

ANTHONY M. BLOCH

Curriculum Vitae

Alexander Ziwet Collegiate Professor of Mathematics, The University of Michigan
Chair, Department of Mathematics

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Education:

1985	Ph.D.	Harvard University (Applied Mathematics)
1981	M.Phil.	Cambridge University, England (Control Engineering and Operations Research)
1979	M.S.	California Institute of Technology (Physics)
1977,78	B.Sc., B.Sc.(Hons.)	University of the Witwatersrand (Applied Mathematics and Physics)

Selected Awards and Honors:

2015-2016	Simons Fellow
2012-	AMS Fellow
2012-	SIAM Fellow
2012-	Editor-in-Chief, SIAM Journal on Control and Optimization
2010-2014	Senior Fellow, Michigan Society of Fellows
2008	AMS Invited Lecture
2005-	Alexander Ziwet Collegiate Professorship
2003-	Fellow of the IEEE
2002	Senior Member of the IEEE
1996-97	Guggenheim Fellowship
1996-97	Membership in the Institute for Advanced Study, Term II
1996	University of Michigan LS&A Excellence in Research Award
1996	University of Michigan Faculty Recognition Award
1995	University of Michigan Advice Magazine Honors list, teaching
1991-98	Presidential Young Investigator Award (NSF)
1986	Horace H. Rackham Faculty Fellowship, University of Michigan
1979	Elsie Ballot Scholarship, Cambridge University
1978	Convocation Scholarship; Unico Co. Gold Medal for the most distinguished Honors graduand in the Faculty of Science
1978	Awarded Fulbright Fellowship
1977	Freda Lawenski Scholarship; William Cullen Medal
1976	Herbert le May Prize for the best student majoring in Applied Mathematics
1975-76	Robert Schlesin Memorial Scholarship

Grants:

2014-	AFOSR MURI Grant
2013-2017	National Science Foundation INSPIRE Grant
1993-present	(Multiple) National Science Foundation Grants
1992-99	Air Force Office of Scientific Research Grant
1991-98	Presidential Young Investigator Award (NSF)
1990-91	Ohio State University Seed Grant

1987-90 National Science Foundation/Air Force Office of Scientific Research Grant

Professional Career:

The University of Michigan	
Alexander Ziwet Collegiate Professor	2005-
Chair of Mathematics Department	2005-2008, 2017-
Associate Chair for Graduate Affairs	2001-2004
Professor of Mathematics	1997-
Associate Professor of Mathematics	1994-1997
The Institute for Advanced Study, Princeton	
Member	Jan – April, 1997
The Technical University of Vienna	
Guest Professor	April, 1997
The Ohio State University	
Associate Professor of Mathematics	1992-95
Assistant Professor of Mathematics	1988-92
Mathematical Sciences Institute, Cornell University	
Postdoctoral Associate	1988-89
The University of Michigan	
T.H. Hildebrandt Research Assistant Professor	1985-88
Royal Institute of Technology, Stockholm	
Visiting Research Scientist	Spring 1985
Arizona State University	
Faculty Associate	Fall 1984
Harvard University	
Research Assistant	1982-85
Teaching Fellow	1982-84
Applied Mathematics Tutor, Leverett House	1983-84

Professional Affiliations:

Fellow:	American Mathematical Society
	Institute of Electrical and Electronics Engineers
	Society for Industrial and Applied Mathematics
Editor-in-Chief	SIAM Journal on Control and Optimization (2012-)
Associate Editor	IEEE Transactions on Automatic Control (1993-96)
	Electronic Journal of Differential Equations (1993-)
	SIAM Journal on Control and Optimization (1993-1999)
	Mathematics of Control, Signals and Systems (1997-)
	Journal of Nonlinear Science (2001-)
	Dynamical Systems (2002-2014)
	Systems and Control Letters (2002-2008)
	Elec. Journal of Mathematical and Physical Sciences (2002-)
	Journal of Geometric Mechanics (2009-)
	Michigan Mathematical Journal (20014-)
Associate Editor	IEEE Transactions on Automatic Control (1996-99)
at Large:	

Reviewer: Linear Algebra and its Applications, Transactions of the American Mathematical Society, Mathematical Systems Theory, Systems and Control Letters, SIAM Journal on Applied Mathematics, SIAM Journal on Control and Optimization, Mathematics of Control, Systems and Signals, IEEE Transactions on Automatic Control, Physics Letters A, Physica D, Nonlinear Science

Graduate Students:

Ph.D.'s completed: Dmitry Zenkov (Ohio State University), Kai-Yu Lum, Patrick Hagerty, Melinda Koelling, Eduard Kirr, Amit Sanyal, Vincent Guibout . Jason Kutch, Islam Hussein, Jared Maruskin, Oscar

Fernandez, Tomoki Ohsawa, Patrick Rooney. Current: Jake Ketchum, Hamed Razavi, Rohit Gupta, Chris Barot.

