Curriculum Vitae

Name: Gunnar WILKEN
Position Title: Science and Technology Associate III (Continuing), OIST

Education:

2011	Priv.Doz. in Mathematics	University of Münster (Germany)
2004	Ph.D. in Mathematics	University of Münster (Germany)
1998	Diplom in Mathematics	University of Münster (Germany)

Academic Experience:

2023-Present	Science and Technology Associate, Science and Technology Group, OIST
2011-2023	Staff Scientist III, Structural Cellular Biology Unit (Professor B.U. Skoglund), OIST
2008-2011	Researcher, Mathematical Biology Unit (Professor R.M. Sinclair), Okinawa Institute of Science and Technology, Okinawa (OIST), Japan
2008	Postdoctoral Scholar (working with Professor A. Weiermann), Ghent University, Belgium
2006-2008	Postdoctoral Scholar (working with Professor W. Pohlers), University of Münster, Germany
2005-2006	Postdoctoral Scholar (working with Professor T.J. Carlson), Ohio State University (OSU), Columbus Ohio, USA

Industry Experience:

1996	Trainee at Siemens Company Munich, Germany (Spring & Summer)

Grants and Certificates:

2023	Certificate: Data Science and Machine Learning: Making Data-Driven Decisions, MIT Schwarzman College of Computing, Massachusetts Institute of Technology and MIT Institute for Data, Systems, and Society (IDSS)
1998-1999	Foreign Exchange Scholarship of the German Academic Exchange Service (DAAD), Sao Paulo State University (UniCamp), Campinas, Brazil

Publications:

<u>Peer-Reviewed Articles</u>

1. Wilken, G. (2024). Fundamental sequences based on localization.
LNCS Proceedings of the 20th Conference on Computability in Europe (CiE): Twenty Years of Theoretical and Practical Synergies, Amsterdam, 324--338.

2. Purba, E.R., Saita, E., Akhouri, R.R., Öfverstedt, L.-G., Wilken, G., Skoglund, U., Maruyama, I.N. (2022). Allosteric Activation of Preformed EGF Receptor Dimers by a Single Ligand Binding Event.
Frontiers in Endocrinology. Section Molecular and Structural Endocrinology.

3. Wilken, G. (2021). Pure Σ 2-Elementarity beyond the Core.
Annals of Pure and Applied Logic, 172, 1-93.
https://www.sciencedirect.com/science/article/pii/S0168007221000592/

4. Mahmood, F., Öfverstedt, L., Toots, M., Wilken, G., Skoglund, U. (2018). An Extended Field-Based Method for Noise Removal from Electron Tomographic Reconstructions.
IEEE Access, 6, 17326-17339.

5. Wilken, G. (2018). Pure Patterns of Order 2.
Annals of Pure and Applied Logic, 169, 54-82.
https://www.sciencedirect.com/science/article/pii/S0168007217301069?via%3Dihub

6. Weiermann, A., Wilken, G. (2013). Goodstein sequences for prominent ordinals up to the ordinal of Π1,1-CA0. *Annals of Pure and Applied Logic,* 164, 1493-1506.

7. Carlson, T.J., Wilken, G. (2012). Normal Forms for Elementary Patterns.
The Journal of Symbolic Logic, 77, 174-194.
8. Wilken, G., Weiermann, A. (2012). Derivation Lengths Classification of Gödel's T extending Howard's Assignment. *Logical Methods in Computer Science,* 8, 1-44.
9. Carlson, T.J., Wilken, G. (2012). Tracking Chains of Σ2-elementarity.
Annals of Pure and Applied Logic, 163, 23-67.
10. Wilken, G., Weiermann, A. (2011). Ordinal Arithmetic with Simultaneously defined Theta-Functions. *Mathematical Logic Quarterly,* 57, 116-132.
11. Wilken, G., Weiermann, A. (2009). Complexity of Gödel's T in lambda-Formulation.
Lecture Notes in Computer Science, 5608, 386-400.
12. Wilken, G. (2007). Assignment of Ordinals to Patterns of Resemblance.
The Journal of Symbolic Logic, 72, 704-720.
13. Wilken, G. (2007). Σ1-elementarity and Skolem Hull Operators.
Annals of Pure and Applied Logic, 145, 162-175.
14. Wilken, G. (2007). Ordinal Arithmetic based on Skolem Hulling.
Annals of Pure and Applied Logic, 145, 130-161.
15. Wilken, G. (2006). The Bachmann-Howard Structure in terms of Σ1-elementarity.
Archive for Mathematical Logic, 45, 807-829.

