

CURRICULUM VITA

Current to January 12, 2016

Willard Miller, Jr.

School of Mathematics

University of Minnesota

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Personal Information:

Born: September 17, 1937, Fort Wayne, Indiana

Married to Jane C. Miller. Two grown children, Stephen and Andrea

US citizen

Formal Education:

Ph.D. Applied Mathematics, UC Berkeley, June 1963

B.S. Mathematics, University of Chicago, December 1958 (cum laude)

Research Interests:

Superintegrable systems, Lie groups and algebras, special functions, q -series, mathematical physics.

Summary of Experience:

Forty seven years of experience as an Assistant, Associate and full Professor of Mathematics, in the School of Mathematics, University of Minnesota. Eight years as Head of the School and seven as Associate Director of the Institute for Mathematics and its Applications, working with Directors Hans Weinberger and Avner Friedman. Three years as Associate Dean for Finance and Planning, Institute of Technology, University of Minnesota, including four months as Acting Dean. Director of the Institute for Mathematics and its Applications 1997-2001. Acting IMA Deputy Director 2008. Have written four books (two textbooks and two research monographs) and more than 190 research papers, and have edited dozens of IMA proceedings. Managing Editor of the SIAM Journal on Mathematical Analysis for 6 years. Have developed extensive online course notes on linear operators, harmonic analysis, wavelets, radar and sonar, Lie groups, special functions, orbital maneuvers etc., for the benefit of students and the research community. Appointed CSE Distinguished Professor 2005-. Professor Emeritus 2010-.

Employment History:

Assistant Professor, University of Minnesota, 1965-67
Associate Professor, University of Minnesota, 1967-72
Professor, University of Minnesota, 1972-2010
Head, School of Mathematics, 1978-86
Associate Director, Institute for Mathematics and its Applications, 1987-94
Associate Dean - Finance and Planning, Institute of Technology, June 1, 1994- August 31, 1997
Acting Dean, Institute of Technology, July 1 -November 15 1995
Director, Institute for Mathematics and its Applications, 1997-2001
Acting Deputy Director, Institute for Mathematics and its Applications, February-May, 2008

Fellowships:

Honorary Woodrow Wilson Fellow (liberal arts), 1959-60
NSF Predoctoral Fellow, (science) UC Berkeley, 1959-60
NSF Postdoctoral Fellow, Courant Institute, 1963-64
University of Waikato, Hamilton, New Zealand, summer 1980
University of Waikato, Hamilton, New Zealand, summer 1984

Visiting Positions:

Visiting Member, Courant Institute, 1964-65
Visiting Member, CRM, Université de Montreal, 1973-74
Visiting Member, IIMAS, National University of Mexico, June 1976

Editorial Appointments:

- Managing Editor, SIAM Journal on Mathematical Analysis, 1975-81
- Associate Editor, Applicable Analysis, 1978-90.
- MEB, SIAM Journal on Mathematical Analysis, 1970-92.
- Associate Editor, Journal of Mathematical Physics, 1973-75.
- Co-Editor, IMA Volumes in Mathematics, 1987-94.
- Editor, IMA Volumes in Mathematics, 1997-2001.
- Co-Editor, Superintegrability in Classical and Quantum Systems, Vol 37 of CRM Proceedings and Lecture Notes, American Mathematical Society 2004.
- MEB, EqWorld, The World of Mathematical Equations, (website) 2005-
.
- MEB, Symmetry, Integrability and Geometry: Methods and Applications (SIGMA), an online journal, 2005-

- Member of Advisory Panel, Journal of Physics A: Mathematical and General, 2006-.
- MEB, Advances in Mathematical Physics, 2008-2014
- Guest Editor for Special Issue – “Symmetries of Differential Equations: Frames, Invariants and Applications” of the online journal “Symmetry, Integrability and Geometry: Methods and Applications” (SIGMA), 2012.
- Guest Editor for Special Issue – “Superintegrability, Exact Solvability, and Special Functions,” of the online journal “Symmetry, Integrability and Geometry: Methods and Applications” (SIGMA), 2012.
- Guest Editor for Special Issue “Special Issue on Exact Solvability and Symmetry Avatars in honour of Luc Vinet,” of the online journal “Symmetry, Integrability and Geometry: Methods and Applications” (SIGMA), 2015.
- Guest Editor for Special Issue honoring Sergio Benenti of the online journal “Symmetry, Integrability and Geometry: Methods and Applications” (SIGMA), 2015-16.