Invited Lectures and Conferences:

“An infinite-dimensional variational problem arising in estimation theory,” The Conference on Algebraic and Geometric Methods in Nonlinear Control Theory, Paris, June 1985.

“Total least squares estimation in infinite dimensions and completely integrable Hamiltonian systems,” The 7th International Symposium on the Mathematical Theory of Networks and Systems, Stockholm, June 1985.

“An application of geometrical methods to estimation theory,” The Workshop on Parametrization Problems in Systems Theory, Bremen, June 1985.

“Total least squares estimation and completely integrable Hamiltonian systems,” The American Mathematical Society/Mathematical Association of America Meeting, Claremont, California, November 1985.

“Left invariant control systems on infinite-dimensional homogeneous spaces,” The 24th IEEE Conference on Decision Theory and Control, Fort Lauderdale, Florida, December 1985.

“Hamiltonian flows on homogeneous spaces,” The San Antonio Conference on Differential Geometry, San Antonio, April 1986.

“Infinite-dimensional Hamiltonian control systems,” SIAM 1986 National Meeting, Boston, July 1986.

“Maximum likelihood estimation for errors-in-variables models,” SIAM Conference on Linear Algebra in Signals, Systems and Control, Boston, August 1986.

“An algebra-geometric approach to the analysis of dynamic errors-in-variables models,” The Workshop on Algebraic Methods in Systems Theory, Columbus, Ohio, June 1987.

“Identification of dynamic errors-in-variables models,” 8th MTNS Symposium, Tempe, Arizona, June 1987.

“Stabilization of Hamiltonian systems with constraints,” 8th MTNS Symposium, Tempe, Arizona, June 1987.

“Dynamics and control of flexible bodies,” 8th MTNS Symposium, Tempe, Arizona, June 1987.

“Dynamics of a free flexible body,” American Mathematical Society Summer Conference on Hamiltonian Systems, Boulder, Colorado, June 1987.

“Stability and equilibria of deformable systems,” The 26th IEEE Conference on Decision and Control, Los Angeles, December 1987.

“Least squares, linear programming and Hamiltonian flows,” AMS Summer Conference on Mathematical Developments arising from Linear Programming, Bowdoin, Maine, June 1988.

“Centrifugal forces and the stability of rotational motion,” AMS Summer Conference on Control Theory and Multibody Systems, Bowdoin, Maine, July 1988.

“Approximate models of rotating beams,” The 27th IEEE Conference on Decision and Control, Austin, December 1988.

“Bifurcation behavior in some rotating systems,” SIAM Conference on Control in the '90's, San Francisco, May 1989.

“Stabilizability of nonholonomic control systems,” IFAC Symposium on Nonlinear Control Systems Design, Capri, Italy, June 1989.

“Constrained dynamical systems in identification and control,” 9th MTNS Symposium, Amsterdam, The Netherlands, June 1989.

“Gradient flows associated with the Toda lattice,” Workshop on Hamiltonian Systems, Transformation Groups and Spectral Transform Methods, Montreal, Canada, October 1989.

“Control of mechanical systems with classical nonholonomic constraints,” The 28th IEEE Conference on Decision and Control, Tampa, December, 1989.

“Control and stabilization of systems with homoclinic orbits,” The 28th IEEE Conference on Decision and Control, Tampa, December, 1989.

“The weak dispersion limit of the Toda lattice equations,” AMS Summer Conference on Inverse Scattering on the Line, Amherst, June 1990.

“Stabilization and control of the rigid body equations with internal torques,” Mathematical Problems in Nonlinear Elasticity, Oberwolfach, Germany, June 1990.

“Inertial manifolds for rotating elastic beams,” New Trends in Systems Theory, Genoa, Italy, July 1990.

“Steepest descent problems and the Toda lattice,” Second SIAM Conference on Linear Algebra in Signals, Systems and Control, San Francisco, November 1990 (one hour invited talk).

“Stability and control of nonlinear systems with constraints,” 97th Annual Meeting of the AMS, San Francisco, January 1991.

“Asymptotic stability, instability, and stabilization of relative equilibria,” 1991 American Control Conference, Boston, June 1991.