Book Chapters
1. Wilken, G. (2020). Pure Σ2-Elementarity beyond the Core.
Invited, peer-reviewed book chapter in:
Kahle, R., Rathjen, M. (eds.), *The Legacy of Kurt Schuette, 415-441.*
Springer Nature Switzerland 2020.
https://link.springer.com/chapter/10.1007/978-3-030-49424-7_21
2. Akhouri, R.R., Öfverstedt, L.-G., Wilken, G., Skoglund, U. (2019). Antibody Complexes.
In: Harris, J.R., Marles-Wright, J. (eds.), *Macromolecular Protein Complexes II: Structure and Function, 23-51.* Subcellular Biochemistry 93, Springer Nature Switzerland 2019.
3. Wilken, G. (2017). Tracking Chains Revisited.
Invited, peer-reviewed book chapter in:
Friedman, S.-D., Raghavan, D., Yang, Y. (eds.), *Sets and Computations*, 183-220.
Lecture Notes Series, Institute for Mathematical Sciences, National University of Singapore 2017.
https://www.worldscientific.com/doi/abs/10.1142/9789813223523_0008

Invited Presentations and Lectures:

2024-7-17	Informal, interactive talk at Ghent University, July 17, 2024: Introduction to elementary patterns of resemblance.
2024-7-12	Computability in Europe 2024, University of Amsterdam, July 8-12, 2024. Accepted paper: Fundamental sequences based on localization.
2024-5-15	STG Forum 2024, OIST: Patterns in Proof Theory.
2022-6-28	Logic Colloquium 2022, Reykjavik University, June 27 – July 1, 2022. Invited speaker at the Special Session on Proof Theory and Ordinal Analysis: Isominimal realizations of patterns.
2021-9-29	DMV-OeMG Annual Conference 2021 Contributed talk: Current outlook on research of patterns of resemblance.
2019-11-8	Wormshop 2019, Workshop on Proof Theory, Modal Logic, and Reflection Principles University of Barcelona Invited talk: Crosslinking Pattern Notations.
2018-7-3	Proofs and Computation Hausdorff Institute for Mathematics University of Bonn Invited talk: Pure Σ2-Elementarity beyond the Core. Video of my talk:

2016-9-16   Logic and Semantics Seminar
            University of Cambridge
            Invited talk: Analysing Gödel's T by means of ordinal assignment and collapsing.

2016-9-13   Logical Foundations of Computer Science Seminar
            University of Edinburgh
            Invited talk: Combining Howard's ordinal assignment and Weiermann's collapsing
            technique to analyse Gödel's T.

2016-9-12   Colloquium Logicum 2016
            University of Hamburg
            Contributed talk: Gödel's T as a case study for ordinal assignment.

2015-9-24   Annual meeting of the Deutsche Mathematiker Vereinigung (DMV) 2015
            University of Hamburg.
            Minisymposium 38: Well-Quasi-Orders: From Theory to Applications.
            Invited talk: On the Well-Quasi-Orderedness of Pure Patterns of Order Two.

2015-9-23   Annual meeting of the Deutsche Mathematiker Vereinigung (DMV) 2015
            University of Hamburg.
            Contributed talk: Pure Patterns of Resemblance.

2015-4-17   Sets and Computations: Interactions between set theory and computability theory.
            Institute of Mathematical Sciences of the National University of Singapore
            http://www2.ims.nus.edu.sg/Programs/015set/index.php
            Invited talk: Pure Patterns and Ordinal Numbers.

