

# Daniel Horsley

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School of Mathematical Sciences  
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Australia

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Citizenship: Australian

## Employment

- 2019 - present:** Associate Professor at Monash University
- 2014 - 2018:** Senior Lecturer at Monash University
- 2011 - 2014:** Lecturer at Monash University
- 2010 - 2011:** Postdoctoral Scholar at Arizona State University
- 2008 - 2010:** AARMS Postdoctoral Research Fellow at Memorial University of Newfoundland
- 2007 - 2008:** Postdoctoral Research Fellow at University of Queensland

## Education

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|---|--------------------------|
| <b>PhD, Mathematics</b> (2008)                      | University of Queensland |
| <b>Bachelor of Science</b> (Honours Class 1) (2002) | University of Queensland |

## External grant funding

- ARC Discovery Project Grant “Fractional decomposition of graphs and the Nash-Williams conjecture” (2023–2027)
- ARC Discovery Project Grant “The Zarankiewicz problem through linear hypergraphs and designs” (2022–2025)
- ARC Future Fellowship “Edge decomposition of dense graphs” (2017–2021)
- ARC Discovery Project Grant “Matchings in combinatorial structures” (2015–2019).
- ARC Discovery Early Career Researcher Award “Partitioning and ordering Steiner triple systems” (2012–2016).
- ARC Discovery Project Grant “A new approach to compressed sensing” (2012–2014).
- Atlantic Association for Research in the Mathematical Sciences Postdoctoral Fellowship (2008–2010).

## Awards

- ICA Kirkman Medal (2010)
- ICA Hall Medal (2017)
- Monash Student Association Teaching Excellence Award (2019)

## Past and present HDR students

- Rosalind Hoyte (PhD, completed in 2017)
- Rakhi Singh (PhD, completed in 2018, “Excellence in PhD Research Award” from IITB)
- Ajani de vas Gunesakara (PhD, completed in 2022)
- Adam Gowty (PhD, completed in 2022)
- Amber Gentle (PhD, commenced in 2020)

## Publications

- [58] J. Hall, D. Horsley and D.R. Stinson, Bounds on data limits for all-to-all comparison from combinatorial designs, *Des. Codes Cryptogr.* (in press).
- [57] G. Chen, D. Horsley and A. Mammoliti, Zarankiewicz numbers near the triple system threshold, *J. Combin. Des.* (in press).
- [56] G. Chen, D. Horsley and A. Mammoliti, Exact values for some unbalanced Zarankiewicz numbers, *J. Graph Theory* **106** (2024), 81–109.
- [55] A. Gowty, D. Horsley and A. Mammoliti, Minimising the total number of subsets and supersets, *European J. Combin.* **118** (2024), Paper No. 103882, 16 pp.
- [54] A. De Vas Gunasekara and D. Horsley, Smaller embeddings of partial  $k$ -star decompositions, *Electron. J. Combin.* **30** (2023), Paper No. 1.19, 20 pp.
- [53] P. Ó Catháin and D. Horsley, Block avoiding point sequencings of partial Steiner systems, *Des. Codes Cryptogr.* **90** (2022), 2375–2383.
- [52] A. De Vas Gunasekara and D. Horsley, An Evans-style result for block designs, *SIAM J. Discrete Math.* **36** (2022), 47–63.
- [51] T. Feng, D. Horsley and X. Wang, Novák’s conjecture on cyclic Steiner triple systems and its generalization, *J. Combin. Theory Ser. A* **184** (2021), 105515, 10 pp.
- [50] D. Horsley and A. Mammoliti, The cyclic matching sequenceability ability of regular graphs, *J. Graph Theory* **98** (2021), 342–366.
- [49] A. Gowty and D. Horsley, More constructions for Sperner partition systems, *J. Combin. Des.* **29** (2021), 579–606.
- [48] D. Horsley, M. Iradmusa and C.E. Praeger, Generating infinite digraphs by derangements, *Q. J. Math.* **72** (2021), 961–974
- [47] S. Akbari, D. Horsley and I.M. Wanless, Induced path factors of regular graphs, *J. Graph Theory* **97** (2021), 260–280
- [46] D. Horsley and B.S. Webb, Countable homogeneous Steiner triple systems avoiding specified subsystems, *J. Combin. Theory Ser. A* **180** (2021), 105434, 16 pp.
- [45] Y. Chang, C.J. Colbourn, A. Gowty, D. Horsley and J. Zhou, New bounds on the maximum size of Sperner partition systems, *European J. Combin.* **90** (2020), 103165, 18 pp.
- [44] D. Bryant, A. De Vas Gunasekara and D. Horsley, On determining when small embeddings of partial Steiner triple systems exist, *J. Combin. Des.* **28** (2020), 568–579.
- [43] R. Cameron and D. Horsley, Decompositions of complete multigraphs into stars of varying sizes, *J. Combin. Theory Ser. B* **145** (2020), 32–64.