“Dispersive regularization of the Whitham equation for the Toda lattice,” Nato Advanced Research Workshop on Singular Limits of Dispersive Waves, Lyon, July 1991.

“Control of systems with nonintegrable constraints,” AFOSR Workshop on Nonlinear Control, St. Louis, August, 1991.

“Nonholonomic Control Systems,” Fields Institute Workshop on Falling Cats, The Fields Institute, Waterloo, Ontario, March, 1992.

“Convexity and Integrability,” Fields Institute Workshop on Gradient and Hamiltonian Flows, Algorithms and Control, The Fields Institute, Waterloo, Ontario, April, 1992.

“The Geometry of Nonholonomic Control Systems,” NSF Workshop on Nonlinear Control, St. Louis, May, 1992.

“On the Dynamics and Control of Nonholonomic Systems on Riemannian Manifolds,” IFAC Nonlinear Control Systems Symposium, Bordeaux, France, June, 1992.

“The Geometry of Nonholonomic Systems on Riemannian Manifolds,” SIAM Conference on Control, Minneapolis, September, 1992.

“Control of Systems with Homoclinic and Heteroclinic Orbits,” SIAM Conference on Dynamical Systems, Salt Lake City, October, 1992.

“Integrable Differential Equations and Convexity,” The 876th Meeting of the American Mathematical Society, Dayton, October, 1992.

“Controllability of Nonholonomic Systems on Riemannian Manifolds,” The 31st IEEE Conference on Decision and Control, Tucson, December, 1992.

“On the Geometry of Saddle Point Algorithms,” The 31st IEEE Conference on Decision and Control, Tucson, December, 1992.

“The Dynamics of Gradient and Hamiltonian Flows and Convexity,” Dynamics Days, Tempe, Arizona, January, 1993.

“The Dynamics of Generalized Rigid Bodies,” Workshop on Robotics, The Institute for Mathematics and its Applications, Minnesota, January, 1993.

“The Dynamics of the Toda Lattice in Finite and Infinite Dimensions,” Workshop on Geometric Mechanics, Rio de Janeiro, March, 1993.

“Gradient and Hamiltonian Flows in Infinite Dimensions,” Geometric, Analytic, and Computational Aspects of Mechanics, Oberwolfach, July, 1993.

“Hamiltonian Flows in Networks and Control,” The International Symposium on the Mathematical Theory of Networks and Control 93, Regensburg, August, 1993.

“Optimal Control and Variational Mechanics,” The Joint American Mathematical Society – Canadian Mathematical Society Summer Meeting, Vancouver, August, 1993.

“The Geometry of Nonholonomic and Variational Control Systems,” The Workshop on Mechanics, Holonomy and Control, San Antonio, December, 1993.

“Convexity, Group Theory and the Dispersionless Toda Flow,” Cornelius Lanczos International Centenary Conference, Raleigh, December, 1993.

“Symmetry, Constraints and Dissipation,” MSRI Workshop on Exterior Differential Systems, Submanifolds and Control Theory, MSRI, Berkeley, March, 1994.

“An Infinite-dimensional Optimization Problem,” IMACS World Congress, Atlanta, July 1994.

“Examples in Nonholonomic Mechanics,” Workshop on Geometric Mechanics and Nonholonomic Systems, Berkeley, August, 1994.

“Stabilization of a Nonholonomic System via Sliding Modes,” The 33rd IEEE Conference on Decision and Control, Orlando, December, 1994.

“Dynamics of the Toda Lattice and Convexity”, hour talk given at the Midwest Dynamical Systems Meeting, Minneapolis, March, 1995.

“Lagrangian and Hamiltonian Formulations of Constrained Variational Problems,” The Meeting on Geometric Mechanics, Dynamical Systems and Control, Fayetteville, April, 1995.

“Optimal Control and the Lagrange Problem,” Third SIAM Conference on Control and its Applications, St. Louis, April, 1995.

“Constrained Variational Principles and Optimal Control,” The Third International Congress on Industrial and Applied Mathematics, Hamburg, Germany, July, 1995.

“The Geometry of Nonholonomic Mechanical Systems with Symmetry,” The Third International Congress on Industrial and Applied Mathematics, Hamburg, Germany, July, 1995.

“Multiple Brackets and Optimal Control,” ARO-NASA Workshop on Exterior Differential Systems and Hybrid Control, Bozeman, Montana, July, 1995.

“Discrete Computation and Smooth Hamiltonian and Gradient Flows,” Workshop on New Connections between Mathematics and Computer Science, The Newton Institute, Cambridge, November, 1995.

