

Dennis The

Australian National University
Mathematical Sciences Institute
John Dedman Building 27
Canberra, ACT 0200, Australia

Date of Birth: April 5, 1979 (Berlin, Germany)
Canadian citizen, Australian permanent resident
Email: dennis.the@anu.edu.au
<http://maths.anu.edu.au/~the/>

Education

Ph.D. Mathematics, McGill University, 2008.

M.Sc. Mathematics, University of British Columbia, 2003.

B.Math. Applied Mathematics & Pure Mathematics, University of Waterloo, 2001.

Research Interests

Differential geometry, parabolic geometry, representation theory, mathematical physics.

Academic Experience

ARC Research Fellow, Australian National University, 2011 – 2015. (*Supervisor: Mike Eastwood*)

NSERC Postdoctoral Fellow / Visiting Assistant Professor, Texas A&M University, 2008 – 2011. (*Supervisor: JM Landsberg*)

Research assistant, McGill University, 2003 – 2008. (*Supervisor: Niky Kamran*)

Research assistant, UBC, 2001 – 2003. (*Supervisors: George Bluman & Stephen Anco*)

Research assistant, University of Waterloo, 2001. (*Supervisors: Raymond McLenaghan & Roman Smirnov*)

Research assistant, University of Waterloo, 2000. (*Supervisor: John Wainwright*)

R&D co-op student, Symbolic Computation Group, University of Waterloo, 1999 – 2000. (*Supervisor: George Labahn*)

Teaching Experience

Instructor, Math 3228/6213 – Honours Complex Analysis, ANU, Semester 2, 2014.

Instructor, Math 3228/6213 – Honours Complex Analysis, ANU, Semester 2, 2013.

Instructor, Math 323 – Honours Linear Algebra, Texas A&M University, Spring 2011.

Instructor, Math 602 – Graduate course: Methods and Applications of Partial Differential Equations, Texas A&M University, Spring 2010.

Instructor, Math 262 – Intermediate Calculus for Engineers, McGill University, May 2007.

McGill Graduate Teaching Development Workshop, Jan. 2007.

Math Helpdesk Coordinator & Tutor, McGill University, 2006 – 2008.

Instructor, Math 180 – First year Calculus, UBC, Fall 2002.

Instructor, Math 180 – First year Calculus, UBC, Winter 2002.

Research Publications

In preparation

B. Kruglikov, D. The. *Jet-determination of symmetries of parabolic geometries.*

B. Kruglikov, V. Matveev, D. The. *Submaximally symmetric almost c-projective structures.*

M. Eastwood, K. Sagerschnig, D. The. *Four-dimensional split-conformal structures and a special geometry in dimension five.*

D. The, T. Willse. *Highly symmetric generic 3-plane fields on 6-manifolds and special holonomy.*

Preprints

B. Doubrov, A. Medvedev, D. The. *Homogeneous integrable Legendrian contact structures in dimension five*, arXiv:1411.3288 (2014), 31 pages.

Refereed Journal Publications

B. Kruglikov, D. The. *The gap phenomenon in parabolic geometries*, J. reine angew. Math. (2014), doi: 10.1515/crelle-2014-0072

B. Doubrov, D. The. *Maximally degenerate Weyl tensors in Riemannian and Lorentzian signatures*, Diff. Geom. Appl. **34** (2014), 25–44.

C. Robles, D. The. *Rigid Schubert varieties in compact Hermitian symmetric spaces*, Selecta Math. (N.S.) **18** (2012), no. 3, 717–777.

D. The. *Conformal geometry of surfaces in the Lagrangian Grassmannian and second-order PDE*, Proc. Lond. Math. Soc. (3) **104** (2012), no. 1, 79–122.

D. The. *Invariant Yang–Mills connections over non-reductive pseudo-Riemannian homogeneous spaces*, Trans. Amer. Math. Soc. **361** (2009), 3879–3914.

D. The. *Contact geometry of hyperbolic equations of generic type*, SIGMA **4**, 058 (2008), 1–52. (Special issue on “Elie Cartan and Differential Geometry”.)

S. Anco, D. The. *Symmetries, conservation laws and cohomology of Maxwell’s equations using potentials*, Acta Appl. Math. **89** (2005), 1–52.

R.G. McLenaghan, R.G. Smirnov, D. The. *An extension of the classical theory of algebraic invariants to pseudo-Riemannian geometry and Hamiltonian mechanics*, J. Math. Phys. **45** (2004), 1079–1120.

J.T. Horwood, M.J. Hancock, D. The, J. Wainwright. *Late-time asymptotic dynamics of Bianchi VIII cosmologies*, Class. Quantum Gravity **20** (2003), 1757–1778.

R.G. McLenaghan, R.G. Smirnov, D. The. *Group invariant classification of separable Hamiltonian systems in the Euclidean plane and the $O(4)$ -symmetric Yang–Mills theories of Yatsun*, J. Math. Phys. **43** (2002), 1422–1440.

Conference Proceedings

J. T. Horwood, R.G. McLenaghan, R.G. Smirnov, D. The. *Fundamental covariants in the invariant theory of Killing tensors*, SPT 2004: Symmetry and Perturbation Theory, World Sci. Publishing (2004), 124–131.