January 2015   Asian Logic Conference 2015, IIT Bombay, India.
            Invited speaker in the Special Session on Proof Theory.
            (cancelled due to on-site review of SCB Unit on January 6-7, 2015)

2014-9-5   Colloquium Logicum 2014, University of the Bundeswehr Munich.
            Contributed talk: Goodstein sequences for prominent ordinals up to the ordinal of
            Π1,1-CA_0.

2013-7-12   Sy David Friedman's 60th birthday conference, Kurt Gödel Research Center,
            University of Vienna. Contributed talk: A short introduction to Patterns of
            Resemblance.

2013-6-28   Logic Seminar at Yonsei University, Seoul.
            Invited talk: Elementary Patterns of Resemblance.

2013-3-7   3rd Workshop on Proof Theory and Rewriting, JAIST Logic Workshop Series,
            Kanazawa. Invited talk: Goodstein sequences for prominent ordinals up to the
            ordinal of Π1,1-CA_0.

2011-11-16 Habilitationskolloquium, University of Münster.
            Talk: Goodstein-Folgen und Unabhängigkeit.

2011-11-14 Teaching sample, University of Münster.
            Lecture in the course Logik II: Die Unvollständigkeit der Peano Arithmetik.

2011-11-10 Oberwolfach Seminar on Proof Theory and Constructive Mathematics:
            Invited talk: On Elementary Patterns of Resemblance.

2011-7-19   The Infinity Conference, Centre de Recerca Matematica, Universitat Autonoma de
            Barcelona, Bellaterra. Contributed talk: Infinitary Concepts and Gödel's T.

2011-7-13   Logic Colloquium 2011, Barcelona.
            Invited talk in the Special Session on Proof Theory and Constructive Mathematics:
            Derivation lengths classification of Gödel's T as a prototype of higher order rewrite
            systems.

2011-2-22   Workshop on Proof Theory and Computability Theory, JAIST und Tohoku University,
            Sendai. Invited talk: Derivation Lengths Classification of Gödel's T revisited.

2010-8-15   Conference on Mathematical Logic and Set Theory, Chennai. Satellite Conference of
            the ICM 2010, Hyderabad. Accepted paper: Tracking Chains of Σ2-Elementarity.

2010-3-24   Spring Meeting of the Mathematical Society of Japan. Keio University.
            Invited talk: Elementary Patterns of Resemblance. An Overview.

2010-3-18	Workshop Proof Theory. Keio University.
	Invited talk: Derivation Lengths Classification of Gödel's T extending Howard's Assignment.
2009-7-1	Federated Conference on Rewriting, Deduction, and Programming: Typed Lambda Calculi and Applications. University of Brasilia.
	Contributed paper: Complexity of Gödel's T in lambda-Formulation.
2009-6-22	Asian Logic Conference. National University of Singapore.
	Contributed talk: Normal Forms for Elementary Patterns.
2009-3-5	Kansai Set Theory Seminar. Kobe University.
	Invited talk: Tracking Chains for Elementary Patterns of Resemblance.
2009-2-22	Seminar in Logic and Philosophy of Mathematics. Kobe University.
	Invited talk: Proof-theoretic Ordinals arising from Elementary Patterns of Resemblance.
2008-12-19	Seminar in Electrical Engineering. Technical University of Braunschweig.
	Invited talk: Aspekte der Arbeitsweise des Hippocampus.
2008-3-14	Department of Mathematics and Computeralgebra. Ghent University.
	Invited talk: Elementary Patterns of Resemblance.
2008-2-5	OIST Seminar. Okinawa Institute for Science and Technology.
	Invited talk: Elementary Patterns of Resemblance.
2007-4-13	International Workshop: Proof, Computation, Complexity. Swansea University.
	Invited talk: Ordinal Arithmetic and $\Sigma 2$-Elementarity.
2007-2-22	Department of Mathematics, Technical University of Darmstadt.
	Invited talk: Elementary Patterns of Resemblance.
2006-11-20	Logic Seminar at Ludwig-Maximilians-University Munich.
	Invited talk: Elementary Patterns of Resemblance of order 2.
2006-10-10	Logic Seminar at Stanford University.
	Invited talk: Skolem Hulls for the analysis of Elementary Patterns of Resemblance.
2006-10-6	Logic Seminar at University of California, Berkeley.
	Invited talk: Pure Patterns of order 2.
2006-9-29	Logic and Philosophy of Science Colloquium at University of California, Irvine.
	Invited talk: Ordinals and Substructures.
2006-2-20	Logic Seminar at University of Colorado, Boulder.
	Invited talk: Ordinal arithmetical aspects of Patterns of Resemblance.
2004	Logic Colloquium 2004, Turin.
	Contributed talk: Characterizing Closure Properties of Ordinals.
2004-6-8	Logic Seminar at Ohio State University, Columbus.
	Invited talk: $\Sigma 1$-Elementarity and Skolem Hull Operators.
2003	Logic Colloquium 2003, Helsinki.
	Contributed talk: $\Sigma 1$-Elementarity and Skolem Hull Operators.
2003	Summer Workshop in Finestructure Theory, University of Bonn 2003.
	Contributed talk: $\Sigma 1$-Elementarity and Skolem Hull Operators.
2002	Logic Colloquium 2002, Münster.
	Contributed talk: Assigning Ordinals to Elementary Patterns of Resemblance.