“On the Geometry of Optimal Control and Geodesic Flows,” The 34th IEEE Conference on Decision and Control, New Orleans, December, 1995.

“Integrable Geodesic Flows on Homogeneous Spaces,” Joint Mathematics Meeting, Orlando, January, 1996.

“Stabilization of Nonlinear Control Systems,” The AFSOR Contractors/Grantees Meeting, Pasadena, March, 1996.

“Control and Optimal Control on Lie Algebras,” The University of Notre Dame Symposium on Current and Future Directions in Applied Mathematics,” Notre Dame, April, 1996.

“Control and Orbital Control of Constrained Nonlinear Systems,” First International Conference in Aviation and Aerospace, Daytona Beach Florida, May, 1996.

“Integrable Optimal Flows,” Mathematical Theory of Networks and Systems, MTNS 96, St. Louis, June, 1996.

“Integrable Systems –Theory and Applications,” Plenary Address, SIAM National Meeting, Kansas City, July, 1996.

“Use of Linear Feedback for the Supression of Chaos in a Metal Passivation Model,” IEEE International Conference on Control Applications, Dearborn, September, 1996).

“Geometry and Control of Systems with Nonholonomic Constraints,” Colloquium of the Center for Intelligent Control Systems and the Division of Engineering and Applied Sciences, Harvard University, Cambridge, October, 1996.

“Symplectic Structures on Homogeneous Spaces and Integrability,” 914th Meeting of the American Mathematical Society, October, 1996.

“Optimization and Dynamical Systems,” Applied Mathematics Colloquium, Princeton University, Feb, 1997.

“Nonholonomic Mechanics” Series of 5 Invited Lectures given as Guest Professor, The Technical University of Vienna, Vienna, 14-19 April, 1997.

“The Dispersionless Toda Lattice and Infinite Dimensional Lie Algebras,” 922nd Meeting of the American Mathematical Society, Detroit, May, 1997.

“Mechanics of Nonholonomic Systems and Control,” , invited hour talk, 1997 AMS Summer Research Institute on Differential Geometry and Control, Boulder, June/July 1997.

“Hamiltonian Methods in the Control of Mechanical Systems,” invited hour talk, 1997 AMS Summer Research Institute on Differential Geometry and Control, Boulder, June/July 1997.

“Stabilization of Mechanical Systems by Energy Methods,” 17th IFIP Conference on Systems Modelling and Identification, Detroit, July, 1997.

“Optimal Control and the Full Toda Flow,” The 36th IEEE Conference on Decision and Control, San Diego, December, 1997.

“A Serret- Andoyer Transformation Analysis for the Controlled Rigid Body,” The 36th IEEE Conference on Decision and Control, San Diego, December, 1997.

“Integrable Systems, Rigid Body Mechanics and Optimal Control,” , Caltech Workshop on Mechanics, Dynamics and Control, Pasadena, December, 1997.

“Geodesic Flows and Integrability”, Winter Meeting of the American Mathematical Society, Baltimore, January 1998.

“Geometric Aspects of the Full Toda Flows,” 934th Meeting of the American Mathematical Society, Davis, California, April 1998.

“Nonholonomic Stabilization and Isospectral Flows,” Plenary talk, IMA Workshop on Nonlinear Identification and Control, Minneapolis, April, 1998.

“Integrable Systems and the Geometry of Gradient Flows,” Workshop on Symplectic Geometry,” Warwick University, U.K., July, 1998.

“Double Bracket Equations in Optimzation, Mechanics and Controls,” Conference on Perspectives in Control, Harvard University, October, 1998 (Plenary Address).

“Mechanical Feedback Control Systems,” 37th IEEE Conference on Decision and Control, Tampa, December, 1998.

“Discrete Rigid Body Dynamics and Optimal Control,” 37th IEEE Conference on Decision and Control, Tampa, December, 1998.

“Nonholonomic stabilization and isospectral flows,” 37th IEEE Conference on Decision and Control, Tampa, December, 1998.

“Noncommutative integrability of generalized rigid body equations,” 941st meeting of the American Mathematical Society, Urbana, March, 1999.

“Stabilization by the method of controlled Lagrangians,” UC Santa Barbara, April 1999.

“Stabilization of the pendulum on a rotor arm,” International Conference on Robotics and Automation, Detroit, May 1999.

“Reduction of constrained and interconnected mechanical systems,” Fourth International Conference on Industrial and Applied Mathematics, Edinburgh, U.K., July, 1999.

“Symmetric rigid body equations,” Foundations of Computational Mathematics, Oxford, U.K., July 1999.