R.G. McLenaghan, R.G. Smirnov, D. The. *Towards a classification of cubic integrals of motion*, Superint. in Class. and Quantum Systems, CRM Proceedings & Lecture Notes 37 (2004), 199–209.

R.G. McLenaghan, R.G. Smirnov, D. The. *Group invariant classification of orthogonal coordinate webs*, Recent advances in Riemannian and Lorentzian geometries, Contemp. Math. 337 (2003), 109–120.

R.G. McLenaghan, R.G. Smirnov, D. The. *Group invariants of Killing tensors in the Minkowski plane*, SPT 2002: Symmetry and Perturbation Theory, World Sci. Publishing (2002), 153–162.

R.G. McLenaghan, R.G. Smirnov, D. The. *The 1881 problem of Morera revisited*, Differential Geometry and its Applications, Proc. Conf., Opava (Czech Republic), August 27–31, 2001, Silesian University, Opava, 2001, 333–341.

Talks

Invited and contributed talks

Homogeneous integrable Legendrian contact structures in dimension five, Banach Center, Warsaw (June 2014).

Symmetry gaps for geometric structures, University of Adelaide colloquium (Sep. 2013), Korea Institute for Advanced Study (May 2014), Queen’s University (July 2014).

Symmetry and geometric structures, AMSI Summer School public lecture (Jan. 2014).

Conformal geometry in dimension four and a special geometry in five, University of Adelaide (Sep. 2013).

The gap phenomenon in parabolic geometries, ESI, Vienna (Sep. 2012), University of Tromsø (Aug. 2012), Cambridge University (June 2013), Universidade Técnica de Lisboa (June 2013), Friedrich–Schiller Universität Jena (June 2013), University of Toronto (July 2013), DGA conference, Brno (Aug. 2013), AustMS Annual Meeting, Sydney (Oct. 2013).

The Lagrangian Grassmannian, hyperbolic PDE, and G_2 , Centre de Recherches Mathématiques (June 2011), Universität Wien (July 2011).

Rigidity of Schubert varieties in compact Hermitian symmetric spaces, Memorial University (Dec. 2010), Hiroshima University (Jan. 2011), University of Wollongong (Sept. 2011).

Conformal geometry of surfaces in the Lagrangian–Grassmannian & 2nd order PDE, University of Minnesota (Apr. 2010), University of Waterloo (Aug. 2010), Masaryk University (Aug. 2010), Brock University (Dec. 2010), University of Colorado – Boulder (Jan. 2011).

Maximally symmetric hyperbolic equations of generic type, University of North Carolina (Apr. 2009), CIRGET seminar, Montreal (Apr. 2008).

Contact geometry of hyperbolic equations of generic type, University of Waterloo (Feb. 2009), Banach Center, Warsaw (Jan. 2009), TAMU (Sept. 2008).

The principle of symmetric criticality in gauge theory, CMS Winter 2007 Meeting, London (Dec. 2007).

Symmetries, conservation laws, and cohomology of Maxwell’s equations using potentials, CMS Summer 2005 Meeting, Waterloo (Jun. 2005).

Invariants of Killing tensors and their applications, CMS Summer 2004 Meeting, Halifax (Jun. 2004).
A geometrical approach to separation of variables in Hamiltonian systems, Waterloo (Jun. 2001).

Recent local seminar talks

Complex Beauties, ANU (October 2014).
Homogeneous integrable Legendrian contact structures in dimension five, ANU (May 2014).
On a new normalization for tractor covariant derivatives, ANU (May 2013).
H-projective geometry, ANU (Nov. 2012).
The gap phenomenon in parabolic geometries (revisited), ANU (Nov. 2012).
The gap phenomenon in parabolic geometries, ANU (May 2012).
Tanaka theory, ANU (May 2012).
Octonionic projective geometry, ANU (Mar. 2012).
Kostant's version of the Bott–Borel–Weil theorem, ANU (Feb. 2012).
Hasse diagrams and other representation-theoretic preliminaries for BGG, ANU (Jan. 2012).
The Cartan–Kähler theorem, ANU (Jan. 2012).
Submanifold geometry in generalized flag manifolds, TAMU (Apr. 2010).
A geometer studies PDE, TAMU (Apr. 2010).
Bryant's paper on Schubert varieties and homological rigidity, TAMU (Feb. 2009).
Exterior differential systems and Lie algebra cohomology, TAMU (Oct. 2008).
Linear Pfaffian systems and the Cartan–Kähler theorem, TAMU (Sept. 2008).

Professional Activities

Organizer, Differential Geometry research and working seminars, ANU (2011 – present),
<http://maths.anu.edu.au/~the/seminar/>

Participant in the Go8-DAAD Australia-Germany Joint Research Cooperation Scheme "*Projective and H-projective Geometry via Cartan Connections and Integrable Systems*" (2013–2014).