Honors:

1. Appointed IT (now CSE) Distinguished Professor, 2005-
2. Ida Cordelia Beam Distinguished Visiting Professor, University of Iowa, October 2006
3. The Symmetry, Separation, Super-integrability and Special Functions (S4) Conference, in my honor, was held at the University of Minnesota September 17-19, 2010
4. Journal of Physics A Best Paper Prize 2012 for the paper with E. G. Kalnins and S. Post, “Coupling constant metamorphosis and Nth order symmetries in classical and quantum mechanics”
5. Elected as a Fellow of the American Mathematical Society, 2015.
6. 2015 President’s Award for Outstanding Service, University of Minnesota.

Committees (International, National and State):

1. Applied Mathematics Panel, NSF Graduate Fellowships, 1978-80
2. NSF EPSCOR panel (Mississippi), 1986

3. CBMS Graduate Mathematics Enrollment Committee, 1986-87
4. Organizing Committee, SIAM National Meeting, 1988
5. NSERC site visit panel, (CRM, Montreal), 1992
6. Local Arrangements Committee, AMS Summer Meeting, 1994
7. NSF Industrial Postdoc Panel, 1994
8. NSERC site visit panel, (CRM, Fields Inst.),1994
9. Program Director, SIAG/OS,1996-8
10. Chair, IMA Director Search Comm. ,1996-7
11. External Review Committee, College of Engineering & Science, Clemson,1997
12. Review panel for science/engineering college, Clemson University, 1997
13. Co-organizer, Minisymposium on Handbooks for Special Functions and the World Wide Web, SIAM National Meeting, Stanford, July, 1997
14. Member Scientific Advisory Committee, CRM, Montreal, 1997-2001
15. NSF STC Review Panel, 1998
16. AAAS External Review Committee, Mathematics Department, University of Nevada, Las Vegas, 1998
17. External Review Committee, Mathematics Department, University of Virginia, 1998
18. Co-organizer, Minisymposium on Problems Sessions in Journals, SIAM National Meeting, Toronto, July, 1998
19. Organizing Committee, SIAM Annual Meeting, San Diego, July 2001
20. Member of Organizing and Finance Committees, FOCM'02 (Foundations of Computational Mathematics, International Meeting, Minneapolis, August 2002)
21. External Review Committee, Applied Mathematics Graduate Program, University of Waterloo, spring 2002
22. External Review Committee, Mathematics Department, Penn State University, fall 2003
23. Electorate Nominating Committee of the Section on Mathematics (A), American Association for the Advancement of Science, 2003-2006 (Chair of the Committee 2004-2005)

24. Member of Finance Committees, FOCM'05 (Foundations of Computational Mathematics, International Meeting, Santander Spain, 2005)
25. Member of External Advisory Committees for mathematical physics conferences in Varna Bulgaria, Kiev Ukraine, and Dubna Russia. 2005
26. Member of External Advisory Committee for SYMPHYS-12, Yerevan, Armenia, 2006
27. Member of External Advisory Committee for Quantum Theory and Symmetry - 5 Conference (QTS-5) in Valladolid Spain. July 2007
28. Member of External Advisory Committee for "Symmetry in Nonlinear Mathematical Physics", Kiev, Ukraine, June 24-30, 2007
29. Member of External Advisory Committee for SYMPHYS-13, Yerevan, Armenia, 2008
30. Member, Major Resources Support Grant Selection Committee, GSC 1051. National Science and Engineering Research Council of Canada, (NSERC), 2008-2011
31. Reviewer of NSERC Institute proposals and reports, 2008-2015
32. Member of NSF-NSERC-CONACYT-AET site visit panel, (BIRS, Banff), January 2010
33. Member, IMA Community Relations Committee, 2010-2015
34. Member of International Advisory Committee, Eighth Conference on Quantum Theory and Symmetries (QTS8), Mexico City, August 5-9, 2013
35. Member of the Advisory Committee, International Colloquium on Group Theoretical Methods in Physics, Ghent, Belgium, July 10-14, 2014
36. Member of the Scientific Committee for the 13th international conference on Orthogonal Polynomials, Special Functions and their Applications, Washington, DC, June 2015
37. Chair of IMA Prize Committee, 2014-2015
38. Chair, NSERC site visit panel, (CITA, University of Toronto), 2015

