

Bram Mesland

Curriculum Vitae

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Personal Information

Citizenship Dutch
Work address Mathematisch Instituut, Universiteit Leiden, Niels Bohrweg 1, 2333 CA Leiden, Netherlands
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Scientific Interests

Bivariant K-Theory and Index Theory, Cohomology of Arithmetic Groups, Noncommutative Geometry, Operator Algebras of Hyperbolic Dynamical Systems.

Preprints

- *Gauge theory for noncommutative Riemannian principal bundles* (with B. Ćaćić, 73 pages), arXiv:1912.04179.
- *Toeplitz extensions in noncommutative topology and mathematical physics* (with F. Arici, 18 pages), arXiv:1911.05823.
- *Curvature of differentiable Hilbert modules and Kasparov modules* (with A. Rennie and W.D. van Suijlekom, 47 pages), arXiv:1911.05008.

Publications

- *Homotopy equivalence in unbounded KK-theory* (with K. van den Dungen, 33 pages), to appear in Ann. K-theory, arXiv:1907.04049.
- *A K-theoretic Selberg trace formula* (with M.H. Sengun and H. Wang, 18 pages), to appear in Proc. IWOTA 2018, arXiv:1904.04728.
- *Untwisting twisted spectral triples* (with M. Goffeng and A. Rennie, 42 pages), to appear in Int. J. Math., arXiv:1903.02463.
- *Hecke operators in KK-theory and the K-homology of Bianchi groups* (with M.H. Sengun, 49 pages), to appear in J. Noncomm. Geom., arXiv:1610.06808.
- *Boundaries, spectral triples and K-homology* (with I. Forsyth, M. Goffeng and A. Rennie, 65 pages), J. Noncomm. Geom. **13** (2) (2019), 407–472.
- *Index theory and topological phases of aperiodic lattices* (with C. Bourne, 69 pages), Ann. Henri Poincaré **20** (6) (2019), 1969–2038.
- *Sums of regular self-adjoint operators in Hilbert C^* -modules* (with M. Lesch, 33 pages), J. Math. Anal. Appl. **472** (1) (2019), 947–980.
- *Hecke modules for arithmetic groups via bivariant K-theory* (with M.H. Sengun, 24 pages), Ann. K-theory **3** (4) (2018), 631–656.
- *Wieler solenoids, Cuntz-Pimsner algebras and K-theory* (with R.J. Deeley, M. Goffeng and M.F. Whittaker, 46 pages), Ergodic Th. Dynam. Sys. **38** (8) (2018), 2942–2988.

- *Operator *-correspondences in analysis and geometry* (with D. Blecher and J. Kaad, 41 pages), Proc. Lond. Math. Soc. **117** (2) (2018), 303–344.
- *Spectral triples on O_N* (with M. Goffeng, 16 pages), 2016 MATRIX Annals, Springer (2018), 183–201.
- *Shift tail equivalence and an unbounded representative of the Cuntz-Pimsner extension* (with M. Goffeng and A. Rennie, 32 pages), Ergodic Th. Dynam. Sys. **38** (4) (2018), 1389–1421.
- *The bordism group of unbounded KK-cycles* (with R.J. Deeley and M. Goffeng, 46 pages), J. Topol. Anal. **10** (2) (2018) 355–400.
- *Nonunital spectral triples and metric completeness in unbounded KK-theory* (with A. Rennie, 78 pages), J. Funct. Anal. **271** (9) (2016), 2460–2538.
- *Gauge theory for spectral triples via the unbounded Kasparov product* (with S. Brain and W.D van Suijlekom, 71 pages), J. Noncomm. Geom. **10** (2016) 135–206.
- *Spectral triples and finite summability for Cuntz-Krieger algebras* (with M. Goffeng, 81 pages), Documenta Math. **20** (2015), 89–170.
- *Dense domains, symmetric operators and spectral triples* (with I. Forsyth and A. Rennie, 19 pages), New York J. Math. **20** (2014), 1001–1020.
- *Unbounded bivariant K-theory and correspondences in noncommutative geometry* (71 pages), J. Reine Angew. Math. **69** (2014), 101–172 (published online September 2012).
- *Spectral triples and KK-theory, a survey* (16 pages), Clay Math. Proc. **16**, "Topics in Noncommutative Geometry" (2012), 197–213.
- *Groupoid cocycles and K-theory* (23 pages), Münster J. of Math. **4** (2011), 233–256.