- [42] P.J. Dukes and D. Horsley, On the minimum degree required for a triangle decomposition, *SIAM J. Discrete Math.* **34** (2020), 597–610.
- [41] R. Singh, A. Das and D. Horsley,  $SUE(s^2)$ -optimal supersaturated designs, *Statist. Probab. Lett.* **158** (2020), 108673, 5 pp.
- [40] C.J. Colbourn, R.E. Dougherty and D. Horsley, Distributing hash families with few rows, *Theoret. Comput. Sci.* **800** (2019), 31–41.
- [39] N. Francetić, S. Herke and D. Horsley, MAX for  $k$ -independence in multigraphs, *Discrete Appl. Math.* **265** (2018), 56–68.
- [38] A. Das, D. Horsley and R. Singh, Pseudo generalized Youden designs, *J. Combin. Des.* **26** (2018), 439–454.
- [37] D. Horsley and R. Singh, New lower bounds for  $t$ -coverings, *J. Combin. Des.* **26** (2018), 369–386.
- [36] D. Bryant, D. Horsley, B. Maenhaut and B.R. Smith, Decompositions of complete multigraphs into cycles of varying lengths, *J. Combin. Theory Ser. B* **129** (2018), 79–106.
- [35] C.J. Colbourn, D. Horsley and V.R. Syrotiuk, A hierarchical framework for recovery in compressive sensing, *Discrete Applied Mathematics* **236** (2018), 96–107.
- [34] D. Bryant, C.J. Colbourn, D. Horsley and I.M. Wanless, Steiner triple systems with high chromatic index, *SIAM J. Discrete Math.* **31** (2017), 2603–2611.
- [33] D. Horsley, Switching techniques for edge decompositions of graphs, *Surveys in Combinatorics 2017 (London Mathematical Society Lecture Note Series 440)* (2017), 238–271.
- [32] D. Horsley, Generalising Fisher’s inequality to coverings and packings, *Combinatorica* **27** (2017), 673–696.
- [31] D. Bryant, C.J. Colbourn, D. Horsley, P. Ó Catháin, Compressed sensing with combinatorial designs: theory and simulations. *IEEE Trans. Inform. Theory* **63** (2017), 4850–4859.
- [30] D. Horsley and R.A. Hoyte, Decomposing  $K_{u+w} - K_u$  into cycles of prescribed lengths, *Discrete Mathematics* **340** (2017), 1818–1843.
- [29] D. Horsley and R.A. Hoyte, Doyen-Wilson Results for Odd Length Cycle Systems, *J. Combin. Des.* **30** (2016), 308–335.
- [28] C.J. Colbourn, B. Fan and D. Horsley, Disjoint spread systems and fault location, *SIAM J. Discrete Math.* **30** (2016), 2011–2026.
- [27] B. Alspach, D. Bryant, D. Horsley, B. Maenhaut and V. Scharaschkin, On factorisations of complete graphs into circulant graphs and the Oberwolfach problem, *Ars Math. Contemp.* **11** (2016) 157–173.
- [26] N. Francetić, S. Herke and D. Horsley, More nonexistence results for symmetric pair coverings, *Linear Algebra Appl.* **487** (2015), 43–73.
- [25] D. Bryant and D. Horsley, Steiner triple systems without parallel classes, *SIAM J. Discrete Math.* **29** (2015), 693–696.
- [24] D. Horsley, Embedding Partial Steiner Triple Systems with Few Triples, *SIAM J. Discrete Math.* **28** (2014), 1199–1213.
- [23] D. Horsley, Small Embeddings of Partial Steiner Triple Systems, *J. Combin. Des.* **22** (2014), 343–365.
- [22] D. Bryant, D. Horsley, and W. Pettersson, Cycle decompositions V: Complete graphs into cycles of arbitrary lengths, *Proc. London Math. Soc.* **108** (2014), 1153–1192.

