

Dietrich Burde

Prof. Dr.

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Personal Data

Place of birth **Frankfurt a. M., Germany.**

Citizenship **German.**

Education

1999 **Habilitation**, *Heinrich-Heine-Universität Düsseldorf*, Germany.

Left-invariant affine structures on nilpotent Lie groups.

1992 **Thesis**, *Friedrich-Wilhelms-Universität Bonn*, Germany, Left-symmetric algebras and left-symmetric structures on Lie algebras.

Advisor: Prof. Dr. Fritz Grunewald

1983–1988 **Music**, *Musikhochschule*, Frankfurt a.M., Germany.

Graduated with High Honor.

1983–1988 **Mathematics**, *Johann-Wolfgang-Goethe-Universität*, Frankfurt a.M., Germany.

Graduated with High Honor.

1988 **Staatsexamen**, *Mathematics and Music*, Frankfurt a.M., Germany.

Employment

2011–Present **Associate Professor (§27 KV)**, *Universität Wien*, Austria.

Fakultät für Mathematik

2002–2011 **Associate Professor (§49 l, VBG)**, *Universität Wien*, Austria.

Fakultät für Mathematik

2004 **Visiting Professor**, *KU Leuven*, Belgium, Fonds voor Wetenschappelijk Onderzoek.
6 month

2004 **Professeur invité**, *Université de Mulhouse*, France.

1 month

2001–2002 **Professor**, *Jacobs University (IUB)*, Bremen, Germany.

12 month

1995–2001 **Assistant Professor**, *C1 position*, Universität Düsseldorf, Germany.

72 month

1994–1995 **Visiting Professor**, *Yale University*, New Haven, U.S.A.

12 month

- 1992–1994 **Assistant Professor**, *University of Düsseldorf*, Düsseldorf, Germany.
24 month
- 1992 **Assistant Professor**, *University of Bielefeld*, Bielefeld, Germany.
3 month
- 1991 **Werkstudent**, *Siemens, Automation Research*, Erlangen, Germany.
1 month
- 1990 **Research affiliate of Prof. Jens Carsten Jantzen**, *MSRI*, Berkeley, U.S.A..
2 month
- 1989–1991 **Teaching Assistant**, *University of Bonn*, Bonn, Germany.
27 month

Research Grants

- 2021–2024 **FWF Stand-Alone Project P33811**, *Affine Geometry on Lie Groups and Lie-algebraic Structures*, Universität Wien, Budget: € 349.000.
1 postdoc, 1 predoc.
- 2017–2022 **FWF-FWO International Joint Project I3248**, *Automorphisms of Nilpotent Groups and Geometric Structures*, Universität Wien, Budget: FWF: € 212.000, FWO: € 267.000.
1 postdoc.
- 2016–2019 **FWF Stand-Alone Project P28079**, *Nil-affine Crystallographic Groups and Algebraic Structures*, Universität Wien, Budget: € 323.000.
1 postdoc, 1 predoc.
- 2009–2013 **FWF Stand-Alone Project P21683**, *Geometric Structures on Lie Groups*, Universität Wien, Budget: € 300.000.
1 postdoc, 1 predoc.
- 2008–2013 **FWF Stand-Alone Project P20632**, *Classification Problems on Group Analysis*, Universität Wien, Principal investigator: Roman O. Popovych.
core team member
- 2006–2009 **Member of IK-Kolleg 1008-N**, *Differential Geometry and Lie Groups*, Universität Wien, Total Budget € 591.000, Share € 118.000.
2 predocs.

Awards and Scholarships

- 1994–1995 **Auslandsstipendium**, *Deutsche Forschungsgemeinschaft*.
- 1990–1992 **Promotionsstipendium**, *Studienstiftung des Deutschen Volkes*.
- 1983–1989 **Studienstipendium**, *Studienstiftung des Deutschen Volkes*.

Activities

- 2013–Present **Doktoratsbeirat**, *Member of the doctoral advisory board in mathematics*.
- 2006–Present **Member of appointment committees**, *Algebraic Geometry, Algebra, Global Analysis and Differential Geometry, Number Theory*.

