Peter Sin

Present Position

Professor, University of Florida Mathematics Department

Degrees

1986	D.Phil in Mathematics, Oxford University
1983	B.Sc in Mathematics (First class hons.), Warwick University

Professional Experience

2002–present	Professor at University of Florida
	Department of Mathematics
	2016-21 Associate Chair and Graduate Coordinator
	Department of Mathematics
2000	Research Visitor, Indian Statistical Institute
1997	National Board of Higher Mathematics (India)
	visiting lecturer, Indian Statistical Institute
1994–95	Visiting Scholar, University of Utah
1993 – 2002	Associate Professor at University of Florida
	Department of Mathematics
1990	Postdoctoral Fellow, Mathematical Sciences Research Institute, Berkeley
1989 – 1993	Assistant Professor at University of Florida
	Department of Mathematics
1987,1988,	Deutsche Forschungsgemeinschaft exchange
	visitor at U. Mainz and U. Essen
1986 – 1988	L. E. Dickson Instructor at University of Chicago
	Department of Mathematics

Memberships

American Mathematical Society

Mathematical Association of America

Prizes, Awards

Mathematics Prize, Warwick University, 1983

UF Term Professor, 2018-21

Editorial Boards

Associate Editor, Communications in Algebra.

Ph.D. Students

Michael F. Dowd (1994), Some 1-Cohomology Computations for Groups of Lie Type.
(Statistical Programming Group at GlaxoSmithKline, Statistical Consultant at Bogier
Clinical & IT Solutions, Inc)

Jeffrey M. Lataille (2001), The Elementary Divisors of Incidence Matrices between Certain
Subspaces of a Finite Symplectic Space.
(Mathematician, National Security Agency)

Ogül Arslan, (2009) Some Algebraic Problems from Coding Theory.
(Tenured Associate Professor, Coastal Carolina University)

Josh Ducey, (2011) Problems in Algebraic Combinatorics
(Tenured Associate Professor, James Madison University)

Liz Wiggins (2015) On Certain Weyl Modules and Simple Modules for Algebraic Groups of Type
B and D. (Machine Learning Engineer, Spotify)

Raghu Pantangi (2019) Smith and Critical Groups of Polar Graphs
(PIMS Postdoc, U. Regina and U Lethbridge, Canada)

Marly Cormar (2019) Atomicity and Factorization of Puiseux Monoids
(Data Scientist, Apple)

Julien Sorci (2021) Topics in Algebraic Graph Theory and Algebraic Coding Theory
(Senior Research Scientist, Cambridge Quantum Computing/Quantinuum)

Grants

1987–88 NSF DMS 8421367 (Postdoc)
1990–93 NSF DMS 9001273 (Co-PI)$86,700.00
1997–2000 NSF DMS 9701065 (Principal Investigator) $65,459
2000–2003 NSF DMS 0071060 (Principal Investigator) $71,349
2009 BIRS Workshop (Joint organizer)
2011-2016 Collaboration Grant for Mathematicians, Simons Foundation $35,000.
2019-2024 Collaboration Grant for Mathematicians, Simons Foundation $42,500.

Conferences Organized

AMS special session, sectional meeting, Gainesville 1999 (joint organizer)

Finite Groups 2003, U. of Florida, 2003 (joint organizer)

Group Representations and Combinatorics, U. of Florida, 2007 (joint organizer)

Invariants of Incidence Matrices, Banff International Research station 5-day workshop, March
2009 (joint organizer).

ICM satellite conference, Buildings, Finite Geometries and Groups, Bangalore, India, August
29-31, 2010 (organizing committee member)

Invited Lectures and Talks at Meetings

Conference on Representation Theory, Athens, Georgia, 1988.

Special Session, AMS meeting, Kent State, Ohio, 1987.

Special Session, AMS meeting, E. Lansing, Michigan, 1988.

International Conference on Representation Theory, Manchester, England, 1988.

Deutsche Forschungs Gemeinschaft Conference, Bad Honnef, Germany, June 1989.

Program on Representations of Finite Groups, MSRI, Berkeley, California, October 1990.