Research Grants:

NSF *Special fnctns., harm. anal., sep. of variables*, 1966-71,1975-97
 NSF Co-Principal Investigator, IMA main grant, 1981-94, 1997-2001
 NSF *Mathematics Computation Laboratory*, 1985

NSA Co-Principal Investigator, *Applied Combinatorics*, 1987-88
 ONR Co-Principal Investigator, *Appl. Comb., etc.*, 1987-90
 ONR Co-Principal Investigator, *Signal Processing*, 1988
 NSA Co-Principal Investigator, *Signal Processing*, 1988
 ARO Co-Principal Investigator, *Signal Processing*, 1988
 AFOSR Co-Principal Investigator, *Signal Processing*, 1988
 NSF Co-Principal Investigator *Supercomputer Cycles*, 1988-89
 ARO Co-Principal Investigator, *Nonlin. Waves, etc.*, 1988-94
 AFOSR Co-Principal Investigator, *Nonlin. Waves, etc.*, 1988-91
 ARO Co-Principal Investigator, *Applied Statistics*, 1989
 ONR Co-Principal Investigator, *Applied Statistics*, 1989
 AFOSR Co-Principal Investigator, *Applied Statistics*, 1989
 NSA Co-Principal Investigator, *Applied Statistics*, 1989
 NSF Co-Principal Investigator, Industrial Postdoctorates, 1990-92
 NSA Co-Principal Investigator, *Time Series*, 1990
 AFOSR Co-Principal Invest., *Radar/Sonar & Time Series*, 1990
 ARO-DARPA Co-Principal Invest., *Radar/Sonar & Time Series*, 1990
 ONR Co-Principal Investigator, *Radar/Sonar*, 1990
 AFOSR Co-Principal Investigator, *Semiconductors*, 1991
 ARO Co-Principal Investigator, *Semiconductors*, 1991
 NSF Internat. Progs., Co-Prin. Inv., *IMA-INRIA wkshop*, 1991
 NSA Co-Principal Investigator, *Applied Linear Algebra*, 1991-92
 EPRI Co-Principal Investigator, *Environmental Studies*, 1992
 NASA Co-Principal Investigator, *Environmental Studies*, 1992
 AFOSR Co-Principal Investigator, *Signal Processing*, 1992
 ARO Co-Principal Investigator, *Control*, 1992
 ONR Co-Principal Investigator, *Flow Control*, 1992
 NSF Co-Principal Investigator, *Control of Power Systems*, 1993
 NSF Co-Principal Investigator, *Industrial Postdoc Tutorial*, 1993
 ARO Co-Principal Investigator, *Control Theory*, 1993
 NSF Co-Principal Investigator, *Computer Equipment*, 1993-94
 NSA Co-Principal Investigator, *Probability*, 1993-94
 AFOSR Co-Principal Investigator, *Probability*, 1993-94
 Ford Co-Principal Investigator, *Postdocs in Indust. Math*, 1992-94
 Honeywell Co-Principal Investigator, *Postdocs in Indust. Math*, 1990-94
 3M Co-Principal Investigator, *Postdocs in Indust. Math*, 1990-94
 ARO Co-Principal Investigator, *Probability Theory*, 1994
 NSF Principal Investigator, *Difference Equations Conference*, 1994
 NSF Co-Principal Investigator, *Molecular Biology*, 1994
 NSF Principal Investigator, *Integrable Systems Conference*, 1999
 NIH Principal Investigator, *Immunolgy and Ecology Workshops* 1998-1999
 NSA Principal Investigator, *Codes, Systems and Graphical Models* 1999
 ONR Pricipal Investigator, *MATHEMATICS IN MULTIMEDIA*, 2000-2001
 DOE Pricipal Investigator, *CONNECTING WOMEN IN MATHEMATICAL SCIENCES TO INDUSTRY*, 2000