- 2007 **Summer school on “Elliptic Curves”**, with Michael Stoll, Studienstiftung des Deutschen Volkes, 2 weeks.
- 2010–2014 **Editor**, *ISRN Algebra*.

Supervision

- 2020 **Mina Monadjem**, *Rota-Baxter Operators and decompositions of Lie algebras*, Master thesis, Universität Wien.
Final examination 16.10.2020
- 2020 **Bert Verbeke**, *Almost inner derivations of Lie algebras*, PhD thesis, KU Leuven.
Co-Supervisor, Defensio 16.09.2020
- 2019 **Christof Ender**, *Post-Lie algebra structures on classes of Lie algebras*, PhD thesis, Universität Wien.
Defensio 10.04.2019
- 2018 **Thimo Kasper**, *Engel Lie Algebras*, Master thesis, Universität Wien.
Final examination 30.05.2018
- 2016 **Bert Verbeke**, *Almost-inner Derivations of Lie Algebras*, Master thesis, KU Leuven, Universität Wien.
Final examination 02.06.2016
- 2015 **Andrew Chiriac**, *Dimension Theory of Rings*, Master thesis, Universität Wien.
Final examination 07.10.2015
- 2013 **Florian Heinzl**, *Affine Crystallographic Groups*, Diploma thesis, Universität Wien.
Final examination 09.04.2013
- 2012 **Gudrun Weisz**, *Geometry and Topology of the Universe*, Diploma thesis, Universität Wien.
Final examination 26.11.2012
- 2012 **Manuel Wolf**, *Faktorisierungsverfahren für ganze Zahlen*, Diploma thesis, Universität Wien.
Final examination 05.06.2012
- 2011 **Thomas Beneš**, *Degenerations of Lie algebras and pre-Lie algebras*, PhD thesis, Universität Wien.
Defensio 28.06.2011
- 2010 **Rosalie Chevalley**, *Profinite Groups and Galois Cohomology*, Master thesis, Erasmus Program, Universität Wien.
Final examination 17.02.2010
- 2009 **Wolfgang Moens**, *Faithful Representations of Minimal Degree for Lie Algebras with Abelian Radical*, PhD thesis, Universität Wien.
Defensio 25.06.2009

Teaching activities - lectures

- SS 2022 **Homological Algebra**, *Universität Wien*.
- WS 2021 **Algebraic Number Theory**, *Universität Wien*.
- SS 2021 **Lie algebras and representation theory**, *Universität Wien*.

- WS 2020 **Computational Commutative Algebra**, *Universität Wien*.
SS 2020 **Group Theory**, *Universität Wien*.
- WS 2019 **Algebra II**, *Universität Wien*.
SS 2019 **Algebra I**, *Universität Wien*.
- WS 2018 **Cohomology of Groups and Algebras**, *Universität Wien*.
SS 2018 **Lie Algebras and Representation Theory**, *Universität Wien*.
- WS 2017 **Algebraic Number Theory**, *Universität Wien*.
SS 2017 **Group Theory**, *Universität Wien*.
- WS 2016 **Homological Algebra**, *Universität Wien*.
SS 2016 **Analytic Number Theory**, *Universität Wien*.
- WS 2015 **Algebra – a survey**, *Universität Wien*.
SS 2015 **Lie Algebras and Representation Theory**, *Universität Wien*.
- WS 2014 **Algebraic Number Theory**, *Universität Wien*.
SS 2014 **Homological Algebra**, *Universität Wien*.
- WS 2013 **Algebraic Number Theory**, *Universität Wien*.
SS 2013 **Algebra in the Applications**, *Universität Wien*.
- WS 2012 **Algebraic Number Theory**, *Universität Wien*.
SS 2012 **Commutative Algebra**, *Universität Wien*.
- WS 2011 **Homological Algebra**, *Universität Wien*.
SS 2011 **Computer Algebra**, *Universität Wien*.
- WS 2010 **Algebra at a Glance**, *Universität Wien*.
SS 2010 **Analytic Number Theory**, *Universität Wien*.
- WS 2009 **Cohomology of Groups**, *Universität Wien*.
SS 2009 **Group Theory**, *Universität Wien*.
- WS 2008 **Commutative Algebra**, *Universität Wien*.
SS 2008 **Lie algebras and representation theory**, *Universität Wien*.
- WS 2007 **Computer Algebra**, *Universität Wien*.
SS 2007 **Cryptography**, *Universität Wien*.
- WS 2006 **Cohomology of Groups and Lie Algebras**, *Universität Wien*.
SS 2006 **Lie algebras and representation theory**, *Universität Wien*.
- WS 2005 **Analytic Number Theory**, *Universität Wien*.
SS 2005 **Computer Algebra**, *Universität Wien*.
- WS 2004 **Lie algebras and representation theory**, *Universität Wien*.
SS 2004 **Cohomology of Groups with Applications to Number Theory**, *Katholieke Universiteit Leuven*.
- WS 2003 **Analytic Number Theory**, *Universität Wien*.
SS 2003 **Cryptography**, *Universität Wien*.
- WS 2002 **Cohomology of Groups and Algebras**, *Universität Wien*.
SS 2002 **Analytic Number Theory**, *Jacobs University Bremen*.
SS 2002 **General Mathematiks II**, *Jacobs University Bremen*, with Joachim Vogt.
SS 2002 **Linear Algebra II**, *Jacobs University Bremen*.

