

Stefaan G. De Winter

Michigan Technological University

Mathematical Sciences

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Personal information

- Born on June 18th, 1979 in Bruges, Belgium
- U.S. permanent resident (Green Card holder)

Education

- PhD in Mathematical Sciences, Ghent University (Belgium), December 2004.
Thesis Advisors: F. De Clerck and J.A. Thas.

Professional positions

- Program Director for Combinatorics, National Science Foundation, 2017 -
- Associate Professor, Michigan Technological University, 2014 -
- Assistant Professor, Michigan Technological University, 2011 - 2014.
- Visiting Assistant Professor, Ohio University, 2010 - 2011.
- Teaching Visitor, UC San Diego, 2009 - 2010.
- Research Fellow, Research Foundation - Flanders (Belgium), 2005 - 2011.
- Research Assistant, Research Foundation - Flanders (Belgium), 2001 - 2005.

Current research interests

- Finite geometries and their interaction with graph theory and coding theory.
- Applications of linear algebra to the theory of strongly regular and distance regular graphs.
- Difference sets and partial difference sets in Abelian groups.

Awards and honors

- Selected as Rotating Program Director in Combinatorics at the National Science Foundation, 2017.
- Outstanding Teaching Award, Dept. Mathematical Sciences MTU, 2017.
- Outstanding Teaching Award - Junior Level, Dept. Mathematical Sciences MTU, 2013.
- REF research grant (Michigan Tech) “Applications of projective geometry”, project value \$14,600, 2012-2013.
- Outstanding Research Award - Junior Level, Dept. Mathematical Sciences, MTU, 2012.
- Outstanding Teaching Award - Junior Level, Dept. Mathematical Sciences MTU, 2012.
- Oberwolfach Research in Pairs, Mathematisches Forschungsinstitut Oberwolfach, Germany, 2007.

Mentoring and supervision

PhD student

- Thomas Maes, PhD, Ghent University, 2011. (Advised jointly with F. De Clerck)

MS students

- Diego Domenzain-Gonzalez, MS, Michigan Technological University, 2014.
- Ellen Kamischke, MS, Michigan Technological University, 2013.
- Ryan Bruner, MS, Michigan Technological University, 2013.

Undergraduate students

- Daniel Gershenson (high school student), Michigan Tech, 2013-2014.
- Andrew Groeneveld, Michigan Tech, summer 2013.
- Mason Korb, Ohio University, 2010-2011.

Teaching mentor

- William Keith (2013-14) and Cécile Piret (2014-15) (junior faculty); Sophie Zhu and Jarrett Dunn (2013-14) (graduate students).