Conferences and workshops:

Vector distributions and related geometries, Banach Center, Warsaw (June 2014).
Australian Math Society 57th annual meeting, University of Sydney, Sydney (Sept. 2013).
Differential Geometry and its Applications, Masaryk University, Brno (Aug. 2013).
New Directions in Exterior Differential Systems, Estes Park, Colorado (July 2013).
The Interaction of Geometry and Representation Theory, ESI, Vienna (Sept. 2012).
Geometry and Algebra of PDEs, University of Tromsø, Tromsø (Aug. 2012).
Conformal and CR geometry, BIRS, Banff (July 2012).

The Geometry of Differential Equations, ANU, Canberra (Sept. 2011).
Australian Math Society 55th annual meeting, University of Wollongong, Wollongong (Sept. 2011).
Cartan Connections, Geometry of Homogeneous Spaces, and Dynamics, ESI, Vienna (July 2011).
Workshop on Moving Frames in Geometry, CRM, Montreal (June 2011).
Conformal Differential Geometry and its Interaction with Representation Theory, University of Arkansas, Fayetteville (Apr. 2011).
Differential Geometry and Tanaka theory, RIMS, Kyoto and Hiroshima University (Jan. 2011).
S⁴ conference: Symmetry, Separation, Super-integrability and Special Functions, University of Minnesota, Minneapolis (Sep. 2010).
Differential Geometry and its Applications, Masaryk University, Brno (Aug. 2010).
Workshop on Bernstein–Gelfand–Gelfand sequences, Brno, Czech Republic (Aug. 2010).
Geometric Flows, Moving Frames and Integrable Systems, Macalester College, Minnesota (Apr. 2010).
Workshop on geometric structures and equivalence problems, Korean Institute for Advanced Study (KIAS), Seoul, South Korea (Apr. 2009).
Geometry of differential equations, Univ. of North Carolina, Raleigh, NC (Apr. 2009).
Geometry of ODE's and vector distributions, Banach Center, Warsaw, Poland (Jan. 2009).
Exterior Differential Systems and the Method of Equivalence, MSRI, Berkeley (May 2008).
23rd Annual Geometry Festival, Duke University (Apr. 2008).
Special Structures in Riemannian Geometry, BIRS, Banff (Feb. 2008).
10th International Conference on Differential Geometry and its Applications, Olomouc, Czech Republic (Aug. 2007).
Symmetries and Overdetermined Systems of PDE, IMA, Minneapolis (Jul. 2006).
Symmetry & Perturbation Theory, Sardinia, Italy (May 2004).
Differential Invariants and Invariant Differential Equations, BIRS, Banff (Jul. 2003).

Referee for:

Advances in Mathematics
Central European Journal of Mathematics
Differential Geometry and its Applications
Journal of Geometry and Physics
Proceedings of the London Mathematical Society
SIGMA

Awards & Fellowships

ANU Early Career Researcher Travel Grant (\$2100; June 2014).
NSERC Postdoctoral Fellowship (9 awarded in Pure Math in Canada; \$80000; 2008 – 2010).
Dalhousie Killam Postdoctoral Fellowship (2008; declined).
ISM Travel Bursaries (3 × \$500; Dec. 2007, Jun. 2005, Jun. 2004).
McGill Graduate Fellowship (\$5000; 2007/08).

McGill – Dr. & Mrs. Milton Leong Fellowship in Science (\$25000; 2006/07).
FQRNT Bourse de Doctorat en Recherche (\$20000; 2005/06).
ISM scholarship (\$9000; 2005/06).
NSERC Canada Graduate Scholarship CGS-D (8 awarded in Math in Canada; \$70000; 2003 – 2005).
NSERC Postgraduate Scholarship PGS-A (\$34600; 2001 – 2003).
NSERC Undergraduate Student Research Award ($3 \times \$8000$; 2001, 2000, 1998).
University of Waterloo – René Descartes Entrance Scholarship (\$8000; 1996).
National Gold Medal, Euclid (Grade 12) Math Contest (\$500; 5 awarded in Canada; 1996).
Governor General’s Medal, Silver Heights Collegiate (1996).

Extracurricular

Sports: Badminton, tennis, ping pong, alpine skiing.
Musical instruments: piano, ukulele
Singing: Brazos Valley Chorale (2008/09), Yellow Door Choir (2006 – 2008), Eight Bars Later (2005/06).
ISM Graduate Student Seminar organizer (2005/06).
University of Waterloo varsity badminton team coach (2000/01).
University of Waterloo Badminton Club Director (1998/99), Executive Member (1997/98).
Campus Recreation Leader of the Week (Jul. 1998, Nov. 1998, Nov. 1999).
Campus Recreation Leadership Award (Fall 1998).
Junior / Juvenile National Badminton Championships participant (1994/95).

References

Professor Michael Eastwood (postdoc supervisor), ANU, Michael.Eastwood@anu.edu.au
Professor JM Landsberg (postdoc supervisor), Texas A&M University, jml@math.tamu.edu
Professor Boris Kruglikov (collaborator), University of Tromsø, boris.kruglikov@uit.no
Professor Niky Kamran (Ph.D. supervisor), McGill University, nkamran@math.mcgill.ca
Professor Stephen Roberts (teaching reference), ANU, stephen.roberts@anu.edu.au

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