- WS 2001 **General Mathematiks I**, *Jacobs University Bremen*.
 WS 2001 **Linear Algebra I**, *Jacobs University Bremen*.
 SS 2001 **Analytic Number Theory II**, *Universität Düsseldorf*.
 WS 2000 **Analytic Number Theory I**, *Universität Düsseldorf*.
 SS 2000 **Elementary Number Theory II**, *Universität Düsseldorf*.
 WS 1999 **Elementary Number Theory I**, *Universität Düsseldorf*.

Selected Publications

- 2022 **Homological algebra**, *Lecture Notes*, Universität Wien, 1-71.
 2022 **Algebraic number theory**, *Lecture Notes*, Universität Wien, 1-97.
 2021 **Almost inner derivations of Lie algebras II**, with *K. Dekimpe and B. Verbeke*, *International Journal of Algebra and Computation*, Volume 31, Issue 02, 341-364.
 2021 **Almost inner derivations of 2-step nilpotent Lie algebras of genus 2**, with *K. Dekimpe and B. Verbeke*, *Linear Algebra and its Applications*, Vol. 608, 185-202.
 2021 **Crystallographic actions on Lie groups and post-Lie algebra structures**, *Communications in Mathematics*, Vol. 29, Issue 1, 67-89 (2021).
 2020 **A Zassenhaus conjecture and CPA-structures on simple modular Lie algebras**, with *W. A. Moens*, *Journal of Algebra*, Vol. 559, 529-546.
 2020 **Decompositions of algebras and post-associative algebra structures**, with *V. Gubarev*, *International Journal of Algebra and Computation*, Vol. 30, Issue 3, 451-466.
 2020 **Commutative post-Lie algebra structures on nilpotent Lie algebras and Poisson algebras**, with *C. Ender*, *Linear Algebra and its Applications*, Vol.584, 107-126.
 2019 **In memory of Igor Dmitrievich Ado**, with *V. Gubarev*, arXiv:1908.08361.
 2019 **Algebra I,II**, *Lecture Notes*, Universität Wien, 1-137.
 2019 **Commutative post-Lie algebra structures on Kac-Moody algebras**, with *P. Zismanovich*, *Communications in Algebra*, Vol. 47, Issue 12, 5218-5226.
 2019 **Rota-Baxter operators and post-Lie algebra structures on semisimple Lie algebras**, with *V. Gubarev*, *Communications in Algebra*, Vol. 47, Issue 5, 2280-2296.
 2019 **Commutative post-Lie algebra structures and linear equations for nilpotent Lie algebras**, with *K. Dekimpe and W. A. Moens*, *Journal of Algebra*, Vol. 526, 12-29.
 2019 **Etale representations for reductive algebraic groups with factors $SP(n)$ and $SO(n)$** , with *W. Globke and A. Minchenko*, *Transformation Groups* Vol. 24, Issue 3, 769-780.
 2018 **Post-Lie algebra structures for nilpotent Lie algebras**, with *C. Ender and W. A. Moens*, *International Journal of Algebra and Computation* Vol. 28, Issue 5, 915-933.
 2018 **Almost inner derivations of Lie algebras**, with *K. Dekimpe and B. Verbeke*, *Journal of Algebra and Its Applications*, Vol. 17, Issue 11, 26 pp..
 2017 **Group Theory**, *Lecture Notes*, Universität Wien, 1-85.
 2017 **Etale representations for reductive algebraic groups with one-dimensional center**, with *W. Globke*, *Journal of Algebra*, Vol. 487, 200-216.