“Asymptotic stability in energy preserving systems,” 38th IEEE Conference on Decision and Control, December 1999.

“Matching and Asymptotic Stability for Euler-Poincaré Mechanical Systems,” IFAC Workshop on Lagrangian and Hamiltonian for Nonlinear Control”, Princeton, March 2000.

Series of three invited lectures in IIIe Cycle Romand de Mathematiques, “Séminaire sure les distribution non-intégrables”, Les Diablerets, Switzerland, March 2000.

“Poisson Structures, Asymptotic Stability and Integrable Systems” Invited Session, Sectional Meeting of the AMS, Notre Dame, April 2000.

“The Interactions of Classical and Quantum Oscillators with Fields,” Hour invited lecture, IMA Workshop on Dispersive Corrections to Transport Equations, Minneapolis, May 2000.

“Control of Squeezed States”, American Control Conference, Chicago, June, 2000.

“Nonlinear Control and Nonholonomic Mechanics,” Bell Laboratories, Murray Hill, New Jersey, July 2000.

“The Symplectic Structure and Integration of the Symmetric Rigid Body Equations,” London Mathematical Symposium Durham Symposium on Geometric Integration, Durham, England, July 2000.

“Symplectic Structures on Cross Products of Lie Groups,” 957th Meeting of the American Mathematical Society, Toronto, September, 2000.

“Discrete Optimal Control and the Dynamics of Rigid Bodies,” 964th Meeting of the American Mathematical Society, Lawrence, Kansas, March, 2001.

“Dissipation and Stability for Classical and Quantum Oscillators Interacting with a Wave Field,” IMACS 2001, Athens, Georgia, April, 2001.

“Almost Poisson Systems and Constrained Dynamics,” SIAM Conference on Applications of Dynamical Systems, May, 2001.

“Nonholonomic Systems and Control,” SIAM Conference on Control and its Applications, June, 2001.

“Asymptotically Stable Equilibria in Coupled Conservative Mechanical Systems,” SIAM Conference on Control and its Applications, June, 2001.

“Nonlinear Control Systems and Nonholonomic Mechanics,” National Academy of Science Frontiers in Science Symposium, The Beckman Center, Irvine, California, November, 2001.

“Geometric Mechanics of the Symmetric Rigid Equations,” December Meeting of the Canadian Mathematical Society, Toronto, December, 2001.

“Optimal Control and the Symmetric Rigid Body Equations,” 4th International Conference on Dynamical Systems and Differential Equations, Wilmington, May 2002.

“Dissipative Dynamics and Instabilities in coupled Hamiltonian systems,” Warwick Symposium on Mechanics and Symmetry, July 2002.

“Dissipative Dynamics in Conservative Classical and Quantum Systems,” Plenary Talk, 15th International Symposium on the Mathematical Theory of Networks and Systems, Notre Dame, August, 2002.

“Discrete Variational Problems, the Maximum Principle, and Rigid Body Dynamics,” Midwest Optimization Workshop, Ann Arbor, September, 2002.

“Dissipative Dynamics in Conservative Mechanical Systems,” Colloquium, Wayne State University, Detroit, March, 2003.

“Oscillators, Spin Squeezing and Interactions with the Environment”, Plenary Talk, IFAC Meeting on Lagrangian and Hamiltonian Control Systems, Seville, Spain, April, 2003.

“The Geometry and Dynamics of Generalized Double Bracket Equations,” SIAM Conference on Dynamical Systems, Snowbird, Utah, May 2003.

“Generalized Double Bracket Flows”, Workshop on Group Theory and Numerical Analysis, Montreal, May 2003.

“Nonholonomic Mechanics,” Mittag Leffler Institute, May 2003.

Mittag Leffler Institute, Semester on Systems Theory and Control, long term visit, May, 2003.

“The Michigan Doctoral Program,” Carnegie Institute on the Doctorate, Palo Alto, July 2003.

“Nonholonomic Mechanics and Control,” Chi Epsilon Engineering Honor Society, University of Michigan, October 2003.

“ Dynamics and Control of Oscillators and Spins Interacting with their Environment,” Dynamics and Control Colloquium, Caltech, Pasadena, November 2003.

“Dynamics and Control of Oscillator and Spin Systems” Conference on New Direction and Applications in Control, Lubbock, Texas, November 2003.

“Optimality and Generalized Double Bracket Flows,” 42nd IEEE Conference on Decision and Control, December, 2003.