Editorial

- *Operator spaces and noncommutative geometry in interaction* (S. Brain, M. Goffeng, J. Kaad and B. Mesland (editors)), Oberwolfach reports **13**, (2016), 267–296.

Education and employment history

August 2019	Assistant Professor , <i>Universiteit Leiden, Netherlands.</i>
April 2019–August 2019	Research fellow , <i>IMAPP, Radboud Universiteit Nijmegen, Netherlands.</i>
April 2018–March 2019	Guest researcher , <i>MPI for Mathematics, Bonn, Germany.</i>
December 2017	Habilitation , <i>Leibniz Universität Hannover, Germany</i> , Thesis: <i>Analytic K-homology, arithmetic manifolds and symbolic dynamics</i> , Scientific Colloquium: <i>Mathieu Moonshine</i> .
April 2017–March 2018	Deputy Professor , <i>Chair of Friedrich Hirzebruch, Universität Bonn, Germany.</i>
April 2015–September 2017	Wissenschaftliche Mitarbeiter , <i>Leibniz Universität Hannover, Germany.</i>
April 2012–March 2015	Postdoctoral Fellow , <i>University of Warwick, UK.</i>
September 2009–March 2012	Postdoctoral researcher , <i>Utrecht University, the Netherlands.</i>

- January 2007-July 2009 **Doctoral degree (magna cum laude)**, *Mathematics, Universität Bonn / MPI for Mathematics, Germany*, Thesis: *Bivariant K-theory of groupoids and the noncommutative geometry of limit sets*, <http://hss.ulb.uni-bonn.de/2009/1829/1829.htm>.
Advisor: Prof. dr. M. Marcolli.
- August 2005-May 2006 **Ph.D. student**, *Pennsylvania State University, State College, USA*.
(under supervision of Prof. dr. N. Higson)
- September 1998-June 2005 **M.Sc. Mathematics (cum laude)**, *University of Amsterdam*, Thesis: *Algebraic K-theory, periodic cyclic homology and the Connes-Moscovici index theorem*.
Advisor: prof. dr. N. P. Landsman.

Supervision

- August 2018 **Thesis advisor of S. Kotlewski**, *Universität Bonn*, B. Sc. project title: *Index theory and Dirac operators*.
- August 2018 **Thesis advisor of L. Hofmann**, *Universität Bonn*, B. Sc. project title: *The Dirac operator in gauge theory*.
- June 2018 **Thesis advisor of A. Tarnowsky**, *Universität Bonn*, B.Sc. project title: *The Cheeger-Müller Theorem*.
- May 2018 **Second thesis advisor of Q. Wang, M. Sc.**, *Universität Bonn*, Thesis: *Hilbert complexes and Hodge theory*.
- November 2017 **Second thesis advisor of M. Körfer, M. Sc.**, *Universität Bonn*, Thesis: *Smooth manifolds from an operator algebraic perspective*.
- August 2017 **Second thesis advisor of L. Ronge, B. Sc.**, *Universität Bonn*, Thesis: *Unbounded operators on Hilbert C^* -modules*.
- June 2017 **Second thesis advisor of M. Barthelme, M. Sc.**, *Universität Bonn*, Thesis: *The scalar curvature of the noncommutative 4-torus*.
- November 2011 **Thesis advisor of E.L. Jacobs, M.Sc.**, *Utrecht University*, Thesis: *Types of von Neumann algebras*.