NSF Principal Investigator, *BIOCOMPLEXITY 2000 COMPETITION* , 2000
 ONR Co-Prin. Inv., *Foundations of Computational Mathematics* , 2002
 IBM Co-Prin. Inv., *Foundations of Computational Mathematics* , 2002
 NSF Co-Prin. Inv., *Foundations of Computational Mathematics* , 2002
 NSF Principal Investigator, *Symmetry in Physics Conference*, 2004
 NSF Co-Prin. Inv., *Quantum Theory and Symmetries Conference* , 2005
 Simons Foundation Collaboration Grant, 2011-16
 NSF Principal Investigator, *Conference on “Symmetries of Differential Equations: Frames, Invariants and Applications”*, 2012
 NSF Principal Investigator, *Conference “30th International Colloquium on Group Theoretical Methods in Physics”*, 2014

Education Grants:

Ford Found., Co-Org., Twin Cities Urban Math Collaborative, 1985-86
 NSF, Co-Princ. Invest., Research Experiences for Undergrads, 1987-92
 IBM, Woksape computer education project, 1988-90
 IBM, SCRATCHPAD test, 1989-91
 NSF Co-Prin. Inv., *Industrial Math for Undergraduates* , 1992-94
 NSF Co-Prin. Inv., *Math Modeling for Instructors* , 1994
 NSA Co-Prin. Inv., *Industrial Modeling for Graduate Students* , 2000

Recent Invited Symposia/Talks:

- University of Waterloo, January 2000
- Math Sciences Department Chairs Meeting, Washington D.C., November 2000
- University of Waterloo, April 2002
- Workshop on “Special Functions in the Digital Age”, IMA, July 2002
- Workshop on Special Functions at FoCM’02, August 2002
- Workshop on Superintegrable Systems, September 2002, Montreal
- Workshop on Harmonic Analysis and Special Functions, Irsee, Germany, July 2004
- Sixth International Conference on Symmetry in Nonlinear Mathematical Physics, Kiev, Ukraine, 2005
- SYMPHYS 2003, Yerevan, Armenia, August 2003
- XXth International Conference, Symmetry in Physics, Cocoyoc Mexico, August 2004.

- Dalhousie University, March 2005
- Canadian Math Society, Session on Invariant Theory and Differential Geometry, University of Waterloo, June 2005
- Special Session on Special Functions and Orthogonal Polynomials, AMS Regional meeting, Evanston Illinois, October 2004
- VI th International Symposium on Quantum Theory and Summetries, Varna Bulgaria August 2005
- Special Session: In the wake of Hamilton and Jacobi, 200 years later. AMS Annual Meeting, Atlanta, January 2005.
- Workshop on Superintegrable Systems, June 2005, Dubna, Russia
- Special Session on Special Functions and Orthogonal Polynomials, AMS Regional meeting, Notre Dame, Indiana, April 2006
- IMA summer conference on “Symmetries and overdetermined systems of partial differential equations”, Minneapolis, July-August 2006.
- Ida Cordelia Beam Distinguished Visiting Professor, University of Iowa, October 2006 (5 talks)
- Seventh International Conference on Symmetry in Nonlinear Mathematical Physics, Kiev, Ukraine, June 2007
- Special Session on Symbolic Symmetry Analysis and Its Applications, International Conference on Applications of Computer Algebra (ACA), Oakland University, Rochester Michigan, July 2007
- Conference on Conformal Geometry and its Applications, Nelson, New Zealand, January 2008 (3 talks)
- University of Auckland, January 2008
- SYMPHYS 2008, Yerevan, Armenia, August 2008
- Georgia Southern University, March 2008
- University of Waterloo, April 2008
- CRM, Université de Montréal, February 2009
- Miniworkshop: Selected Topics in Mathematical Physics: Solvability and Superintegrability in Quantum and Classical Mechanics, Cocoyoc, Mexico, November 2009.