- [21] D. Horsley and D.A. Pike, On balanced incomplete block designs with specified weak chromatic number, *J. Combin. Theory Ser. A* **123** (2014), 123–153.
- [20] P. Danziger, D. Horsley and B.S. Webb, Resolvability of infinite designs, *J. Combin. Theory Ser. A* **123** (2014), 73–85.
- [19] Y.M. Chee, C.J. Colbourn, D. Horsley and J. Zhou, Sequence Covering Arrays, *SIAM J. Discrete Math.* **27** (2013), 1844–1861.
- [18] D. Bryant and D. Horsley, A second infinite family of Steiner triple systems without almost parallel classes, *J. Combin. Theory Ser. A* **120** (2013), 1851–1854.
- [17] C.J. Colbourn, D. Horsley and C. Wang, Colouring Triples in Every Way: A Conjecture, *Quaderni di Matematica* **28** (2012), 257–286.
- [16] C.J. Colbourn, D. Horsley and C. Wang, Trails of triples in partial triple systems, *Des. Codes Cryptogr.* **6** (2012), 199–212.
- [15] C.J. Colbourn, D. Horsley and V.R. Syrotiuk, Strengthening hash families and compressive sensing, *J. Discrete Algorithms* **16** (2012), 170–186.
- [14] D. Horsley, Decomposing various graphs into short even-length cycles. *Ann. Comb.* **16** (2012), 571–589.
- [13] D. Bryant, M. Buchanan, D. Horsley, B. Maenhaut and V. Scharaschkin, The non-existence of certain pair covering designs with at least as many points as blocks, *Combinatorica*, **31** (2011), 507–528.
- [12] C.J. Colbourn, D. Horsley and C. McLean, Compressive sensing matrices and hash families, *IEEE Trans. on Communications* **59** (2011), 1840–1845.
- [11] D. Horsley, D.A. Pike and A. Sanaei, Existential closure of block intersection graphs of infinite designs having infinite block size, *J. Combin. Des.* **19** (2011), 317–327.
- [10] D. Horsley, Maximum packings of the complete graph with uniform length cycles, *J. Graph Theory* **68** (2011), 1–7.
- [9] D. Bryant, D. Horsley, B. Maenhaut and B.R. Smith, Cycle decompositions of complete multi-graphs, *J. Combin. Des.* **19** (2011), 42–69.
- [8] D. Bryant and D. Horsley, An asymptotic solution to the cycle decomposition problem for complete graphs, *J. Combin. Theory Ser. A* **117** (2010), 1258–1284.
- [7] D. Horsley and D.A. Pike, On cycle systems with specified weak chromatic number, *J. Combin. Theory Ser. A* **117** (2010), 1195–1206.
- [6] D. Horsley and D.A. Pike, Embedding partial odd-cycle systems in systems with orders in all admissible congruence classes, *J. Combin. Des.* **18** (2010), 202–208.
- [5] D. Bryant and D. Horsley, Decompositions of complete graphs into long cycles, *Bull. Lond. Math. Soc.* **41** (2009), 927–934.
- [4] D. Bryant and D. Horsley, A proof of Lindner’s conjecture on embeddings of partial Steiner triple systems, *J. Combin. Des.* **17** (2009), 63–89.
- [3] D. Bryant and D. Horsley, Packing cycles in complete graphs, *J. Combin. Theory Ser. B* **98** (2008), 1014–1037.
- [2] D. Bryant and D. Horsley, Steiner triple systems with two disjoint subsystems, *J. Combin. Des.* **14** (2006), 14–24.

- [1] D. Bryant, D. Horsley and B. Maenhaut, Decompositions into 2-regular subgraphs and equitable partial cycle decompositions, *J. Combin. Theory Ser. B* **93** (2005), 67–72.