Teaching experience

- September 2019-January 2020 **Linear Analysis (in English)**, *Leiden University, Netherlands*.
- September 2017-March 2018 **Spectral theory of automorphic forms (in English)**, *Graduate seminar, Universität Bonn, Germany*.
- September 2017-March 2018 **Global Analysis I: Riemannian geometry (in English)**, *B.Sc. course, Universität Bonn, Germany*.
Course website: http://guests.mpim-bonn.mpg.de/bram/F4B1_V3B3.html
- April -July 2017 **Index theory and Dirac operators (in English)**, *M. Sc. course, Universität Bonn, Germany*.
- April -July 2017 **Spectral theory and algebras of Hilbert space operators (in English)**, *Graduate seminar, Universität Bonn, Germany*.
- October 2015-March 2017 **Einführung in die Biomathematik (in German)**, *Leibniz Universität Hannover, Germany*.
Reference: M.J. Gruber, gruber@math.uni-hannover.de
- April-July 2015 **Mathematik für Ingenieure (in German)**, *Leibniz Universität Hannover*.
- January-May 2014 **Maths in Action projects**, *University of Warwick, United Kingdom*.
- September 2011-February 2012 **Wiskundige Technieken (in Dutch)**, *1st year bachelor course for scientists and engineers, Utrecht University, the Netherlands*.

- September 2010-December 2010 **Rings and modules (in English), 3rd year bachelor course, Utrecht University, the Netherlands.**
- January 2006-May 2006 **College algebra (in English), 1st year course, The Pennsylvania State University, State College, USA.**
Reference: J. Sellers, sellersj@math.psu.edu

Events organised

- November 5-30, 2018 **Thematic Programme Bivariant K -theory in Geometry and Physics**, Erwin Schrödinger International Institute for Mathematics and Physics, Austria (with A. Carey, H. Grosse, A. Rennie, and W. D. van Suijlekom).
- July 3-6, 2018 **Conference K -theory, representation theory and Hecke algebras**, Marking Roger Plymen's 75th birthday, University of Sheffield, United Kingdom (with N. Higson, M.H. Sengun and H. Wang).
Supported by the London Mathematical Society
- June 12-16, 2017 **Conference Analysis, noncommutative geometry and operator algebras**, Chalmers University of Technology, Gothenburg, Sweden (with M. Goffeng and A. Usachev).
- February 7-13, 2016 **Oberwolfach Mini-Workshop Operator Spaces and Noncommutative Geometry in Interaction**, Mathematisches Forschungsinstitut Oberwolfach, Germany (with S. Brain, M. Goffeng and J. Kaad).
- October 6-9, 2014 **Conference Methods of Noncommutative Geometry in Analysis and Topology**, Leibniz Universität Hannover, Germany (with M. Goffeng, R. Deeley, S. Mahanta).
Supported by the Niedersächsisches Ministerium für Wissenschaft und Kultur
- May 2014 **Visitor program Noncommutative geometry, number theory and dynamics**, May 2014, University of Warwick, UK (with R. Sharp).

Research visits

- February-March 2020 **Visiting researcher**, IHES, Paris, France.
- November 2019 **Visiting researcher**, East China Normal University, Shanghai, China.
- June 2019 **Visiting researcher**, Chalmers University, Gothenburg, Sweden.
- October 2018 **Visiting researcher**, University of Missoula, University of Colorado at Boulder and Penn State University, United States.
- September 2017 **Visiting researcher**, Tohoku University, Japan.
- August 2017 **Hausdorff Trimester program K -theory and related fields**, Hausdorff Institute for Mathematics, Bonn, Germany.
- September-October 2016 **Simons Visiting Professor, Simons program Noncommutative Geometry the Next Generation**, Banach Center, Warsaw, Poland.
- September-December 2014 **Hausdorff Trimester program Noncommutative Geometry and its Applications**, Hausdorff Institute for Mathematics, Bonn, Germany.
- August-September 2013 **Research in Pairs**, Mathematisches Forschungsinstitut Oberwolfach, Germany.
- 2013-current **Visiting Fellow**, University of Wollongong, Australia.

Invited conference talks

- August 2020 **Nordic Congress of Mathematicians, special session on Operator Algebras and Noncommutative Geometry**, Aalto, Finland.

