

# Michael Sagraloff

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## CONTACT

### INFORMATION

Department 1: Algorithms and Complexity  
Max-Planck-Institut für Informatik  
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## PERSONAL

### INFORMATION

Citizenship: Germany

Marital status: single

Date of birth: 14/03/1978

## RESEARCH

### INTERESTS

(Real) Algebraic Geometry, Computer Algebra, Exact Geometric Computing and Computational Geometry

## EDUCATION

**Helene-Lange-Gymnasium Fürth, Abitur**, 6/1997

**Universität Bayreuth, Diplom**, Mathematics (Algebraic Geometry), 10/2002

Thesis Topic: Quartiken als Summe von Potenzen im  $\mathbb{P}^3$

Advisor: Professor Frank-Olaf Schreyer

Minor in Economics

**Universität Saarland, Dr. rer. nat.**, Mathematics (Algebraic Geometry), 11/2005

Thesis Topic: Syzygies and Special Linear Series of Canonical Curves of Genus 9

Advisor: Professor Frank-Olaf Schreyer

## PROFESSIONAL

### EXPERIENCE

**Max-Planck-Institut für Informatik, Postdoctoral Researcher**, 10/2005-now

Work group leader of “Geometric Computing and Computer Algebra” within D1 (Algorithms and Complexity Group) headed by Kurt Mehlhorn

MPII Site Leader within the European Project ACS

**NYU Courant Institute, Research Visit**, with Prof. Chee K. Yap, 4/2009-7/2009

## GRANTS

Project Leader of the project “Design, analysis, and implementation of efficient and reliable algorithms for complex geometric objects” within the DFG Priority Project SPP 1489 “Algorithmic and Experimental Methods”, 2010-now

Strategic Innovation Fund Coordinator within the Cluster of Excellence “Multimodal Computing and Interaction”, 2010-now

## AWARDS

Studienstiftung des Deutschen Volkes, 1998-2002

Bayerische Begabtenförderung, 1998-2002

Bundessieger Bundeswettbewerb Mathematik, 1995, 1996 and 1997

Selection of Best 16, German Team for [International Mathematical Olympiad](#), 1997

Participation at summer schools: Duke TIP (1993), Deutsche Schülerakademie (1994), ISSI Weizmann Institute of Science (1995), Studienstiftung des Deutschen Volkes (2000)

## TEACHING EXPERIENCE

### *Lecturer*

Lecture **Computer Algebra**, Saarland University, SS 11

Seminar **Computational Geometry and Geometric Computing**, Saarland University, SS 10

Lecture **Computational Geometry and Geometric Computing**, Saarland University, WS 09/10

Lecture **Nonlinear Computational Geometry**, Saarland University, WS 08/09

Seminar **Computational Topology**, Saarland University, WS 06/07

### *Teaching Assistant*

Seminar **Computational and Algebraic Geometry**, Saarland University, WS 05/06

Lecture **Analysis**, Saarland University, SS 05

Lecture **Complex Analysis**, Saarland University, SS 04

Lecture **Algebra**, Saarland University, WS 03/04

Lecture **Mathematics for Computer Scientists, I, II**, Saarland University, WS 02/03, SS 03

Lecture **Analysis I, II**, Uni Bayreuth, WS 01/02, SS 02

Seminar **Boolean Algebra**, Uni Bayreuth WS 00/01

Lecture **Mathematics for Economics**, Uni Bayreuth WS 99/00

## SUPERVISION

Pavel Emeliyanenko, PhD Thesis, 2010-now

Alexander Kobel, Master Thesis “Certified Numerical Root Finding”, 2011

Michael Kerber, PhD Thesis “Geometric Algorithms for Algebraic Curves and Surfaces”, 2009

Pavel Emeliyanenko, Master Thesis “Visualization of Points and Segments of Real Algebraic Plane Curves”, 2007

Manuel Caroli, Master Thesis “Evaluation of a Generic Method for Analyzing Controlled-Perturbation Algorithms”, 2007

SERVICE

***Organisation***

PhD selection committee, MPII

Organization Workshop on Geometric Computing 2010, IIT Delhi

PC member International Congress on Mathematical Software (ICMS) 2010, Kobe

Round of Introduction, MPII Department D1, 2008

MPII Summer School Adfocs (Advanced Course on the Foundations of Computer Science), 2006

***Reviewer for Journals and Conferences***

CGTA, JSC, SICOMP, ISSAC, SNC, SoCG, ALENEX, STACS

TALKS

*A General Approach to the Analysis of Controlled Perturbation Algorithms* (invited), Dagstuhl Seminar on Computational Geometry, 2011

*Hybrid Methods for Improving the Efficiency of Topology and Arrangement Computations*, IMPECS Workshop on Geometric Computing, Delhi, India, 2010

*Certified Complex Root Isolation via Adaptive Root Separation Bounds*, 9th Asian Symposium on Computer Mathematics (ASCM), Fukuoka, Japan, 2009

*How Complex are Real Algebraic Objects?*, 7th Japan Conference on Computational Geometry and Graphs (JCCGG'09), Kanazawa, Japan, 2009

*Isolating Real Roots of Real Polynomials*, International Symposium on Symbolic and Algebraic Computation (ISSAC), Seoul, Korea, 2009

*Symbolic and Verified Approximate Methods in Reliable Geometric Computing* (invited), Algebraic Geometry and Geometric Modeling (AGGM), Lijiang China, 2009

*Exact Geometric-Topological Analysis and Triangulation of Algebraic Surfaces* (invited), Imaginary (DMV Meeting), Erlangen, 2008

*Exact Geometric-Topological Analysis of Algebraic Surfaces*, Symposium on Computational geometry (SoCG), 2008