- Workshop on “Superintegrability, exact solvability and canonical transformations,” International Center of Science (CIC), Cuernavaca, Mexico, August 2010
- CRM, Université de Montréal, October 2010
- Special Session on “Integrability and Nonintegrability in Hamiltonian Systems,” The 7th International Conference on Differential Equations and Dynamical Systems, Tampa, Florida, December 2010.
- International Conference on Special Functions in the 21st Century: Theory and Applications, Washington DC, April 2011.
- Session on “Integrability, Superintegrability and Exact Solvability,” Quantum Theory and Symmetry -7, Prague, Czech Republic, August 2011.
- Conference on Special Functions and Orthogonal Polynomials of Lie Groups and their Applications, Děčín, Czech Republic, August 2011.
- Conference on The Geometry of Differential Equations, Australian National University, Canberra Australia, September 2011.
- Plenary speaker: Conference on “Selected Topics in Classical and Quantum Integrability”, UNAM, Mexico City, October 2011.
- University of Wisconsin, Madison, November 2011, (2 talks)
- Invited speaker: Symposium on “Superintegrability, Exact Solvability and Special Functions”, Cuernavaca, Mexico, February 2012 (2 talks).
- Co-chair and invited speaker, Special Session on Superintegrable Hamiltonians, International Colloquium on Group Theoretical Methods in Physics, Tianjin, China, August 20-26, 2012
- Invited speaker: Special Session on Symmetries of Differential and Difference Equations” at the Canadian Mathematical Society Winter Session, Montreal, December 2012
- Invited speaker: Quantum Theory and Symmetry-8, Mexico City, August 2013
- Invited speaker: Richard Askey’s 80th birthday conference, Madison WI, December 2013
- Plenary speaker: Conference on “Integrability and Exact Solvability as Avatars of Symmetry”, CRM, Montreal, August 25-29, 2014.

- Invited speaker: Special session on “special functions and their applications”, AMS Sectional meeting, Halifax, Nova Scotia, October 18-19, 2014.
- Invited speaker: International Colloquium on Group Theoretical Methods in Physics, Ghent, Belgium, July 10-14, 2014
- Invited speaker 13th international conference on Orthogonal Polynomials, Special Functions and their Applications, Washington, DC, June 2015
- Invited speaker: Benenti workshop, Torino, Italy, March 12-13, 2015.
- Invited speaker: Doppler Institute - CRM workshop, Prague, May 30th - June 3rd, 2016.
- Penn State University, January 2016, (2 talks)

Other Service:

- Co-founder, Math. Minority Program, 1980
- Co-founder, Math. Actuarial Program, 1980
- Co-founder, U. of M. Talented Youth Math. Proj., 1980
- Established School of Math. Advisory Council, 1980
- Co-founder, Minnesota Mathematics Mobilization, 1986
- MAA Representative to IMA, 1987-90
- Part. in PAMRAN mtng, China Lake Naval Cntr., CA , November 1987
- Co-organizer, Weinberger Symposium, October 1988
- Co-organizer, Natl. Meeting on Calculus Revision, October 1988
- Member, Computer Science Review Committee, March 1990
- IMA Grievance Officer, 1990-1994
- Member, School of Math. Executive Committee, 1990-92
- Member, IT Promotion & Tenure Advisory Committee, 1991
- Member, Electrical Engineering Internal Review Committee, 1991
- Participant, Computer Science Internal Review , 1992
- University Senate , 1992-95

