

Peter Sin

Present Position

Professor

Degrees

1986 D.Phil in Mathematics, Oxford University

1983 B.Sc in Mathematics (First class hon.), Warwick University

Prizes, Awards

Mathematics Prize, Warwick University, 1983.

UF Term Professor 2018-21.

Memberships

American Mathematical Society

Mathematical Association of America.

Editorial Boards

Communications in Algebra

Professional Experience

2002–present	Professor at University of Florida Department of Mathematics
2016–2021	Associate Chair and Graduate Coordinator UF 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
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

Ph.D. Students

- Michael F. Dowd (1994), Some 1-Cohomology Computations for Groups of Lie Type.
- Jeffrey M. Lataille (2001), The Elementary Divisors of Incidence Matrices between Certain Subspaces of a Finite Symplectic Space.
- Ogul Arslan, (2009) Some Algebraic Problems from Coding Theory.
- Josh Ducey, (2011) Problems in Algebraic Combinatorics
- Liz Wiggins (2015) Some Weyl modules for algebraic groups of type B_4 and D_4
- Raghu Tej Pantangi (2019) Smith and critical groups of graphs
- Marly Cormar (2019) Atomicity and Factorization of Puiseux Monoids
- Julien Sorci (2021) Topics in Algebraic Graph Theory and Algebraic Coding Theory

Grants

- 1987–88 NSF DMS 8421367 (Postdoc)
- 1990–93 NSF DMS 9001273 (Co-PI)
- 1997–2000 NSF DMS 9701065 (Principal Investigator)
- 2000–2003 NSF DMS 0071060 (Principal Investigator)
- 2009 BIRS Workshop (Joint organizer)
- 2011–2016 Collaboration Grant for Mathematicians, Simons Foundation
- 2019–2024 Collaboration Grant for Mathematicians, Simons Foundation.

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.

Millican 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 9-11 2013 .

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

Colloquium, James Madison U, February, 2016.

Gainesville Conference on Number Theory, March 2016.

New Directions in Combinatorics, Institute for Mathematical Sciences, NUS Singapore, May 2016.

Conference in Finite Groups and Vertex Algebras, Taipei, August 2016.

Open Problems in Algebraic Combinatorics, May 2021, U. Waterloo.

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

Algebra Seminar U. Manchester, September 2022.

Seminar talks given at: U.Chicago, U.Illinois, Chicago Circle, U. Illinois, Urbana, U. Oxford, U. Mainz, U. Essen, CalTech, Northwestern U., Institute of Theoretical and Applied Mathematics, U. Utah, Indian Statistical Institute, U. Leicester, Colorado State U., U. Delaware, U. South Alabama, Texas State University, U. Florida, Peking U, U. North Texas.

Other Meetings Attended

Conference in honour of John Thompson, Cambridge, September 2002

Finite Groups 2003, Gainesville, FL March 2003

Conference in honour of Walter Feit, Yale, September 2003

Conference in honour of Richard Lyons, U. Warwick, June 2015

Conference in honour of Dan Segal and Aner Shalev, Oxford, September 2018.

Algebraic Graph Theory and Quantum Information Workshop, Fields Institute, Toronto, August, 2021.

Publications

- [1] A. Chan and P. Sin, “Pretty good state transfer among large sets of vertices.” Preprint, arxiv:2305.14276.
- [2] P. Sin, “Large sets of strongly cospectral vertices in Cayley graphs,” *Vietnam J. Math.*, 2023. <https://doi.org/10.1007/s10013-023-00625-3>.
- [3] 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.
- [4] 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.
- [5] 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.
- [6] 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.
- [7] 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.
- [8] 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.
- [9] 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.
- [10] P. Sin, “The critical groups of the Peisert graphs,” *J. Alg. Combinatorics*, vol. 48, pp. 227–245, 2018.
- [11] 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.
- [12] 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.
- [13] 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.
- [14] 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.
- [15] O. Arslan and P. Sin, “A remark on Grassmann and Veronese embeddings of $PG(3)$ in characteristic 2,” *Innov. Incidence Geom.*, vol. 14, pp. 111–117, 2015.
- [16] 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.
- [17] P. Sin, “Smith normal forms of incidence matrices,” *Sci. China. Math.*, vol. 56, pp. 1359–1371, 2013.
- [18] 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.