Special Session, AMS meeting, U.C. Irvine, California, 1990.

Special Session, AMS meeting, Tampa, FL, March 1991.

AMS Summer Institute on Algebraic Groups, Penn. State, July 1991.

AMS/SIAM Research Conference, Mt. Holyoke College, MA, June 1992.

Special Session on Algebraic Groups and Finite Groups, AMS meeting, Los Angeles, November 1992.

Special Session on Algebraic Groups and Quantum groups, AMS meeting, Manhattan, Kansas, March 1994.

Special Session on Finite groups and Related Topics, AMS meeting, Orlando, Florida, March 1995.

Special Session on Algebraic Groups and Finite Groups, AMS meeting, Baton Rouge, Louisiana, April 1996.

AMS Summer Institute on Group Actions and Cohomology, Seattle, Washington, July 1996.

Milliken Lecture, University of N. Texas, Denton, February 1995.

Special Session on Groups and Geometry, AMS meeting Detroit, April 1997.

Colloquium at Indian Statistical Inst., 1997.

Colloquium at Indian Inst. of Science, 1997.

Colloquium at Math. Sciences Inst., Madras, 1997.

Mini-course: Modular Representations and Cohomology, ISI, Bangalore, 1997.

Symposium on Representation Theory, U.of Virginia, May 1998.

Special Session on Finite groups and Geometries, AMS meeting, Manhattan KS

CBMS Conference on Cross Characteristic Representation Theory, Denton, Texas, June 1998.

Special Session on Finite Groups and Geometries, AMS meeting, Detroit, Mi,

Conference in honour of E. Shult, Manhattan, Kansas, March 2001.

U. Of South Alabama, Colloquium, November 2004.

Special Session on Designs and Codes, AMS meeting, Newark, Delaware, April 2005.

AMS/MAA joint annual meeting, Atlanta, January 2005.

Group Representations and Combinatorics, U. of Florida, September 2007.

Chat Yin Ho Memorial Conference on Combinatorics, U. of Florida, February 2008.

Local Methods in Group Theory, conference in honor of George Glauberman, U. of Chicago March 2008.

Institute of Advanced Study/ Princeton University Number Theory Seminar, May 2008.

London Mathematical Society Triangle Conference, U. Birmingham, June 2008.

Workshop on Invariants of Incidence Matrices, Banff International Research Station, Canada, March 30th, 2009

Universiti Sains Malaysia, Penang, Malaysia, June 9th, 2009.

Southwestern Group Theory Day, University of Arizona, November 7th, 2009.

Conference on Designs, Codes and Geometries, Lewes, Delaware, March 30th, 2010.

ICM satellite conference on Buildings, Finite Geometries and Groups, Bangalore, India, August 30th, 2010.

AMS special session Tampa, March 10th, 2012

Finite Groups, Representations and Related Topics, Conference in honor of Michael J. Collins, Oxford, August 23rd, 2012.

Workshop and Conference on Groups and Geometries, Indian Statistical Institute, Bangalore, India, December 10-21 2012 (three lectures).

The Mathematics of John Thompson, Cambridge, UK, September 11, 2013,

Milliken Lecture, University of N. Texas, Denton, March, 2014.

U. of Delaware Discrete Mathematics Seminar, October 22nd, 2015.

Mathematics Colloquium, James Madison University, February 8th, 2016

Gainesville International Number Theory Conference, March 20, 2016

New Directions in Combinatorics, IMS NUS Singapore, May 26th 2016

Lecture at Beijing International Mathematics Research center, July 25th, 2016

Finite Groups and Vertex Algebras, Conference in honor of Robert L. Griess Jr. on the occasion of his 71st birthday, Academia Sinica, Taipei, August 23rd, 2016.

U. Delaware Discrete Math Seminar May 7th, 2018.

U. Delaware Discrete Math Seminar Nov 5, 2018.

Finite Geometry and Extremal Combinatorics, University of Delaware, August 22nd, 2019.