*WP-I: Robust Shape Operations - algebraic issues*, ACS Review Meeting, Berlin, 2007

*Fast and Exact Geometric Analysis of Real Algebraic Plane Curves*, Agreement of French-German cooperation in computer science, Nancy, 2007

*Reliable and Efficient Geometric Computation via Controlled Perturbation*, ACS Review Meeting, Athens, 2006

**Journals**

- K. Mehlhorn, R. Osbild, M. Sagraloff. *A General Approach to the Analysis of Controlled Perturbation Algorithms* (pdf). Accepted for publication in Computational Geometry: Theory and Applications (CGTA), 2011.
- M. Sagraloff. *A General Approach to Isolating Roots of a Bitstream Polynomial* (pdf). Accepted for publication in Mathematics in Computer Science (MCS), 2011.
- M. Kerber, M. Sagraloff. *A Note on the Complexity of Real Algebraic Hypersurfaces* (pdf). Journal on Graphs and Combinatorics, Volume 27 , Issue 3 (March 2011), pp. 419-430.
- K. Mehlhorn, M. Sagraloff. *A deterministic algorithm for isolating real roots of a real polynomial* (pdf). Journal of Symbolic Computation (JSC), Volume 46 , Issue 1 (January 2011), pp. 70-90.
- E. Berberich, M. Kerber, M. Sagraloff. *An Efficient Algorithm for the Stratification and Triangulation of an Algebraic Surface* (pdf). Computational Geometry: Theory and Application (CGTA), Volume 43, Issue 3 (April 2010), pp. 257-278.
- E. Berberich, M. Sagraloff. *A Generic and Flexible Framework for the Geometrical and Topological Analysis of (Algebraic) Surfaces* (pdf). Computer Aided Geometric Design (CAGD), Volume 26 , Issue 6 (August 2009), pp. 627-647.

**Conference Proceedings**

- E. Berberich, P. Emeliyanenko, A. Kobel, M. Sagraloff. *Arrangement Computation for Planar Algebraic Curves*(pdf). to appear in Symbolic Numeric Computation (SNC), 2011.
- M. Kerber, M. Sagraloff. *Efficient Real Root Approximation*(pdf). to appear in the International Symposium on Symbolic and Algebraic Computation (ISSAC), 2011. An extended version is submitted.
- M. Sagraloff, C. Yap. *A Simple But Exact and Efficient Algorithm for Complex Root Isolation*(pdf). to appear in the International Symposium on Symbolic and Algebraic Computation (ISSAC), 2011.
- E. Berberich, P. Emeliyanenko, M. Sagraloff. *An Elimination Method for Solving Bivariate Polynomial Systems: Eliminating the Usual Drawbacks*(pdf). Proceedings of Algorithm Engineering and Experiments (ALENEX), 2011, pp. 35-47.
- K. Mehlhorn, M. Sagraloff. *Isolating Real Roots of Real Polynomials* (pdf). Proceedings of the 34th annual Symposium on Symbolic and Algebraic Computation (ISSAC), 2009, pp. 247-254. An extended version of this work is published in the Journal on Symbolic Computation.
- M. Kerber, M. Sagraloff. *How Complex are Real Algebraic Objects*(pdf). 7th Japan Conference on Computational Geometry and Graphs (JJCCG), 2009. An extended version of this work is published in Graphs and Combinatorics.
- P. Emeliyanenko, E. Berberich, M. Sagraloff. *Visualizing Arcs of Implicit Algebraic Curves, Exactly and Fast*(pdf). Proceedings of the International Symposium on Visual Computing (ISVC), 2009, pp. 608-619.
- M. Sagraloff, M. Kerber, M. Hemmer, *Certified Complex Root Isolation via Adaptive Root Separation Bounds* (pdf). Proceedings of the 9th Asian Symposium on Computer Mathematics (ASCM), 2009, pp. 151-166.

E. Berberich, M. Kerber, M. Sagraloff. *Exact Geometric-Topological Analysis of Algebraic Surfaces*. (pdf) Proceedings of the twenty-fourth annual symposium on Computational geometry (SoCG), 2008, pp. 164-173. An extended version of this work is published in Computational Geometry: Theory and Applications.

E. Berberich, M. Sagraloff. *A Generic and Flexible Framework for the Geometrical and Topological Analysis of (Algebraic) Surfaces*. (pdf) Proceedings of the ACM Symposium on Solid and Physical Modeling (SPM), 2008, pp. 171-182, an extended version of this work is published in Computer Aided Geometric Design.

K. Mehlhorn, R. Osbild, M. Sagraloff. *Reliable and Efficient Computational Geometry via Controlled Perturbation*. (pdf) Proceedings of the International Colloquium on Automata, Languages and Programming (ICALP), 2006, pp. 299-310. An extended version of this work is accepted for publication in Computational Geometry: Theory and Applications.

### ***Submitted***

P. Emeliyanenko, M. Sagraloff *On the Complexity of Solving a Bivariate Polynomial System*(pdf), 2011.

M. Kerber, M. Sagraloff *A Worst-case Bound for Topology Computation of Algebraic Curves*(pdf), 2011.

M. Kerber, M. Sagraloff *Root Refinement for Real Polynomials*(pdf), 2011.

M. Sagraloff *On the Complexity of Real Root Isolation*(pdf), 2011.

### ***Theses***

*Szygies and Special Linear Series of Canonical Curves of Genus 9*. PhD, Saarland University, 2005. (pdf)

*Quartiken als Summe von Potenzen in  $\mathbb{P}^3$* . Diplom, University Bayreuth, 2002. (pdf)

### HOBBIES

Sports: (Beach-) Volleyball, Running, Soccer, Skiing, Juggling

Traveling

Parlor games, playing cards

Reading Books

Technical Gadgets