Publications

Publications in refereed journals

1. S. De Winter, C. Ding and V. Tonchev, Maximal arcs and extended cyclic codes, *accepted for Des. Codes Cryptogr.*
2. S. De Winter and Z. Wang, Non-existence of partial difference sets in Abelian groups of order $8p^3$, *accepted for Des. Codes Cryptogr.*
3. S. De Winter, E. Neubert and Z. Wang, Nonexistence of two types of partial difference sets, *Discrete Math.*, **340**, 2130-2133, 2017.
4. S. De Winter and Z. Wang, Classification of partial difference sets in Abelian groups of order $4p^2$, *Des. Codes Cryptogr.*, **84**, 451-461, 2017.
5. R. Bruner and S. De Winter, Weak isometries of Hamming spaces, *J. Algebra Comb. Discrete Struct. Appl.*, **3**, 209-216, 2016.
6. S. De Winter and M. Korb, Weak isometries of the Boolean cube, *Discrete Math.*, **339**, 877-885, 2016.
7. S. De Winter, E. Kammischke and Z. Wang, Automorphisms of strongly regular graphs with applications to partial difference sets, *Des. Codes Cryptogr.*, **79**, 471-485, 2016.
8. S. De Winter, S. Rottey and G. Van de Voorde, Linear representations of subgeometries, *Des. Codes Cryptogr.*, **77**, 203-215, 2014.
9. S. De Winter and D. Jungnickel, The geometric dimension of some small configurations, *J. Geometry* **103**, 417-430, 2012.
10. S. De Winter, J. Schillewaert and J. Verstraete, Large incidence free sets in geometries, *Electronic J. Combin* **19**, P24, 1-16, 2012.
11. F. De Clerck, S. De Winter, T. Maes, Partial flocks of the quadratic cone yielding Mathon maximal arcs, *Discrete Math* **312**, 2421-2428, 2012.
12. F. De Clerck, S. De Winter, T. Maes, Singer 8-arcs of Mathon type in $PG(2, 2^7)$, *Des. Codes Cryptogr.* **64**, 17-31, 2012.
13. F. De Clerck, S. De Winter, T. Maes, A geometric approach to Mathon maximal arcs, *J. Combin. Theory Ser A* **118**, 1196-1211, 2011.
14. S. De Winter, J. Schillewaert, A note on quasi-Hermitian varieties and singular quasi-quadrics, *Bull. Belgian Math. Soc.* **17**, 911-918, 2010.
15. S. De Winter and K. Thas, Partial ovoids and spreads in generalized quadrangles, and related combinatorial structures, *Innov. Incidence Geom.* **11**, 19-33, 2010.
16. S. De Winter and J. Schillewaert, Characterizations of finite classical polar spaces by intersection numbers with hyperplanes and spaces of codimension 2, *Combinatorica* **30**, 25-45, 2010.
17. S. De Winter, F. Lazebnik and J. Verstraete, An extremal characterization of projective planes, *Electronic J. Combin.* **15**, R143, 1-13, 2008.

18. S. De Winter and K. Thas, Generalized quadrangles admitting a sharply transitive Heisenberg group, *Des. Codes Cryptogr.* **47**, 237-242, 2008.
19. S. De Winter and H. Van Maldeghem, The automorphism group of a class of strongly regular graphs related to $Q(6, q)$, *European J. Combin.* **29**, 617-621, 2008.
20. S. De Winter, Non-isomorphic semipartial geometries, *Des. Codes Cryptogr.* **47**, 3-9, 2008.
21. M. Cimrakova, S. De Winter, V. Fack and L. Storme, On the smallest maximal partial ovoids and spreads of the generalized quadrangles $W(q)$ and $Q(4, q)$, *European J. Combin.* **28**, 1934-1942, 2007.
22. S. De Winter and K. Thas, The automorphism group of Payne derived generalized quadrangles, *Adv. Math.* **214**, 146-156, 2007.
23. S. De Winter, Partial geometries $pg(s, t, 2)$ with a regular abelian automorphism group and a characterization of the Van Lint-Schrijver partial geometry, *J. Alg. Combin.* **24**, 285-297, 2006.
24. S. De Winter and K. Thas, Generalized quadrangles with an abelian Singer group, *Des. Codes Cryptogr.* **39**, 81-87, 2006.
25. F. De Clerck, S. De Winter, E. Kuijken and C. Tonesi, Distance-regular $(0, \alpha)$ -reguli, *Des. Codes Cryptogr.* **38**, 179-194, 2006.
26. S. De Winter and J. A. Thas, On semi-pseudo-ovals, *J. Alg. Combin.* **22**, 139-149, 2005.
27. S. De Winter, Linear representations of semipartial geometries, *Bull. Belg. Math. Soc.* **12**, 767-780, 2005.
28. S. De Winter, Elation and translation semipartial geometries, *J. Combin. Theory Ser. A* **108**, 313-330, 2004.
29. S. De Winter and J. A. Thas, SPG-reguli satisfying the polar property and a new semipartial geometry, *Des. Codes Cryptogr.* **32**, 153-166, 2004.
30. F. De Clerck, S. De Winter and J. A. Thas, A characterization of the semipartial geometries $T_2^*(\mathcal{U})$ and $T_2^*(\mathcal{B})$, *European J. Combin.* **25**, 73-85, 2004.
31. S. De Winter, Classification of SPG-systems of index 2, *Adv. Geom.* **3**, 423-432, 2003.