- May 2020 **Recent results on quantum tori and quantum Euclidean spaces**, *Norwegian University for Science and Technology, Trondheim, Norway.*
- May 2020 **C^* -algebras, K -theory and Noncommutative Geometries of Correlated Condensed Matter Systems**, *Simons Center for Geometry and Physics, Stony Brook, United States.*
- June 2019 **Operator K -Theory in Geometry, Topology and Representation Theory (Genadi Kasparov 70)**, *Kyoto, Japan.*
- June 2019 **Topological Phases of Interacting Quantum Systems**, *Banff International Research Station for Mathematical Innovation and Discovery, Casa Matemática Oaxaca, Mexico.*
- September 2018 **Spectral approaches to fractal geometry**, *Chalmers University of Technology, Gothenburg, Sweden.*
- July 2018 **Non-commutative geometry, index theory and mathematical physics**, *Mathematisches Forschungsinstitut Oberwolfach, Germany.*
- June 2018 **Cuntz-Pimsner cross-pollination**, *Lorentz Center, Leiden, Netherlands.*
- September 2017 **K -theory, representation theory and automorphic forms**, *University of Sheffield, United Kingdom.*
- March 2017 **KK -theory, gauge theory and topological phases**, *Lorentz Center, Leiden, Netherlands.*
- February 2017 **Geometric and Singular Analysis**, *Universität Potsdam, Germany.*
- October 2016 **K -theory and index theory**, *Banach center, Warsaw, Poland.*
- April 2016 **Gauge Theory and Noncommutative Geometry**, *Radboud Univeriteit Nijmegen, Netherlands.*
- December 2016 **Geometry and Quantum Theory**, *Den Dolder, Netherlands.*
- December 2015 **Higher Structures in String Theory and Quantum Field Theory**, *Erwin Schrödinger Insitute, Vienna, Austria.*
- November 2015 **KK_1 -day**, *Radboud University Nijmegen, The Netherlands.*
- September 2015 **Hilbert modules and index theory**, *SISSA, Trieste, Italy.*
- April 2015 **KK -day**, *RU Nijmegen, The Netherlands.*
- November 2014 **Noncommutative geometry and number theory**, *Hausdorff Institute for Mathematics, Bonn, Germany.*
- September 2014 **Noncommutative geometry's interactions with mathematics**, *Hausdorff Institute for Mathematics, Bonn, Germany.*
- August 2014 **K -homology and graph C^* -algebras**, *Trieste, Italy.*
- June 2014 **Noncommutative Geometry and Mathematical Physics**, *Scalea, Italy.*
- July 2012 **K -theory and Quantum Fields**, *Erwin Schrödinger Insitute, Vienna, Austria.*
- September 2011 **Noncommutative Geometry**, *Mathematisches Forschungs Institut Oberwolfach, Germany.*
- November 2010 **C^* -algebras, K -theory and index theory**, *Georg-August Universität Göttingen, Germany.*
- August 2010 **Topics in Noncommutative Geometry**, *Universidad de Buenos Aires, Argentina.*
- June 2010 **Selected topics in Noncommutative Geometry**, *University of Victoria, British Columbia, Canada.*
- September 2009 **Noncommutative Geometry**, *Mathematisches Forschungs Institut Oberwolfach, Germany.*

Invited lecturer

- March 2020 **Focused week on *Unbounded KK-theory***, Sichuan University, Sichuan, China.
- July 2017 **CIMPA research school *Noncommutative Geometry and applications to quantum physics***, Qui Nhon, Vietnam.
Lecture course: *Unbounded KK-theory in noncommutative geometry and physics*
- August 2016 **Masterclass *Sums of self-adjoint operators: Kasparov products and applications***, Copenhagen, Denmark.
Lecture course: *Frames and connections in KK-theory*
- July 2016 **MATRIX program *Refining C^* -algebraic invariants for dynamics using KK-theory***, Melbourne, Australia.
Lecture course: *KK-theory and dynamics*
- June 2016 **School and conference *Noncommutative geometry 2016***, Villa de Leyva, Colombia.
Lecture course: *A categorical approach to spectral triples and KK-theory*
- January 2014 **GQT graduate school**, Zeist, the Netherlands.
Lecture course: *What is noncommutative geometry?*
- May 2011 **CIMPA research school *Spectral triples and their applications***, Bangkok, Thailand.
Lecture course: *KK-theory and spectral triples*
- November 2011 **Invited lecturer, SISSA, Trieste, Italy.**
Lecture course: *KK-theory and spectral triples*