“Geometry and Dynamics of Generalized Double Bracket Flows,” 995th Meeting of the American Mathematical Society, Athens, Ohio, March 2004.

“Nonholonomic Mechanics – a Generalization of Hamiltonian Mechanics,” Midwest Dynamical Systems Meeting, Ann Arbor, Michigan, April 2004.

“ Nonholonomic flows on Lie groups,” Conference on Lie Group Methods and Control Theory, International Center for Mathematical Sciences, Edinburgh, July 2004.

Five Lectures on Nonholonomic Mechanics, Summer School, Milan, Italy, July 2004.

“Dynamics and Control of Oscillator Spin Systems,” Workshop on Quantum Control and Information, Caltech, Pasadena, August 2004.

“Geometry of Oscillator Spin Systems,” Arizona State University, November 2004.

“Geometric Aspects of Isospectral Flows on Symmetric Matrices,” AMS National Meeting, Atlanta, January 2005.

“Quantum Control”, CRM, Barcelona, Spain, February, 2005.

Visitor, CRM Semester on Control, Geometry and Engineering, Barcelona, Spain, February 2005.

Arizona workshop in honor of Hermann Flaschka’s 60th birthday, Tucson, March, 2005.

High Degree of Freedom Workshop, Washington, April 2005

“Orbital Dynamics in Extended Mass Distributions,” SIAM Conference on Dynamical Systems, Snowbird, May 2005.

High Degree of Freedom Workshop, Boston, July 2005

“Mechanics and Control,” Summer school on quantum control, Caltech, Pasadena, August 2005.

“A geodesic flow on the symplectic group” AMS National Meeting, San Antonio, January 2006.

“Geodesic Flows and their Discretizations” Oberwolfach Workshop on Geometric Numerical Integration, March 2006.

“Representations of Geodesic Flows” Sectional Meeting of the AMS, Notre Dame, Indiana, April 2006.

“Nonholonomic mechanics and control,” Distinguished Speaker Series, Michigan State University, April 2006.

“Integrable geodesic flows on manifolds”, Conference on Integrable Systems, Random Matrices and Applications, in honor of Percy Deift’s 60th Birthday, New York University, May 2006.

“Integrable flows and optimal control,” Geometric Analysis and its Applications, University of Illinois, July, 2006.

“Problems in Quantum Control,” PRACQSYS 06, Harvard University, Cambridge, August, 2006.

“Smooth and discrete integrable systems and optimal control,” XV International Workshop on Geometry and Physics, Satellite Conference of the ICM, plenary speaker, Pto. de la Cruz, Tenerife, Spain, September, 2006.

“Nonholonomic mechanics and control,” Colloquium, University of Maryland, Baltimore County, October, 2006.

“Connections between nonholonomic mechanics and control,” BIRS workshop, Banff, Canada, January, 2007.

“Dynamics and control of quantum systems” MSRI workshop on Stochastic Dynamical Systems and Control, hour talk, Berkeley, March 2007.

“Geometry of integrable systems and optimal control,” 6th International Congress on Industrial and Applied Mathematics, Zurich, July 2007.

“Geometric aspects of integrable systems and optimal control,” D2HFest 2007, Lausanne, July 2007.

“Classical and quantum systems interacting with their environment,” Control, Constraints and Quanta, Bedlewo, Poland, October, 2007.

“Integrable flows on the symmetric and skew symmetric matrices,” Midwest Dynamical Systems Seminar, Ann Arbor, October 2007.

“Nonholonomic Systems, Dissipation and Quantization,” American Institute of Mathematical Sciences Meeting, Dallas, May 2008.

“Classical and Quantum Systems Interacting with their Environment”, Control of Physical Systems and PDE’s, Institute Henri Poincare, Paris, June 2008.

“Variational aspects of nonholonomic systems” Oberwolfach meeting, Oberwolfach, July 2008.

“Variational and dissipative aspects of nonholonomic systems” Invited Plenary Lecture, AMS meeting, Huntsville, Alabama, October, 2008.

“Variational principles and in nonholonomic systems” Applied Mathematics Colloquium, University of Waterloo, Ontario, November, 2008.

“Variational principles and in nonholonomic systems” Applied Mathematics Colloquium, University of Waterloo, Ontario, November, 2008.

“Dissipative aspects of nonholonomic systems,” Workshop in honor of Roger Brockett’s 70th Birthday, 45th CDC, Cancun, December, 2008.

“Nonholonomic and quantum dynamics,” workshop on Electrical and Mechatronical Systems, Bernoullie Center, Ecole Polytechnique de Lausanne, Switzerland, February 2009.