- 2016 **Commutative Post-Lie algebra structures on Lie algebras**, with *W. A. Moens*, Journal of Algebra, Vol. 467, 183-201.
- 2016 **Post-Lie algebra structures on pairs of Lie algebras**, with *K. Dekimpe*, Journal of Algebra, Vol. 464, 226-245.
- 2016 **Derivation double Lie algebras**, Journal of Algebra and its Applications, Vol. 15, Issue 06, 17 pp..
- 2014 **Jacobi-Jordan algebras**, with *A. Fialowski*, Journal of Linear Algebra and its Applications, Vol. 459, 586-594.
- 2014 **Classification of orbit closures in the variety of 3-dimensional Novikov algebras**, with *T. Benes*, Journal of Algebra and Its Applications, Vol. 13, Issue 02, 33 pages.
- 2013 **Derived length and nildecomposable Lie algebras**, Proceedings of the 13th International Symposium of Mathematics and its Applications 2012, Scientific Buletin of the "Politehnica" University of Timisoara, 15-24.
ISSN 1224-6069
- 2013 **Algebraische Zahlentheorie**, *Lecture Notes*, Universität Wien, 1-113.
- 2013 **Classification of Novikov algebras**, with *W. A. de Graaf*, Applicable Algebra in Engineering, Communication and Computing, Vol. 24, Issue 1, 1-15.
- 2013 **Post-Lie algebra structures and generalized derivations of semisimple Lie algebras**, with *K. Dekimpe*, Moscow Mathematical Journal, Vol. 13, Issue 1, 1-18.
- 2012 **Affine actions on Lie groups and post-Lie algebra structures**, with *K. Dekimpe and K. Vercaemmen*, Journal of Linear Algebra and its Applications, Vol. 437, Issue 5, 1250-1263.
- 2012 **Periodic derivations and prederivations of Lie algebras**, with *W. A. Moens*, Journal of Algebra, Vol. 357, 208-221.
- 2012 **Abelian ideals of maximal dimension for solvable Lie algebras**, with *M. Ceballos*, Journal of Lie Theory, Vol. 22, 741-756.
- 2011 **Faithful Lie algebra modules and quotients of the universal enveloping algebra**, with *W. A. Moens*, Journal of Algebra, Vol. 325, Issue 1, 440-460.
- 2011 **Algebra im Überblick**, *Lecture Notes*, Universität Wien, 1-87.
- 2010 **Complete LR-structures on solvable Lie algebras**, with *K. Dekimpe and K. Vercaemmen*, Journal of Group Theory, Vol. 13, Issue 5, 703-719.
- 2009 **Commutative Algebra**, *Lecture Notes*, Universität Wien, 1-87.
- 2009 **Degenerations of pre-Lie algebras**, with *T. Beneš*, Journal of Mathematical Physics, Vol. 50, Issue 11, 112102, 9 pp.
- 2009 **Computing faithful representations for nilpotent Lie algebras**, with *B. Eick and W. A. de Graaf*, Journal of Algebra, Vol. 322, Issue 3, 602-612.
- 2009 **LR-algebras**, with *K. Dekimpe and S. Deschamps*, Contemporary Mathematics, Vol. 491, 125-140.
- 2009 **Affine actions on nilpotent Lie groups**, with *K. Dekimpe and S. Deschamps*, Forum Mathematicum, Vol. 21, Issue 5, 921-934.
- 2008 **Novikov algebras and Novikov structures on Lie algebras**, with *K. Dekimpe and K. Vercaemmen*, Linear Algebra and its Applications, Vol. 429, Issue 1, 31-41.
- 2007 **, Contractions of Lie algebras and algebraic groups**, Archivum Mathematicum, Vol. 43, Issue 5, 321-332.