- Co-organizer, Friedman Symposium, January 1993
- Research Scholar Panel, Minn. Supercomputer Inst., 1993-95
- Geometry Center Internal Review Committee, 1993
- Geometry Center Interim Director Search Committee, 1994
- University Grievance panel, 1994
- Headed the IT Industrial Assistance Center project, including development of on-line data base of faculty expertise. 1996-97
- External Examiner for Ph.D. thesis of Zora Thomova. University of Montreal, 1998. “Maximal abelian subalgebras of real pseudoeuclidean Lie algebras and their applications in physics”
- Member, Minnesota NSF/MRI review Committee, 1998-2001
- Member, University of Minnesota Head-Librarian Search Committee, 2001
- Chair of Local Organizing Committee, Foundations of Computational Mathematics 2002 (FoCM’02), August 2002, Minneapolis, Minnesota
- Member of Advisory Committee for the XXV International Colloquium on Group Theoretical Methods in Physics, Cocoyoc, Mexico, August 2004
- Chair, Ordway Visitor Committee, 2002-2003
- External examiner for Ph.D. thesis of Shane N. Smith, University of Waterloo, 2002, “Symmetry Operators and Separation of Variables for the Dirac Equation on Curved Space-Times”
- Member, Search Committee for Associate Dean for Academic Affairs, Institute of Technology, 2002
- Member, Institute of Technology Consultative Committee, 2002-2005, Chair 2003-2004
- Member, Institute of Technology Promotion and Tenure Committee, 2002-2005, Chair 2004-2005
- Member of Organizing Committee, Symmetry-2003, Symmetries in Non-linear Mathematical Physics, Kiev, Ukraine, June 23-29, 2003
- Chair, Headship Search Committee, School of Mathematics, 2002-03
- Vice President, Minnesota Alpha chapter of Phi Beta Kappa, 2003-2004

- President, Minnesota Alpha chapter of Phi Beta Kappa, 2004-2005
- Past-President, Minnesota Alpha chapter of Phi Beta Kappa, 2005-2006
- Co-organizer of IMA summer program on “Symmetries and Overdetermined Systems of Partial Differential Equations”, July 17 - August 4, 2006
- Member, Twin Cities Council on Liberal Education, University of Minnesota, 2005-2008
- External examiner for Ph.D. thesis of Jin Yue, Dalhousie University, 2005, “Development of the invariant theory of Killing tensors defined on pseudo-Riemannian spaces of constant curvature”
- Member, I.T. Distinguished Professorship Selection Committee 2005-2006
- External examiner for Ph.D. thesis of Mark Chanachowicz, University of Waterloo, April, 2008, “Characterization of R-separable webs in Euclidean space by invariants of conformal Killing tensors’
- Co-organizer, Hans Weinberger’s 80th Birthday Conference, October 2008
- External Examiner for Ph.D. thesis of Ian Marquette. University of Montreal, 2009. “Superintegrability with integrals of order three, algebraic polynomials and supersymmetric quantum mechanics”
- External Examiner for Ph.D. thesis of Howard Cohl, University of Auckland, 2010. “Fourier expansions for fundamental solutions of the Laplacian and powers in R^d and H^d ”
- External Examiner for Ph.D. thesis of Frédéric Tremblay, Université de Montréal, 2010. “Superintégrabilité avec séparation de variables en coordonnées polaires et intégrales du mouvement d’ordre supérieur à deux
- In charge of the Undergraduate Math Club, 2010-2011
- External examiner for Ph.D. thesis of Caroline Cochran, Dalhousie University, June 2011, “The characterization of orthogonally separable webs generated by characteristic Killing two-tensors defined in spaces of constant, non-zero curvature”
- Chair of organizing committee, Conference on “Symmetries of Differential Equations: Frames, Invariants and Applications,” May 2012, in honor of Peter Olver on the occasion of his 60th birthday.

- External examiner for Ph.D. thesis of Joshua Capel, University of New South Wales, December 2013, “Classification of Second-Order Conformally-Superintegrable Systems”

Research Supervised:

- Jung Sik Rno, Ph.D. 1973. Thesis: *Clebsch-Gordan coefficients and special functions related to the Euclidean group in three-space*
- Peter DeLong, Ph.D. 1982 Thesis: *Structure theory for spaces of Killing Tensors and symmetry operators*
- Sarah Post, Ph.D. 2009. Thesis: *Models of second order superintegrable systems*
- Sanchita Mukherjee, Postdoctoral Fellow 1990-1992 Project: *q-algebras, quantum groups and special functions*
- Adrian Escobar, Postdoctoral Fellow 2014-2016, Project: *Study of classical and quantum mechanical systems that are exactly or quasi-exactly solvable*

