (2009), 30–43.
41. *Crown theory for the upper halfplane*, Contemp. math. **488** (2009), 147–182.
42. (with Schlichtkrull) *Holomorphic extensions of eigenfunctions*, Math. Ann. **345** (2009), 835–841.
43. (with Gimperlein and Schlichtkrull) *Analytic representation theory of Lie groups: General theory and analytic globalization of Harish-Chandra modules*, Compositio Math. **147** (**5**) (2011), 1581–1607.
44. (with Gimperlein and Lienau) *Analytic factorization of Lie group representations*, J. Funct. Analysis **262** (2012), 667–681.
45. (with Camporesi) *The complex crown for homogeneous harmonic spaces*, Trans. Amer. Math. Soc. **364** (**4**) (2012), 2227–2240.
46. (with Schlichtkrull) *On function spaces on symmetric spaces*, in *Representation Theory, Complex Analysis and Integral Geometry*, 1–8 (2012), Birkhäuser.
47. (with Offen and Sayag, editors) *Representation Theory, Complex Analysis and Integral Geometry*, Birkhäuser, 2012, 275 p.
48. (with Bernstein) *Smooth Fréchet Globalizations of Harish-Chandra Modules*, Israel Journal of Math. **199** (**1**), 2014, 45–111.
49. (with Sayag and Schlichtkrull) *Vanishing at infinity on homogeneous spaces of reductive type*, submitted, arXiv: 1211.2781
50. (with Sayag and Schlichtkrull) *Decay of matrix coefficients on reductive homogeneous spaces of spherical type*, Math. Z. **278** (2014), no. **1-2**, 229–249.
51. (with Danielson and Schlichtkrull) *Decomposition Theorems for Triple Spaces*, Geometriae Dedicata **174** (**1**) (2015), 145–154.
52. (with Schlichtkrull) *Finite orbit decomposition of real flag manifolds*, J. Europ. Math. Soc., to appear

53. (with Schlichtkrull) *Multiplicity bounds and the sub representation theorem for real spherical spaces*, Trans. Amer. Math. Soc., to appear
54. (with Knop and Schlichtkrull) *The local structure theorem for real spherical spaces*, Compositio Math., to appear
55. (with Knop, Sayag and Schlichtkrull) *Simple compactifications and polar decomposition of real spherical spaces*, Selecta Math. **21** (2015), no . **3**, 1071–1097.
56. (with Knop, Sayag and Schlichtkrull) *Volume growth, temperedness and integrability of matrix coefficients on a real spherical space*, submitted, arXiv: 1407.8006
57. (with Sayag and Schlichtkrull) *The harmonic analysis of lattice counting on real spherical spaces*, submitted, arXiv:1409.0258
58. (with Aizenbud, Gourevitch and Liu) *Hausdorffness for Lie algebra homology of Schwartz spaces*, submitted, arXiv:1403.5197
59. (with Knop and Schlichtkrull) *The tempered spectrum of a real spherical space*, submitted, arXiv: 1509.03429

Invited lectures

Out of the 3-digit number of invited lectures here are my five favorites:

1. *Holomorphic extensions of representations*, opening lecture, 50 Jahre Arbeitstagung, Bonn, 23. Juni 2007
2. *Four Theorems*, Birthday conference for Werner Mueller, Jerusalem, March 2010
3. *Convexity theorems on the complex crown*, Analyse harmonique sur les groupes de Lie et les espaces symétriques, Strasbourg, 13. June 2005
4. *Working seminar on Integral Geometry VII*, RIMS, January 2005
5. *Die Hölle am Rand der oberen Halbebene*, Tag der offenen Tür, MPIM Bonn, 25. November 2006

Students

1. **PhD Michael Otto** with the thesis *Symplectic convexity theorems and applications to the structure theory of semisimple Lie groups*, May 2004, Ohio-State University.
2. **Dr. Heiko Gimperlein** with the thesis *Topics in Singular Analysis with Applications to Representation Theory and to Numerical Analysis*, May 2010, Hannover.
3. **Dr. Christoph Lienau** with the thesis *Aspects of analytic representation theory*, February 2012, Hannover.
4. **Dr. Sweitse van Leeuwen** with the thesis *Invariant Bergman spaces*, July 2013, Hannover.