Teaching and Academic Service:

OIST Graduate University Teaching Experience
- Special Topics Course: The Fourier Transform and its applications. Term 3, 2022. Planned, developed and taught by myself, sponsoring faculty: U. Skoglund.
- Instructing computational sessions for Course A410 (U. Skoglund), Term 2, 2021 and 2022.

Other (Non-OIST) University Teaching
- Undergraduate and graduate lecture courses
  - Set Theory, Ohio State University (2006)
  - Discrete Mathematics II, Ohio State University (2005)
- Seminars and tutorial courses
  - Lectures on Ordinal Representations, University of Münster (2006)
  - Seminar, University of Münster (2004) Generalized Inductive Definitions.
  - Seminar, University of Münster (2003) Elementary Patterns of Resemblance.
  - Seminar, University of Münster (2000) Models of Arithmetic.
- Thesis advisor (under direction of Professor W. Pohlers at the University of Münster)
  - Thomas Paetz (2007) A $\Pi 1,1$-analysis of ID$<\omega$ using the relation ≤ 1.
- Other teaching and academic advising
  - Exercises for lecture, University of Münster (2000,2003) Proof Theory.
  - Exercises for lecture, University of Münster (2002) Recursion Theory.
  - Exercises for lecture, University of Münster (2000,2002) Logic II.
  - Exercises for lecture, University of Münster (2001) Introd. to Logic and theor. CS.
  - Exercises for lecture, University of Münster (1999,2001) Functional Interpretation.
  - Exercises for lecture, University of Münster (2001) Intuitionism.

Other (Non-OIST) Academic Professional Service:
- Reviewer for Journals
  - Selecta Mathematica
  - The Journal of Symbolic Logic
  - Annals of Pure and Applied Logic
  - Archive for Mathematical Logic
  - Mathematical Logic Quarterly
  - Journal of the Korean Mathematical Society
- Major Meeting or Symposium Program Committees
  - Member of Organizing Committee: Workshop on Proof Theory 2003, University of Münster (2003)
  - Member of Organizing Committee: Logic Colloquium 2002 (ASL European Summer Meeting), University of Münster (2003)
- Other Professional Service
  - Member of the Search Committee for the successorship of Professor J. Diller, University of Münster (2002-2003)

Programming Skills:
1. Python in data science and machine learning, including deep learning
2. Fortran in numerical computing such as Fourier transforms, optimization, and tomography
3. Prolog in quality assurance of software
4. Pascal and C in algorithms and data structures