Undergraduate Research

- Chih-Jen Chen, Undergrad. Research Project, 1990
- Sheehan Olver, Senior Project, 2004 *A mesh generation method, with variable spacing, for 3D graphs of special functions.*
- Joe Busch, Undergraduate Research Opportunities Project, 2006 *Wavelet methods in the analysis of radar echos to determine positions and velocities of targets.*
- Peter Mueller, Undergraduate Research Opportunities Project, 2008 *Study and Applications of Compressive Sampling*
- Li Lin, Undergraduate Research Opportunities Project, 2009 *Compressive Sampling*
- Li Lin, Undergraduate Research Opportunities Project, 2010, honors thesis 2011 *Compressive Sampling and Application to Radar Systems*
- Aaron Barkley, Honors thesis research, 2010-2011 *Projection of non-singular matrices onto the special linear matrix group*
- Jared Aurentz, Honors thesis research, 2010 *Computation of trajectories for classical superintegrable systems*

- Bjorn Berntson, Honors thesis research, 2010-2011 *Trajectories for classical superintegrable systems*
- Grant Remmer, Honors thesis research, 2011-2012 *Dynamics of a rigid spinning ring in the Schwarzschild metric: A solution to a gravitational problem in mathematical physics*
- Haiyun Zhao, Undergraduate Research Opportunities Project, 2012-2013 *Analyzing Failures of Compressive Sampling.*
- Robin Heinonen, Honors thesis research, *Structure equations for 2D 2nd order superintegrable systems*, 2013-2014
- Haiyun Zhao, Honors thesis research, *Matrix nearness problems with indefinite Lorentz Metric*, 2013-2014
- Qiushi Li, Undergraduate Research Opportunities Project, *Trajectories for classical 2nd order superintegrable systems*, 2013-2015
- Robin Heinonen, Undergraduate Research Opportunities Project, *Structure equations for 2D 2nd order superintegrable systems*, 2012-2015
- Yuxuan Chen, Undergraduate Research Opportunities Project. *Explicitly solvable Coulomb and hydrogen atom systems with barrier on flat and curved spaces.* 2015

Erdős number: 2

Books and Monographs:

1. On Lie algebras and some special functions of mathematical physics, AMS Memoir no. 50, Providence, 1964.
2. Lie Theory and Special Functions, Academic Press, New York, (1968), a monograph of about 350 pages.
3. Symmetry Groups and Their Applications, (a textbook of about 500 pages) Academic Press, New York, 1972 in the Pure and Applied Mathematics Series, edited by Eilenberg and Smith.
4. Symmetry and Separation of Variables, Addison-Wesley, Reading, Mass. 1977.
5. *Topics in harmonic analysis with applications to RADAR and SONAR*, in *RADAR and SONAR, Part I*, by R. Blahut, W. Miller and C. Wilcox, IMA Volumes in Mathematics and its Applications, Springer-Verlag, New York, 1991.

6. *The Mathematics of Signal Processing* (a textbook of about 450 pages) with Stephen Damelin, Cambridge Texts in Applied Mathematics (No. 48), Cambridge University Press, 2012. (ISBN-13: 9781107013223)
7. Paperback edition, *Symmetry and Separation of Variables*, Cambridge University Press, 2012.

Papers:

1. *Some applications of the representation theory of the Euclidean group in three-space*, Comm. Pure Appl. Math., 17 (1965), pp. 527-540.
2. *On a generalization of Bessel functions*, Comm. Pure Appl. Math., 18 (1965), pp. 393-399.
3. *The special function theory of occupation number space*, Comm. Pure Appl. Math., 18 (1965), pp. 679-696.
4. *The special function theory of occupation number space II*, Comm. Pure Appl. Math., 19 (1966), pp. 125-138.
5. *A branching law for the symplectic groups*, Pacific Journal of Math., 16 (1966), pp. 341-346.
6. *Confluent hypergeometric functions and representations of a four-parameter Lie group*, Comm. Pure Appl. Math., 19 (1966), pp. 251-259.
7. *Special functions and the complex Euclidean group in 3-space, I*, J. Math. Phys. 9 (1968), pp. 1163-1175.
8. *Special functions and the complex Euclidean group in 3-space, II*, J. Math. Phys. 9(1968), pp. 1176-1187.
9. *Lie theory and the hypergeometric functions*, J. Math. Mech., 17 (1968), pp. 1143-1174.
10. *Special functions and the complex Euclidean group in 3-space, III*, J. Math. Phys. 9 (1968), pp. 1434-1444.
11. *Lie theory and difference equations, I*, J. Math. Anal. Appl., 28 (1969), pp. 383-399.
12. *Lie theory and q-difference equations* in Studies in Applied Mathematics 6, Special Functions and Wave Propagation, SIAM Philadelphia, 1970.
13. *Lie theory and q-difference equations*, SIAM J. Math. Anal., 1(1970), pp. 171-188. (not identical to 14)