## Conference presentations

### Invited plenary presentations

- Combinatorial Constructions Conference, Dubrovnik, Croatia, April 2024.
- Stinson66 - New Advances in Designs, Codes and Cryptography, Fields Institute, Toronto, Canada, June 2022.
- Thailand-Japan Conference on Discrete and Computational, Graphs, and Games, Chiang Mai, Thailand (originally scheduled for December 2020, held online September 2021).
- 42nd Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Sydney, Australia, December 2019.
- Groups in Galway, Galway, Ireland, May 2018.
- 26th British Combinatorial Conference, Glasgow, UK, June/July 2017.
- Interactions with Combinatorics, Birmingham, UK, June 2017.
- 2016 Midwest Combinatorics Conference, Normal, USA, October 2016.
- 3rd Istanbul Design Theory, Graph Theory and Combinatorics Workshop, Istanbul, Turkey, June 2016.
- Combinatorics 2016, Maratea, Italy, May/June 2016.
- 5th Early Career Workshop of the Australian Mathematical Society, Leura, Australia, September 2013.
- 36th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, UNSW, Australia, December 2012.
- Workshop on Coding, Cryptology and Combinatorial Designs, Singapore, May/June 2011.

### Other presentations

- Constructive and Probabilistic Methods in Combinatorics, Zagreb, Croatia, September 2023.
- 44th Australasian Combinatorics Conference, Dunedin, New Zealand, December 2022 (held online).
- Waterloo Algebraic Graph Theory Seminar, November 2022 (online).
- 43rd Australasian Combinatorics Conference, Melbourne, Australia, December 2021 (held online).
- 8th European Congress of Mathematics (rescheduled, held online Jun 2021).
- 2020 Australian Maths Society Meeting, December 2020 (held online).
- 2020 Canadian Mathematical Society Winter Meeting, December 2020 (held online).
- Combinatorial Mathematics Society of Australasia Seminar, July 2020 (online).
- 41st Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Rotorua, New Zealand, December 2018.
- Conference on Combinatorics and its Applications, Singapore, July, 2018.
- Combinatorics 2018, Arco, Italy, June 2018.
- Graphs, Groups and More, Koper, Slovenia, May/June 2018.
- 5th International Combinatorics Conference, Melbourne, Australia, December 2017.
- 40th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Newcastle, Australia, December 2016.
- 39th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Brisbane, Australia, December 2015.
- Combinatorics and Computer Algebra 2015, Fort Collins, USA, July 2015.

- 25th British Combinatorial Conference, Coventry, UK, June/July 2015.
- 38th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Wellington, New Zealand, December 2014.
- International Conference on Graphs and Combinatorics, Beijing, China, August 2014.
- The 19th International Linear Algebra Society Conference, Seoul, Korea, August 2014.
- 37th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Perth, Australia, December 2013.
- 57th Annual Meeting of the Australian Mathematical Society, Sydney, Australia, September/October 2013.
- 24th British Combinatorial Conference, London, UK, June/July 2013.
- 4th Canadian Discrete and Algorithmic Mathematics Conference, St John's, Canada, June 2013 (two invited minisymposium presentations).
- 18th Coast Combinatorics Conference, Kona, US, July 2013.
- SIAM Conference on Discrete Mathematics, Halifax, Canada, June 2012 (invited minisymposium presentation).
- 35th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Monash University, Australia, December 2011.
- 23rd British Combinatorial Conference, University of Exeter, UK, July 2011.
- Combinatorics 2010, Verbania, Italy, June/July 2010.
- SIAM Conference on Discrete Mathematics, Austin, USA, June 2010.
- 23rd Midwest Conference on Combinatorics, Cryptography, and Computing, Rochester Institute of Technology, USA, October 2009.
- 21st British Combinatorial Conference, University of Reading, UK, July 2007.
- Workshop on Designs, Graphs, and their Topological Representations, University of Queensland, Australia, April 2007.
- 31st Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Alice Springs, Australia, July 2006.
- 30th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, University of Queensland, Australia, Dec 2005.
- 2004 NZIMA Conference in Combinatorics/29th Australasian Conference in Combinatorial Mathematics and Combinatorial Computing, Lake Taupo, New Zealand, Dec 2004.

## Professional Service Roles

- Editor in chief of *Journal of Combinatorial Designs*.
- Member of the editorial board for *Bulletin of the Institute of Combinatorics and its Applications*.
- Treasurer of Combinatorial Mathematics Society of Australasia
- Organiser of CMSA seminar
- Former managing editor for *Australasian Journal of Combinatorics*.