

David Witt Nyström

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Employment and education

- October 2015-Present **Researcher at Department for Mathematics,
Chalmers University of Technology**
- October 2013-September 2015 **Marie Curie Intra European Fellow at DPMMS,
University of Cambridge
College Research Associate at Sidney Sussex College, Cambridge**

Research project: From geodesic rays in spaces of Kähler metrics to the Hele-Shaw flow.

- July 2013-September 2013 **Research project assistant** with Robert Berman,
**Department for Mathematics,
Chalmers University of Technology**
- December 2007-June 2013 **Ph.D Mathematics, University of Gothenburg**
Supervisor: Robert Berman, coadvisor: Bo Berndtsson

Presented thesis for doctoral degree in mathematics "Okounkov bodies and geodesic rays in Kähler geometry," June 2012. Opponent: D. H. Phong, Columbia University.

Aug 2011-Jan 2012 On parental leave

Presented thesis for licentiate degree in mathematics "Chebyshev transforms on Okounkov bodies," May 2009. Opponent: Sebastien Boucksom, Institut de Mathématiques de Jussieu, Paris.

- Sep 2003-Nov 2007 **Bachelor of Science in mathematics, University of Gothenburg**

Presented Master thesis in mathematics "Line bundles, singular metrics and the Kawamata-Viehweg theorem," Nov 2007, supervisor Bo Berndtsson.

Prize

Awarded the **Sparre Prize** in 2013 by the Royal Swedish Academy of Sciences.

Publications

The Hele-Shaw flow and moduli of holomorphic discs (joint with J. Ross), *Compositio Mathematica*, (2015) doi: 10.1112/S0010437X15007526.

Harmonic discs of solutions to the complex homogeneous Monge-Ampère equation (joint with J. Ross), *Publications mathématiques de l'IHES* 122, 1 (2015), 315-335.

Transforming metrics on a line bundle to the Okounkov body, *Annales scientifiques de l'Ecole Normale Supérieure* 47, 4 (2014), 1111-1161.

Analytic test configurations and geodesic rays (joint with J. Ross), *Journal of Symplectic Geometry* 12, 1 (2014), 125-169.

Test configurations and Okounkov bodies, *Compositio Mathematica* 148, 6 (2012), 1736-1756.

Fekete points and convergence towards equilibrium measures on complex manifolds (joint with R. Berman and S. Boucksom), *Acta Mathematica* 207, 1 (2011), 1-27.

Preprints

Okounkov bodies and embeddings of torus-invariant Kähler balls, arXiv:1510.00510.

Canonical growth conditions associated to ample line bundles, arXiv:1509.05528.

Homogeneous Monge-Ampère equations and canonical tubular neighbourhoods in Kähler geometry (joint with J. Ross), arXiv:1403.3282.

Complex optimal transport and the pluripotential theory of Kähler-Ricci solitons (joint with R. Berman), arXiv:1401.8264.

Envelopes of positive metrics with prescribed singularities (joint with J. Ross), arXiv:1210.2220.

Selected talks

AMS Summer Institute in Algebraic Geometry, Utah, US (July 2015) *Canonical growth conditions associated to ample line bundles.*

Geometric Methods of Complex Analysis, Oberwolfach, Germany (Jan 2015) *Harmonic discs of solutions to the homogeneous complex Monge-Ampère equation.*

Okounkov Bodies and Applications, Oberwolfach, Germany (May 2014) *Transforming metrics on a line bundle to the Okounkov body.*

Okounkov Bodies and Applications, Oberwolfach, Germany (May 2014) *Okounkov bodies and moment maps.*

Brussels-London Geometry Seminar III - Complex Geometry, Brussels, Belgium (May 2014) *Homogeneous Monge-Ampère equations and canonical tubular neighbourhoods in Kähler geometry.*

Complex Monge-Ampère Equations on Compact Kähler Manifolds, Banff, Canada (April 2014) *Homogeneous Monge-Ampère equations and canonical tubular neighbourhoods in Kähler geometry.*