University of North Texas Algebra Seminar, September 25th, 2020

Open Problems in Algebraic Combinatorics, U. Waterloo (virtual conference), May 6th 2021

CRM workshop on Graph Theory, Algebraic Combinatorics and Mathematical Physics, U. Montreal, Canada, August 8th, 2022.

University of Manchester Algebra Seminar, September 27th 2022.

U. of Waterloo Combinatorics and Optimization, November 9, 2022.

Zassenhaus Groups and Friends, Texas State U. June 1st, 2024.

Publications

[1] V. R. T. Pantangi and P. Sin, "Perfect state transfer in graphs related to linear groups in two dimensions." Preprint, arxiv:2408.14807:.

[2] A. Chan and P. Sin, "Pretty good state transfer among large sets of vertices." Preprint, arxiv:2305.14276.

[3] P. Sin, "Large sets of strongly cospectral vertices in Cayley graphs," *Vietnam J. Math.*, 2023. https://doi.org/10.1007/s10013-023-00625-3.

[4] P. Sin and J. Sorci, "Continuous-time quantum walks on Cayley graphs of extraspecial groups," *Algebraic Combinatorics*, vol. 5, pp. 699–714, 2022. arxiv:2011.07566.

[5] K. Meagher and P. Sin, "All 2-transitive groups have the EKR-module property," *J. Comb. Theory, Ser. A*, vol. 177, 2021. arxiv:1911.11252.

[6] P. Sin, J. Sorci, and Q. Xiang, "Linear representations of finite geometries and associated LDPC codes," *J. Comb. Theory, Ser. A*, vol. 173, 2020. arxiv:1908.06824.

[7] J. Ducey, I. Hill, and P. Sin, "The critical group of the Kneser graph on 2-element subsets of an n-element set," *Lin. Alg. and Appl.*, vol. 546, pp. 154–168, 2018.

[8] V. R. T. Pantangi and P. Sin, "Smith and critical groups of polar graphs," *J. Comb. Theory, Ser A.*, vol. 167, pp. 460–498, 2019.

[9] J. Ducey and P. Sin, "The Smith and critical groups of graphs defined by lines in $PG(n-1,q)$," *Bull. Inst. Math. Acad. Sinica*, vol. 13, pp. 411–442, 2018.

[10] L. Long, R. Plaza, P. Sin, and Q. Xiang, "Characterization of intersecting families of maximum size in $PSL(2,q)$," *J. Comb. Theory, Ser A.*, vol. 157, pp. 461–499, 2018.

[11] P. Sin, "The critical groups of the Peisert graphs.," *J. Alg. Combinatorics*, vol. 48, pp. 227–245, 2018.

[12] F. Ihringer, P. Sin, and Q. Xiang, "New bounds for partial spreads in $H(2d-1,q^2)$ and partial ovoids of the Ree-Tits octagon.," *J. Combin. Theory Ser. A*, vol. 153, pp. 46–53, 2018.

[13] D. Chandler, P. Sin, and Q. Xiang, "The Smith group of the hypercube.," *Des. Codes. Crypt.*, vol. 84, pp. 283–294, 2017. arxiv:1511.00272.

[14] A. Kleshchev, P. Sin, and P. H. Tiep, "Representations of the alternating group which are irreducible over subgroups II," *Amer. J. Math.*, vol. 138, pp. 1383–1423, 2016. arxiv:1405.3324.

[15] D. Brozovic and P. Sin, "A note on point stabilizers in sharp permutation groups of type $\{0, k\}$," *Comm. Alg.*, vol. 44, pp. 3324–3339, 2016.

[16] O. Arslan and P. Sin, "A remark on Grassmann and Veronese embeddings of PG(3) in chracteristic 2," *Innov. Incidence Geom.*, vol. 14, pp. 111–117, 2015.

[17] D. B. Chandler, P. Sin, and Q. Xiang, "The Smith and critical groups of Paley graphs," *J. Alg. Combinatorics*, vol. 41, pp. 1013–1022, 2015.

[18] P. Sin, "Smith normal forms of incidence matrices," *Sci. China. Math.*, vol. 56, pp. 1359–1371, 2013.