“Dissipative dynamics in quantum and nonholonomic systems,” workshop on Coherence. Control and Dissipation, Institute for Mathematics and its Applications, Minneapolis March 2009.

“Finite control of infinite quantum systems” workshop on Coherent Control,” Kavli Instititue for Theoretical Physics, Santa Barbara, May 2009.

“Geometric control theory and nonholonomic mechanics,” invited series of 6 lectures, International Summer School on Geometry, Mechanics and Control, Amettla Del Mar, Spain, June, 2009.

“Dissipative dynamics in nonholonomic quantum systems,” workshop on Fundamental Aspects of Deterministic Thermostat, CECAM-EPFL, Lausanne Switzerland. July, 2009

“Control Theory and integrable systems.” Invited talk, A Celebration of the Field of Systems and Control, Royal Institute of Technology, Stockholm, Sweden, September, 2009.

“Dynamics of gradient flows, Hamiltonian Flows and Thermostats,” Fall sectional meeting of the American Mathematical Society, Penn State University, October, 2009.

“The rolling sphere and quantum spin,” SIAM-SEAS meeting, Raleigh, North Carolina, March, 2010

“Rolling motion and quantum dynamics,” Workshop on Synergies and Interplay of Nonlinear Dynamics and Control, Ann Arbor, May, 2010.

“Integrable flows and asymptotic stability,” Plenary speaker, Symmetry plus Integrability 2010, South Padre Island, Texas, June 2010

“Geometry of Integrable Systems,” Workshop on Geometry, Mechanics and Dynamics, Luminy, France, July 2010

“Nonholonomic mechanics and quantum dynamics,” Plenary speaker, CAIMS (Canadian Applied Mathematics meeting) 2010, Newfoundland, Canada, July 2010.

“Rolling motion and quantum mechanics,” Workshop in Honor of Chris Byrnes, Lubbock, September 2010.

“Rolling motion and quantum dynamics,” Invited speaker, Workshop on Geometric and Topological Method in Robotics and Control, Miraflores, Spain, October 2010.

“Products of random matrices and the randomly forced Hill’s equation,” special session on Statistical Properties of Dynamical Systems, American Mathematical Society, Richmond Virginia, November 2010.

“Orbit problems in astrophysics and products of random matrices,” Plenary talk, Second IberoAmerican Meeting on Geometric Mechanics and Control, Bariloche, Argentina, January 2011.

“The geometry of nonholonomic systems,” Texas Geometry and Toplogy Seminar, Lubbock, Texas, February 2011.

“Quantum spin and nonholonomic dynamics,” ICIAM international conference, Vancouver, July 1011.

“Future direction in control panel,” SIAM conference on control and its applications, Baltimore, July 2011.

Oberwolfach meeting on Applied Dynamics and Geometric Mechanics, coorganizer, Oberwolfach Germany, August 2011.

“Geometry and Dynamics”, Senior Fellow Colloquium, University of Michigan Biological Station, September 2011.

“Geometry in nonholonomic mechanics and optimal control and the work of Peter Crouch” Workshop in honor of the work of Peter Crouch, Conference on Decision and Control, Orlando, Florida, December, 2011

“Products of random matrices and Hill’s equations” Recent Trends in Dynamical Systems, Munich, January, 2012.

“Integrable systems, gradient flows, and dissipation”, invited session, AMS sectional meeting, Honolulu, March, 2012.

“The geometry of integrable and gradient flows and dissipation”, special session on Geometric Mechanics, The 9th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, July, 2012

“Continuous and Discrete Embedded Optimal Control Problems”, Focus Program on Geometry, Mechanics and Dynamics, Fields Institute, Toronto, July 2012.

“The geometry of integrable and gradient flows and dissipation”, Focus Program on Geometry, Mechanics and Dynamics, Fields Institute, Toronto, July 2012.

“Nonlinear control, quantum control and networks”, ICMAT meeting on Stochastic Systems Simulation and Control, Madrid, Spain, November 2012.

“Course of three lectures on nonholonomic mechanics and control”, NZMRI meeting on Geometric Mechanics and Shape, Ohope Beach, New Zealand, January 2013.

“Optimal control of discrete systems”, SIAM Conference on Control and its Applications, San Diego, July 2013.

“Integrable Systems and Dissipative Dynamics,” Workshop on Integrable Systems and Semiclassical Analysis, EPFL Lausanne, July 2013.

“Action Principles, Optimal Control and Mechanics,” Workshop on Control and Observation of Nonlinear Systems with Applications to Medicine,” Hawaii, September, 2013.