- 2007 **Cryptography**, *Lecture Notes*, Universität Wien, 1-107.
- 2007 **Minimal faithful representations of reductive Lie algebras**, with W. A. Moens, *Archiv der Mathematik*, Vol. 89, Issue 6, 513-523.
- 2007 **A remark on an inequality for the prime counting function**, *Mathematical Inequalities & Applications*, Vol. 10, Issue 1, 9-13.
- 2006 **Lie Algebren und Darstellungstheorie**, *Lecture Notes*, Universität Wien, 1-88.
- 2006 **Analytische Zahlentheorie**, *Lecture Notes*, Universität Wien, 1-109.
- 2006 **Degenerations and contractions of Lie algebras and algebraic groups**, *Oberwolfach Reports*, Vol. 3, Issue 1, 119-186.
- 2006 **Classical r -matrices and Novikov algebras**, *Geometriae Dedicata*, Vol. 122, Issue 1, 145-157.
- 2006 **Left-symmetric algebras, or pre-Lie algebras in geometry and physics**, *Central European Journal of Mathematics*, Vol. 4, Issue 3, 323-357.
- 2006 **Novikov structures on solvable Lie algebras**, with K. Dekimpe, *Journal of Geometry and Physics*, Vol. 56, Issue 9, 1837-1855.
- 2006 **Characteristically nilpotent Lie algebras and symplectic structures**, *Forum Mathematicum*, Vol. 18, Issue 5, 769-787.
- 2005 **On the matrix equation $XA - AX = X^p$** , *Linear Algebra and its Applications*, Vol. 404, 147-165.
- 2005 **The Auslander conjecture for NIL-affine crystallographic groups**, with K. Dekimpe and S. Deschamps, *Mathematische Annalen*, Vol. 332, Issue 1, 161-176.
- 2005 **Degenerations of 7-dimensional nilpotent Lie algebras**, *Communications in Algebra*, Vol. 33, Issue 4, 1259-1277.
- 2005 **Lie-Algebra Kohomologie**, *Lecture Notes*, Universität Wien, 1-47.
- 2004 **Cohomology of groups with applications to number theory**, *Lecture Notes*, Universität Wien, 1-71.
- 2003 **Sur les dégénération d'algèbres de Lie**, *Report*.
- 2002 **Lie algebra prederivations and strongly nilpotent Lie algebras**, *Communications in Algebra*, Vol. 30, Issue 7, 3157-3175.
- 2000 **Affine cohomology classes for filiform Lie algebras**, *Contemporary Mathematics*, Vol. 262, 159-170.
- 2000 **Estimates on binomial sums of partition functions**, *Manuscripta mathematica*, Vol. 103, Issue 4, 435-446.
- 1999 **Left-invariant affine structures on nilpotent Lie groups**, *Lecture Notes*, Habilitation, Universität Düsseldorf, 1-83.
- 1999 **Classification of orbit closures of 4-dimensional complex Lie algebras**, with C. Steinhoff, *Journal of Algebra*, Vol. 214, Issue 2, 729-739.
- 1999 **Degenerations of nilpotent Lie algebras**, *Journal of Lie Theory*, Vol. 9, Issue 1, 193-202.
- 1998 **Simple left-symmetric algebras with solvable Lie algebra**, *Manuscripta Mathematica*, Vol. 95, Issue 3, 397-411.
- 1998 **On a refinement of Ado's theorem**, *Archiv der Mathematik*, Vol. 70, Issue 2, 118-127.