[19] P. Sin, "Some Weyl modules of the algebraic groups of type e_6," in *Groups of Exceptional Type, Coxeter Groups and related Geometries*, vol. 82 of *Proceedings in Mathematics and Statistics*, pp. 279–300, New York: Springer, 2011.

[20] P. Sin and J. G. Thompson, "Some uniserial modules for certain special linear groups," *J. Algebra*, vol. 398, pp. 448–460, 2014.

[21] P. Sin, "On codes that are invariant under the affine group," *Elec. J. Combinatorics*, vol. 19, no. P20, pp. 1–14, 2012.

[22] A. E. Brouwer, J. E. Ducey, and P. Sin, "The elementary divisors of the incidence matrix of skew lines in PG(3, q)," *Proc. Amer. Math. Soc.*, vol. 140, no. 8, pp. 2561–2573, 2012.

[23] P. Sin, "Oppositeness in buildings and simple modules for finite groups of Lie type," in *Buildings, Finite Geometries and Groups*, vol. 10 of *Proceedings in Mathematics*, pp. 273–286, New York: Springer, 2011.

[24] P. Sin, J. Wu, and Q. Xiang, "Dimensions of some binary codes arising from a conic in PG(2, q)," *J. Combin. Theory Ser. A*, vol. 118, no. 3, pp. 853–878, 2011.

[25] O. Arslan and P. Sin, "Some simple modules for classical groups and p-ranks of orthogonal and Hermitian geometries," *J. Algebra*, vol. 327, pp. 141–169, 2011.

[26] P. Sin and J. G. Thompson, "The divisor matrix, Dirichlet series, and SL(2, **Z**)," in *The legacy of Alladi Ramakrishnan in the mathematical sciences*, pp. 299–327, New York: Springer, 2010.

[27] P. Sin, "*Finite group theory*, book review," *Amer. Math. Monthly*, vol. 117, no. 7, pp. 657–660, 2010.

[28] D. B. Chandler, P. Sin, and Q. Xiang, "Incidence modules for symplectic spaces in characteristic two," *J. Algebra*, vol. 323, no. 12, pp. 3157–3181, 2010.

[29] J. Carillo, Y. Chen, P. Sin, and A. Vakharia, "Fusion product planning: A market offering perspective," *Decision Sciences Journal*, vol. 41, no. 2, pp. 235–253, 2010.

[30] D. B. Chandler, P. Sin, and Q. Xiang, "The permutation action of finite symplectic groups of odd characteristic on their standard modules," *J. Algebra*, vol. 318, no. 2, pp. 871–892, 2007.

[31] P. Sin and Q. Xiang, "On the dimension of certain LDPC codes based on q-regular bipartite graphs," *IEEE Trans. Inform. Theory*, vol. 52, no. 8, pp. 3735–3737, 2006.

[32] D. B. Chandler, P. Sin, and Q. Xiang, "The invariant factors of the incidence matrices of points and subspaces in PG(n, q) and AG(n, q)," *Trans. Amer. Math. Soc.*, vol. 358, no. 11, pp. 4935–4957, 2006.

[33] P. Sin and P. H. Tiep, "Rank 3 permutation modules of the finite classical groups," *J. Algebra*, vol. 291, no. 2, pp. 551–606, 2005.

[34] C.-Y. Ho, P. Sin, P. Tiep, and A. E. Turull, *Finite Groups 2003, Proceedings of the Gainesville conference*, vol. 63 of *Proc. Sympos. Pure Math.* Amsterdam: De Gruyter, 2004.

[35] P. Sin, "The p-rank of the incidence matrix of intersecting linear subspaces," *Des. Codes Cryptogr.*, vol. 31, no. 3, pp. 213–220, 2004.

[36] J. M. Lataille, P. Sin, and P. H. Tiep, "The modulo 2 structure of rank 3 permutation modules for odd characteristic symplectic groups," *J. Algebra*, vol. 268, no. 2, pp. 463–483, 2003.

[37] N. S. N. Sastry and P. Sin, "On the doubly transitive permutation representations of $\mathrm{Sp}(2n, \mathbf{F}_2)$," *J. Algebra*, vol. 257, no. 2, pp. 509–527, 2002.