- [19] P. Sin and J. G. Thompson, “Some uniserial modules for certain special linear groups,” *J. Algebra*, vol. 398, pp. 448–460, 2014.
- [20] P. Sin, “On codes that are invariant under the affine group,” *Elec. J. Combinatorics*, vol. 19, no. P20, pp. 1–14, 2012.
- [21] A. E. Brouwer, J. E. Ducey, and P. Sin, “The elementary divisors of the incidence matrix of skew lines in $\text{PG}(3, q)$,” *Proc. Amer. Math. Soc.*, vol. 140, no. 8, pp. 2561–2573, 2012.
- [22] 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.
- [23] P. Sin, J. Wu, and Q. Xiang, “Dimensions of some binary codes arising from a conic in $\text{PG}(2, q)$,” *J. Combin. Theory Ser. A*, vol. 118, no. 3, pp. 853–878, 2011.
- [24] 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.
- [25] P. Sin and J. G. Thompson, “The divisor matrix, Dirichlet series, and $\text{SL}(2, \mathbf{Z})$,” in *The legacy of Alladi Ramakrishnan in the mathematical sciences*, pp. 299–327, New York: Springer, 2010.
- [26] P. Sin, “*Finite group theory*, book review,” *Amer. Math. Monthly*, vol. 117, no. 7, pp. 657–660, 2010.
- [27] 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.
- [28] 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.
- [29] 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.
- [30] 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.
- [31] D. B. Chandler, P. Sin, and Q. Xiang, “The invariant factors of the incidence matrices of points and subspaces in $\text{PG}(n, q)$ and $\text{AG}(n, q)$,” *Trans. Amer. Math. Soc.*, vol. 358, no. 11, pp. 4935–4957, 2006.
- [32] 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.
- [33] 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.
- [34] P. Sin, “The p -rank of the incidence matrix of intersecting linear subspaces,” *Des. Codes Cryptogr.*, vol. 31, no. 3, pp. 213–220, 2004.
- [35] 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.
- [36] N. S. N. Sastry and P. Sin, “On the doubly transitive permutation representations of $\text{Sp}(2n, \mathbf{F}_2)$,” *J. Algebra*, vol. 257, no. 2, pp. 509–527, 2002.

- [37] 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.
- [38] 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.
- [39] 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.
- [40] 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.
- [41] 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.
- [42] P. Sin, “Modular representations of the Hall-Janko group,” *Comm. Algebra*, vol. 24, no. 14, pp. 4513–4547, 1996.
- [43] M. F. Dowd and P. Sin, “On representations of algebraic groups in characteristic two,” *Comm. Algebra*, vol. 24, no. 8, pp. 2597–2686, 1996.
- [44] P. Sin, “Extensions of simple modules for special algebraic groups,” *J. Algebra*, vol. 170, no. 3, pp. 1011–1034, 1994.
- [45] 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.
- [46] G. R. Robinson and P. Sin, “A note on Brauer’s induction theorem,” *J. Algebra*, vol. 162, no. 1, pp. 92–94, 1993.
- [47] 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.
- [48] P. Sin, “On the 1-cohomology of the groups $G_2(2^n)$,” *Comm. Algebra*, vol. 20, no. 9, pp. 2653–2662, 1992.
- [49] 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.
- [50] P. Sin, “On the representation theory of modular Hecke algebras,” *J. Algebra*, vol. 146, no. 2, pp. 267–277, 1992.
- [51] 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.
- [52] P. Sin and W. Willems, “ G -invariant quadratic forms,” *J. Reine Angew. Math.*, vol. 420, pp. 45–59, 1991.
- [53] P. Sin, “The Green ring and modular representations of finite groups of Lie type,” *J. Algebra*, vol. 123, no. 1, pp. 185–192, 1989.
- [54] P. Sin and W. Willems, “On induced projective indecomposable modules,” *Proc. Amer. Math. Soc.*, vol. 105, no. 4, pp. 793–801, 1989.
- [55] P. K. W. Sin, “A Green ring version of the Brauer induction theorem,” *J. Algebra*, vol. 111, no. 2, pp. 528–535, 1987.