Nordan Conference, Svolvær, Norway (May 2013) *The Hele-Shaw flow and moduli of holomorphic discs.*

MACK4 Meeting on Complex Geometry, Paris, France (May 2012) *Symmetries related to Okounkov bodies.*

Workshop on Kähler Geometry, Cambridge, UK (April 2012) *Symmetries related to Okounkov bodies.*

Kaus Conference, Stockholm, Sweden (Jan 2012) *Okounkov bodies and symmetries.*

Conference on Extremal Metrics, Marseille, France (Feb 2011) *The Legendre transform and geodesic rays.*

Kaus Conference, Gothenburg, Sweden (Jan 2011) *Analytic test configurations.*

Young Researchers in Mathematics, Cambridge, UK (April 2010) *Test configurations and Okounkov bodies.*

Kaus Conference, Umeå, Sweden (Jan 2010) *Okounkov bodies.*

Workshop in Complex Analysis and Geometry (KAWA) Toulouse, France (Jan 2010) *Transforming metrics of a line bundle to the Okounkov body.*

Swedish Mathematical Society Meeting, Gothenburg, Sweden (Nov 2009) *Okounkov bodies related to stability.*

Complex Analysis and Geometry Conference, Marseille, France (July 2009) *Transforming metrics of a line bundle to the Okounkov body.*

Swedish Mathematical Society Meeting, Linköping, Sweden (Nov 2008) *From complex to convex.*

Minicourses given

Minicourse on Hele-Shaw flow and holomorphic discs, University of Cambridge, UK (May 2015).

Minicourse on Hele-Shaw flow and holomorphic discs, SCGP, Stony Brook, US (April 2015).

Minicourse on Okounkov bodies, Université Henri Poincaré, Nancy, France (May 2010).

Minicourse on Okounkov bodies, Chinese University of Hong Kong, China (April 2010).

Mathematical software

Hele-Shaw Toolkit, a simple MATLAB package to simulate the Hele-Shaw flow with varying permeability. Developed together with Julius Ross, available on my homepage:

<https://www.dpmms.cam.ac.uk/~dw465/>.

Peer reviewing

Has acted as referee for several journals, including Duke Mathematical Journal, Mathematische Annalen and Compositio Mathematica.

Teaching

Gave a course in Calculus and Linear Algebra for physics students at the University of Gothenburg (Fall 2012).

Teaching assistant in Calculus, Linear Algebra, Complex Analysis and Algebraic Structures at Chalmers University of Technology and the University of Gothenburg (2005-2013).

Popular talks

Allen Society Talk, Sidney Sussex College, Cambridge (May 2014) *Fluid flows and holomorphic discs*.

Gothenburg Science Festival (April 2013) *The art of throwing darts in high dimensions*.

Family Day at Faculty of Science, Univ. of Gothenburg (Nov 2012) *Geometry of holes in the ice*.

Research Day at Faculty of Science, Univ. of Gothenburg (Feb 2012) *Symmetry in algebraic geometry*.

Professional training

Introduction to Science Teaching, 3 hp, University of Gothenburg, 2010.

Lecturing: An introduction for postdocs and staff, 2 h workshop, University of Cambridge, 2013.

Public Engagement Workshop, half a day workshop, DPMMS, University of Cambridge, 2014.

Effective Research Presentations Workshop, 1 day workshop, University of Cambridge, 2014.

Supervising and Small Group Teaching, half a day workshop, University of Cambridge, 2014.

Teaching Associates' Programme 2014-2015, year-long programme provided by University of Cambridge, accredited by the Higher Education Academy in the UK.

References

Robert Berman, Matematiska vetenskaper, Chalmers University, robertb@chalmers.se

Sebastien Boucksom, CNRS, Ecole Polytechnique, boucksom@math.jussieu.fr

Julius Ross, DPMMS, University of Cambridge, j.ross@dpmms.cam.ac.uk