Other publications

1. S. De Winter, E. E. Shult and K. Thas, Singer quadrangles, *Oberwolfach Preprints OWP 2009-07*, 69pp., available at <http://www.mfo.de>

Submitted publications

1. S. De Winter, A. Kodess and F. Lazebnik, A result on polynomials derived from graph theory, *Mathematics Magazine, MAA*

In preparation

1. S. De Winter and K. Metsch, Intriguing sets in distance regular graphs.
2. S. De Winter and J. Schillewaert, Recognizing sets of generators in polar spaces.
3. S. De Winter and Z. Wang, Local multiplier theorems for Paley type PDS and Skew Hadamard difference sets.
4. S. De Winter, The geometry of conics on a common nucleus.

Teaching Experience

Michigan Technological University

Graduate level

- Error-Correcting Codes.
- Algebra I and II.
- Number Theory.
- Advanced topics in Combinatorics, Algebra and Number Theory.

Undergraduate level

- Calculus with Technology I, II and III.
- Introduction to Linear Algebra.
- Preparation for Putnam Exam.
- Introduction to Abstract Algebra.
- Combinatorics and Graph Theory.

Ohio University

Graduate level

- Number Theory.

Undergraduate level

- Calculus I, II and III.
- Introduction to Probability and Statistics.
- Number Theory.

University of California San Diego

- Calculus and Vector Calculus.

Invited presentations

1. Strongly regular Cayley graphs.
Mathematics Colloquium, Georgia State University, March 23, 2018, Atlanta, USA.
2. Intriguing sets in distance regular graphs.
Discrete Math Seminar, Zhejiang University, May 10, 2018, , P.R. China
3. Intriguing sets in Grassmann graphs.
Mathematics Colloquium, National University of Defense Technology, April 26 2018, Changsha, P.R. China
4. Local multiplier results for Paley type partial difference sets.
AMS Sectional Meeting, University of Denver, October 8-9 2016, Denver, USA.
5. A linear algebraic approach to partial difference sets in Abelian groups.
New Directions in Combinatorics, National University of Singapore, May 23-27, 2016, Singapore.
6. Weak isometries of Hamming spaces.
Algebraic Combinatorics and Applications, Michigan Technological University, August 26-28, 2016, Houghton, Michigan, USA.
7. Partial difference sets in Abelian groups.
Combinatorics and Computer Algebra, Colorado State University, July 20-24, 2015, Fort Collins, Colorado, USA.
8. Partial difference sets in Abelian groups.
Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, December 5th, 2014, Fort Collins, Colorado, USA.
9. Automorphisms of strongly regular graphs.
Finite Geometries, Fourth Irsee Conference, September 14th-20th, 2014, Kloster Irsee, Irsee, Germany.
10. An algebraic model for Cayley graphs from subgeometries.
Discrete Math Seminar, University of Delaware, April 22th, 2014, Newark, Delaware.
11. Generalizations of a theorem of Benson for generalized quadrangles.
AMS Sectional Meeting, March 25, 2014 - March 27, 2014, University of Tennessee, Knoxville, Tennessee, USA.
12. Projective Geometry in (Extremal) Combinatorics.
Incidence Geometry and Buildings 2012, February 5, 2012 - February 10, 2012, Ghent University, Ghent, Belgium.
13. Maximal arcs of Mathon type.
Mathematics Colloquium Michigan Technological University, January 17, 2011, Houghton, Michigan, USA.
14. Characterizations of finite geometries as extremal graphs.
2010 SIAM Conference on Discrete Mathematics, special session on Extremal Graphs, June 14-17th, 2010, Austin, Texas, USA.