“Double Bracket Flows, Toda Flows and Rigid Body Toda.” 51st Annual Allerton Conference on Communication, Control and Computing, Allerton, Illinois, October 2013

“Knife edge dynamics, optics and Hamiltonization,” Workshop in honor of Manuel de Leon, ICMAT, Madrid, Spain, November 2013.

“Asymptotics of nonholonomic flows,” Ibero-American Meeting on Geometric Mechanics and Control, Rio de Janeiro, Brazil, April, 2014

“Smooth and discrete integrable systems and optimal control,” INDAM workshop on Analysis and Geometry in Optimal Control, Rome, Italy, June, 2014

“Dynamics and geometry of smooth and discrete optimal control problems”, USNCTAM 2014, East Lansing, June 2014

“Rolling and quantum spin”, Workshop on quantum control engineering, The Newton Institute, Cambridge, UK, July/Aug 2014

“Nonholonomic dynamics, optics, and the least time”, Workshop on Nonholonomic Mechanics and subRiemannian Geometry, Institut Henri Poincare, Paris, November 2014.

“Geometry of integrable systems,” Colloquium, UC San Diego, February 2015.

“Topics in control of mechanical systems”, Mechanics Seminar, UC San Diego, February 2015

“Dynamics of the Genome,” DARPA workshop, Washington DC, March 2015.

“Toda flows and the generalized Flaschka map,” SIAM meeting on Dynamical Systems, Snowbird, May, 2015.

“Stability of the coupled Hill equations and the Lorentz Oscillator,” Oberwolfach workshop on Quantum Many Body Systems, Oberwolfach, Germany, June 2015.

“Geometry of the Flaschka Map and Dispersionless Toda lattice flows” Conference on Waves, Spectral Theory and Applications, Princeton, September 2015

Simons Foundation Annual Meeting on Mathematics and Physical Sciences, October, 2015

“Toda flows, gradient flows and the generalized Flaschka map,” Plenary speaker, Texas Analysis and Mathematical Physics Symposium, Dallas, November 2015.

Visitor, Institute for Mathematics and Applications, Minneapolis, November 2015

“Control of quantum systems with Lindblad dissipation,” Quantum and Nano Control Workshop, Institute for Mathematics and Applications, Minneapolis, April, 2016.

“The symmetric rigid Body, flows on symmetric matrices and optimal control” Ascona Workshop on Integrable Systems, Ascona, Switzerland, June 2016.

“The Clebsch representation in optimal control and low rank integrable systems” The Abel Symposium, Barony Rasenthal, Norway, August 2016.

“Control of quantum systems with Lindblad dissipation,” Colloquium, Dept. of Mechanical Engineering, Syracuse University, November, 2016.

“Quantum control and the geometry of flag manifolds,” SIAM conference on Dynamical Systems, Snowbird, Utah, 2017.

“Hamel’s formalism for constrained field theories,” SIAM conference on Dynamical Systems, Snowbird, Utah, 2017

“Hybrid Dynamics”, Workshop on Verification and Synthesis of Hybrid Systems, U. of Texas, Austin, June, 2017.

“Control of quantum systems with Lindblad dissipation,” Dynamical Systems and Geometric Mechanics, An international conference in honor of Jurgen Scheurle, Munich, Germany, June 2017.

“The Clebsch representation in optimal control, integrable systems and discrete dynamics,” semiplenary lecture, Foundation of Computational Mathematics, Barcelona, Spain, 2017

Journal Publications

A completely integrable Hamiltonian system associated with line fitting in complex vector spaces, *Bull. Amer. Math. Soc.* 12 (1985), 250–254.

Estimation, principal components and Hamiltonian systems, *Systems and Control Letters* 6 (1985), 103–108.

An infinite-dimensional classical integrable system and the Heisenberg and Schrodinger representations, *Physics Letters* 116A (1986), 353–355.

An infinite-dimensional Hamiltonian system on projective Hilbert space, *Trans. Amer. Math. Soc.* 302 (1987), 787–796.

Lax-type flows on Grassmann manifolds, *Contemporary Mathematics*, A.M.S. 68 (1987), 39–50.

Identification and estimation of dynamic errors-in-variables models, *Journal of Econometrics* 41 (1989), 145–158.

Stability analysis of a rotating flexible system, *Acta Applicandae Mathematicae* 15 No. 3 (1989), 211–234.

Stability and stiffening of driven and free planar rotating beams, *Contemporary Mathematics*, A.M.S. 97 (1989), 11–25 (with R. R. Ryan).

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