- 1998 **Étale affine representations of Lie groups**, *Geometry and Representation Theory of Real and p -adic Groups*, Progress in Mathematics, Vol. 158, 35-44.
- 1996 **Affine structures on nilmanifolds**, *International Journal of Mathematics*, Vol. 7, Issue 5, 599-616.
- 1996 **Left-invariant affine structures on reductive Lie groups**, *Journal of Algebra*, Vol. 181, Issue 3, 884-902.
- 1995 **Modules for certain Lie algebras of maximal class**, with F. Grunewald, *Journal of Pure and Applied Algebra*, Vol. 99, Issue 3, 239-254.
- 1994 **Left-symmetric structures on simple modular Lie algebras**, *Journal of Algebra*, Vol. 169, Issue 1, 112-138.
- 1993 **Linkssymmetrische Algebren und linkssymmetrische Strukturen auf Lie-Algebren**, *Bonner Mathematische Schriften*, Vol. 244, 1-65, Dissertation, Universität Bonn.

Selected Invited Talks

- 2021 **Pre-Lie algebras and geometric structures**, *Invited Conference Talk*, Nijenhuis geometry and applications, Universität Jena, Germany.
- 2021 **Étale affine representations**, *Invited Seminar Talk*, Research Seminar Representation Theory and Automorphisms, Universität Wien, Austria.
- 2019 **Crystallographic Groups: Geometry and Algebra**, *Invited Colloquium Talk*, Mathematisches Kolloquium, Universität Wien, Austria.
- 2018 **Étale affine representations of Lie algebras and algebraic groups**, *Invited Conference Talk*, Algebraic Groups, Lie Algebras and their Representations, MPIM Bonn, Germany.
- 2017 **Szpiro's conjecture, ABC and anabelian geometry**, *Invited Talk*, Research Seminar Geometry and Analysis on Groups, Universität Wien.
- 2017 **Geometric Structures on Lie Groups and post-Lie algebras**, *Invited Talk*, Research Seminar Mathematical Physics, University of Ostrava, Czech Republic .
- 2017 **Pre- and post-Lie algebra structures in Algebra and Geometry**, *Invited Conference Talk*, Non-commutative and non-associative algebraic structures in Physics and Geometry, Belfast, Northern Ireland.
- 2016 **Simply-transitive groups of nil-affine motions**, *Invited Talk*, Research Seminar in Geometry, Uniwersytet Gdański, Poland.
- 2015 **The ABC-conjecture: an introduction and some applications**, *Invited Talk*, Research Seminar in Algebra and Topology, KU Leuven Kulak, Belgium.
- 2014 **Post-Lie algebra structures on pairs of Lie algebras**, *Invited Talk*, Discrete Groups and Geometric Structures with applications VII 2014, Leuven (Heverlee), Belgium.
- 2014 **Faithful Lie algebra representations of minimal degree**, *Invited Talk in the algebra and number theory seminar*, Karl-Franzens-Universität Graz, Austria.
- 2014 **Degenerations of Lie algebras and Novikov algebras**, *Invited Conference Talk*, Università degli Studi di Trento, Italy.
- 2012 **Diophantische Gleichungen – von Euklid bis ABC**, *Invited Talk I,II*, Research Seminar Algebra, Universität Wien, Austria.

- 2012 **Crystallographic actions on Lie groups and related algebraic structures**, *Invited Plenary Talk*, The XIII-International Conference on Mathematics and its Applications, Timisoara, Romania.
- 2012 **Post-Lie algebra structures on pairs of Lie algebras**, *Invited Talk*, Research Seminar in Algebra, Università degli Studi di Trento, Italy.
- 2012 **Post-Lie algebra structures and nil-affine actions of Lie groups**, *Invited Colloquium Talk*, Mathematisches Kolloquium, Universität Wien, Austria.
- 2011 **Faithful representations of finite-dimensional Lie algebras**, *Invited Main Lecture*, Bicocca-Workshop on Lie Algebras 2011, Università degli Studi di Milano – Bicocca, Italy.
- 2011 **Constructing faithful Lie algebra representations**, *Section Talk*, Discrete Groups and Geometric Structures VI 2011, Oostende, Belgium.