[38] P. Sin, "The permutation representation of $\mathrm{Sp}(2m, \mathbf{F}_p)$ acting on the vectors of its standard module," *J. Algebra*, vol. 241, no. 2, pp. 578–591, 2001.

[39] N. S. Narasimha Sastry and P. Sin, "Codes associated with nondegenerate quadrics of a symplectic space of even order," *J. Combin. Theory Ser. A*, vol. 94, no. 1, pp. 1–14, 2001.

[40] P. Sin, "The elementary divisors of the incidence matrices of points and linear subspaces in $\mathbf{P}^n(\mathbf{F}_p)$," *J. Algebra*, vol. 232, no. 1, pp. 76–85, 2000.

[41] M. Bardoe and P. Sin, "The permutation modules for $\mathrm{GL}(n + 1, \mathbf{F}_q)$ acting on $\mathbf{P}^n(\mathbf{F}_q)$ and $\mathbf{F}_q^{n-1}$," *J. London Math. Soc. (2)*, vol. 61, no. 1, pp. 58–80, 2000.

[42] N. S. N. Sastry and P. Sin, "The code of a regular generalized quadrangle of even order," in *Group representations: cohomology, group actions and topology (Seattle, WA, 1996)*, vol. 63 of *Proc. Sympos. Pure Math.*, pp. 485–496, Providence, RI: Amer. Math. Soc., 1998.

[43] P. Sin, "Modular representations of the Hall-Janko group," *Comm. Algebra*, vol. 24, no. 14, pp. 4513–4547, 1996.

[44] M. F. Dowd and P. Sin, "On representations of algebraic groups in characteristic two," *Comm. Algebra*, vol. 24, no. 8, pp. 2597–2686, 1996.

[45] P. Sin, "Extensions of simple modules for special algebraic groups," *J. Algebra*, vol. 170, no. 3, pp. 1011–1034, 1994.

[46] P. Sin, "The cohomology in degree 1 of the group F_4 in characteristic 2 with coefficients in a simple module," *J. Algebra*, vol. 164, no. 3, pp. 695–717, 1994.

[47] G. R. Robinson and P. Sin, "A note on Brauer's induction theorem," *J. Algebra*, vol. 162, no. 1, pp. 92–94, 1993.

[48] P. Sin, "Extensions of simple modules for $G_2(3^n)$ and $^2G_2(3^m)$," *Proc. London Math. Soc. (3)*, vol. 66, no. 2, pp. 327–357, 1993.

[49] P. Sin, "On the 1-cohomology of the groups $G_2(2^n)$," *Comm. Algebra*, vol. 20, no. 9, pp. 2653–2662, 1992.

[50] P. Sin, "Extensions of simple modules for $\mathrm{SL}_3(2^n)$ and $\mathrm{SU}_3(2^n)$," *Proc. London Math. Soc. (3)*, vol. 65, no. 2, pp. 265–296, 1992.

[51] P. Sin, "On the representation theory of modular Hecke algebras," *J. Algebra*, vol. 146, no. 2, pp. 267–277, 1992.

[52] P. Sin, "Extensions of simple modules for $\mathrm{Sp}_4(2^n)$ and $\mathrm{Suz}(2^m)$," *Bull. London Math. Soc.*, vol. 24, no. 2, pp. 159–164, 1992.

[53] P. Sin and W. Willems, "G-invariant quadratic forms," *J. Reine Angew. Math.*, vol. 420, pp. 45–59, 1991.

[54] P. Sin, "The Green ring and modular representations of finite groups of Lie type," *J. Algebra*, vol. 123, no. 1, pp. 185–192, 1989.

[55] P. Sin and W. Willems, "On induced projective indecomposable modules," *Proc. Amer. Math. Soc.*, vol. 105, no. 4, pp. 793–801, 1989.

[56] P. K. W. Sin, "A Green ring version of the Brauer induction theorem," *J. Algebra*, vol. 111, no. 2, pp. 528–535, 1987.