15. Maximal arcs in Desarguesian planes: Singer arcs.
Discrete Math Seminar, University of Delaware, April 30th, 2010, Newark, Delaware, USA.
16. Geometries with a Singer group.
Mathematics Colloquium, Northern Illinois University, March 24th, 2010, DeKalb, Illinois, USA.
17. Two-weight sets and their geometries, characterization and classification results.
Algebra Seminar, Ohio University, January 26th, 2009, Athens, Ohio, USA.
18. Characterizations of polar spaces.
Geometry Seminar, University of Colorado at Denver, May 7th, 2008, Denver, Colorado, USA.
19. Generalized quadrangles and Singer groups.
Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, May 2nd, 2008, Fort Collins, Colorado, USA.
20. Characterizations of quadrics and Hermitian varieties.
Discrete Math Seminar, University of Delaware, March 8th, 2008, Newark, Delaware, USA.
21. Characterizing finite classical polar spaces by means of intersection numbers.
Discrete Math Seminar, Università degli Studi di Napoli Federico II, July 18th, 2007, Naples, Italy.
22. The full automorphism group of a class of geometries constructed from classical polar spaces.
Special Session on Finite Geometry and Combinatorics (StanleyFest 2007) of the 1025th AMS Meeting, March 16th-19th, Miami University, Oxford, Ohio, USA.
23. The automorphism group of a class of strongly regular graphs.
Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, November 17th, 2006, Fort Collins, Colorado, USA.
24. A class of generalized quadrangles and their automorphism group.
Mathematics Colloquium, University of Regina, October 25th, 2006, Regina, Saskatchewan, Canada.
25. A class of generalized quadrangles and their automorphism group.
Discrete Math Seminar, University of Delaware, October 20th, 2006, Newark, Delaware, USA.
26. The semipartial geometries arising from Buekenhout-Metz unitals.
Finite Geometries, Second Irsee Conference, September 10th-16th, 2006, Kloster Irsee, Irsee, Germany.
27. A unifying structure for (generalized) ovals, ovoids and unitals.
Combinatorics seminar, Shanghai Jiao Tong University, April 4th, 2006, Shanghai, P.R. China.

28. On semi-pseudo-ovals.
Discrete Mathematics Seminar, University of Colorado at Denver, September 19th, 2005, Denver, Colorado, USA.
29. Partial geometries with a regular automorphism group.
Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, September 16th, 2005, Fort Collins, Colorado, USA.

Service

Service to the profession

- Regular referee for the Research Foundation - Flanders (Belgium), since 2015.
- NSF panelist, 2016.
- Referee for the following journals: *Advances in Geometry*, *Bulletin of the Belgian Mathematical Society*, *Designs Codes and Cryptography*, *Discrete Mathematics*, *Finite Fields and their Applications*, *Innovations in Incidence Geometry*, *Journal of Algebraic Combinatorics*, *Journal of Combinatorial Designs*, *Journal of Combinatorial Theory Series A and B*, *Journal of Geometry*, *Journal of Integer Sequences*, *SIAM Journal on Discrete Mathematics*.

Service to NSF

- Member of the MSPRF (postdocs in math) workforce team, 2017-18.
- Member of the Mathematical and Physical Sciences Interface Council, 2017-18.

Service to the university

- University senate, senator and chair (2015-17) of the Finance and Institutional Planning Committee, Michigan Tech, 2013 - 2017.
- Member of the Michigan Tech Global Literacy Assessment Committee, 2014 - 2017.
- Referee for the REF-SEED grant applications, 2015, 2017.
- Referee for the SURF grant applications, 2017.
- Member of the Maternity/Parental Leave Review Group, April-September 2016.
- Referee for the Michigan Tech Graduate Research Colloquium, February 2014.

Service to the department

- Doctoral committee member: David Clark, 2012; Linjia Hu, 2013; Mustafa Gezek, 2015; Adrian Pastine, Samuel Judge, Timothy Wagner, Brian Freyberg, 2016.
- Graduate Committee member, 2011-2012, 2016-2017.
- Writer and grader of qualifying and comprehensive exams, 2012 - 2017.
- Calculus committee member (revision of Calculus syllabi), 2012 - 2014.
- Course coordinator for MA1161, 2012-2014.
- Hiring committee member, 2012 - 2013.