Invited seminar talks

- November 2019 **Research Center for Operator Algebras**, East China Normal University, Shanghai, China.
- October 2019 **Analysis seminar**, Delft University, Netherlands.
- September 2019 **Operator algebra seminar**, Syddansk Universitet, Odense, Denmark.
- May 2019 **Oberseminar Global analysis and operator algebras**, Universität Bonn, Germany.
- February 2019 **Operator algebra seminar**, University of Glasgow, UK.
- January 2019 **Oberseminar C^* -algebren**, Universität Münster, Germany.
- October 2018 **Geometric functional analysis seminar**, The Pennsylvania State University, State College, USA.
- October 2018 **Analysis seminar**, University of Colorado, Boulder, USA.
- October 2018 **Colloquium**, University of Colorado, Boulder, USA.
- October 2018 **Analysis seminar**, University of Montana, Missoula, USA.
- October 2018 **Colloquium**, University of Montana, Missoula, USA.
- September 2018 **Mathematical physics seminar**, Radboud University Nijmegen, Netherlands.
- June 2018 **Operator algebra seminar**, Syddansk Universitet, Odense, Denmark.
- March 2018 **Differential geometry seminar**, University of Adelaide, Australia.
- February 2018 **Analysis seminar**, University of New South Wales, Sydney, Australia.
- February 2018 **Operator algebra seminar**, University of Wollongong, Australia.
- February 2018 **Kolloquium**, Friedrich-Alexander Universität Erlangen-Nürnberg, Germany.
- August 2017 **Trimester seminar *K-theory and related fields***, HCM, Bonn, Germany.
- June 2017 **Analysis and probability seminar**, Chalmers University, Gothenburg, Sweden.
- May 2017 **Oberseminar C^* -algebren**, Universität Münster, Germany.

November 2016 **Oberseminar Globale Analysis**, *Universität Bonn, Germany.*
 May 2016 **Operator algebra seminar**, *Syddansk Universitet, Odense, Denmark.*
 May 2016 **Operator algebra seminar**, *Copenhagen, Denmark.*
 March 2016 **Analysis seminar**, *Glasgow, UK.*
 March 2015 **Number Theory Seminar**, *Sheffield, UK.*
 February 2015 **Operator algebra seminar**, *University of Wollongong, Australia.*
 January 2015 **GAGA Seminar**, *Utrecht, The Netherlands.*
 December 2014 **Oberseminar Topologie**, *Universität Münster, Germany.*
 November 2013 **Oberseminar Analysis und Theoretische Physik**, *Leibniz Universität Hannover, Germany.*
 November 2013 **GRK Kolloquium**, *Georg August Universität Göttingen, Germany.*
 October 2013 **Operator algebra seminar**, *University of Wollongong, Australia.*
 May 2013 **Cardiff Mathematical Physics Seminar**, *Cardiff University, UK.*
 March 2013 **Operator algebra seminar**, *University of Wollongong, Australia.*
 February 2013 **Analysis seminar**, *University of Glasgow, UK.*
 June 2012 **Oberseminar Analysis und Theoretische Physik**, *Leibniz Universität Hannover, Germany.*
 May 2012 **Noncommutative geometry seminar**, *University of Warsaw, Poland.*
 November 2011 **Colloquium**, *University of Luxembourg.*
 August 2011 **A spontaneous mini-workshop in NCG**, *Australian National University, Canberra, Australia.*
 May 2011 **Colloquium**, *University of Luxembourg.*
 January 2011 **Kolloquium**, *Universität Regensburg, Germany.*
 January 2011 **Seminar Mathematical Physics**, *Radboud University Nijmegen, Netherlands.*

Language skills

Dutch	native
English	fluent
Spanish	fluent
German	fluent
French	passive