14. *Lie theory and special functions satisfying second order nonhomogeneous differential equations*, SIAM J. Math. Anal., 1(1970), pp. 246-265.
15. *Lie theory and some special solutions of the hypergeometric equation*, SIAM J. Math. Anal., 1(1970), pp. 405-425.
16. *Invariant tensor fields in physics and the classical groups*, SIAM J. Appl. Math. 20(1971), pp. 503-519.
17. *On Lie algebras of difference operators and the special functions of mathematical physics*, SIAM J. Math. Anal. 2 (1971), pp. 307-327.
18. *Lie theory and difference equations, II*, J. Math. Anal. Appl. 39 (1972), pp. 406-422.
19. *Clebsch-Gordan coefficients and special function identities, I. The Harmonic oscillator group*, J. Math. Phys. 13 (1972), pp. 648-655.
20. *Clebsch-Gordan coefficients and special function identities, II. The rotation and Lorentz groups*, J. Math. Phys. 13 (1972), pp. 827-833.
21. *Lie theory and generalized hypergeometric functions*, SIAM J. Math. Anal. 3 (1972), pp. 31-44.
22. *Symmetries of differential equations. The hypergeometric and Euler-Darboux equations*, SIAM J. Math. Anal. 4 (1973), pp. 314-328.
23. *Lie theory and the Appell function F_1* , SIAM J. Math. Anal. 4 (1973), pp. 638-655.
24. *Lie theory and the Lauricella functions F_D* , J. Math. Phys. 13 (1972), pp. 1393-1399.
25. *Lie theory and generalizations of the hypergeometric functions*, SIAM J. Appl. Math. 25 (1973), pp. 226-235.
26. *Lie algebras and generalizations of the hypergeometric function*, Proceedings of the AMS Summer Institute (1972), Harmonic Analysis on homogeneous spaces. Proceedings of Symposia in Pure Mathematics, Vol. XXVI, AMS, Providence, R.I., 1973.
27. *Lie theory and Meijer's G-function*, SIAM J. Math. Anal. 5 (1974), pp. 309-318.
28. *Lie theory and separation of variables. I. Parabolic cylinder coordinates*, SIAM J. Math. Anal. 5 (1974), pp. 626-643.
29. *Lie theory and separation of variables. II. Parabolic coordinates*, SIAM J. Math. Anal. 5 (1974), pp. 822-836.

30. *Lie theory and separation of variables. III. The equation $F_{tt} - F_{ss} = k^2 F$* , with E. G. Kalnins. J. Math. Phys. 15 (1974), pp. 1025-1032, Erratum, 16 (1975), p. 1531.
31. *Lie theory and separation of variables. IV. The groups $SO(2,1)$ and $SO(3)$* , with E.G. Kalnins. J. Math. Phys. 15 (1974), pp. 1263-74.
32. *Complete sets of commuting operators and $O(3)$ scalars in the enveloping algebra of $SU(3)$* , with B. Judd, J. Patera and P. Winternitz. J. Math. Phys. 15 (1974), pp. 1787-1799.
33. *Lie theory and separation of variables. V. The equations $iU_t + U_{xx} = 0$ and $iU_t + U_{xx} - \frac{c}{x^2}U = 0$* , with E.G. Kalnins. J. Math. Phys. 15 (1974), pp. 1728-1737.
34. *Lie theory and separation of variables. VI. The equation $iU_t + U_{xx} + U_{yy} = 0$* , with C.P. Boyer and E.G. Kalnins. J. Math. Phys. 16 (1975), pp. 499-511.
35. *A classification of second order raising operators for Hamiltonians in two variables*, with C.P. Boyer, J. Math. Phys. 15 (1974), pp. 1484-1489.
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