

Curriculum Vitae (February 2023)

Name Vitaliy A Kurlin **Computer Science** department
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Research Mathematical Data Science **Applications** : Crystallography, Materials

Successes since February 2022: the new *Crystal Isometry Principle* appeared in four publications including NeurIPS. Nine journal papers are published or accepted, e.g. in Foundations Comp. Maths, Acta Cryst A, Phys. Rev. E, JACS. Won the New Horizons EPSRC grant (£250K). Selected as one of 6 co-chairs to run 3 symposia in math. crystallography at the triannual IUCr Congress 2023. Acta Cryst A will publish post-proceedings of the 3rd MACMSIN, which I founded in 2020. Two PhD students graduated in 2022.

Higher education

2000 – 2003 (full time) *PhD thesis* in Geometry and Topology, Moscow State University
 1995 – 2002 (part time) *MSc thesis* in Mathematics, Independent University of Moscow
 1995 – 2000 (full time) *MSc thesis* in Mathematics, Moscow State University

Academic training

March – October 2021 *Heilbron leadership programme*, University of Liverpool, UK
 Sep 2008 – Sep 2009 *Postgraduate Certificate* in Teaching and Learning in HE, UK

Employment record

Since Sep 2016 Senior Lecturer, then Reader, now Professor, University of Liverpool, UK
 2014 – 2016 Visiting scientist in Computer Vision, [Microsoft](#), Cambridge, UK
 2007 – 2016 Lecturer in Mathematics, Durham University, UK
 June – Sep 2007 Research Assistant in Sensor Networks, Lancaster University, UK
 2005 – 2007 Marie Curie International Incoming Fellow, University of Liverpool, UK
 Feb – July 2005 Postdoctoral Fellow, Independent University of Moscow, Russia
 2003 – 2004 Postdoctoral Fellow, University of Burgundy, Dijon, France

Teaching experience

Since 2019 Developed and led the PhD training in AI and Data Science with 20 two-hour sessions per year for 20+ PhD students from doctoral networks [AI for Future Digital Health](#), Distributed Algorithms, Materials Chemistry and HLS faculty.
 Since 2018 Developed and taught the 15-credit module COMP229 (Introduction to Data Science), which annually attracted on average 100+ mathematics students.
 2017 – 2019 Taught the industry-oriented COMP315 (technologies of e-commerce) and COMP213 (object-oriented programming) for large classes of 150+ students.
 2013 *Lecturer of the Year Award* by the Student Union at Durham University.
 2007 – 2016 Taught mathematics modules to large classes of up to 250 students.

PhD training and COMP229 contribute to the University Strategy by connecting the latest research with innovative teaching of practical skills to extract insights from data.

International leadership

- Since 2021 Consultant representing the UK in the International Union of Crystallography (IUCr) Commission on [Mathematical Crystallography](#). One of six co-chairs to run three mathematical symposia at the triannual IUCr Congress 2023.
- 2021 Co-organiser of mini-symposia at the [British Applied Mathematical Colloquium](#) and the SIAM conference [Mathematical Aspects of Materials Science](#).
- Since 2020 Associate editor in the journals [Pattern Recognition](#) and [Journal of Imaging](#).
- Since 2020 Founder and organiser of the new annual conference [MACSMIN](#) = Mathematics and Computer Science for Materials Innovation. Guest editor of the journal [Acta Crystallographica A](#) to publish post-proceedings of MACSMIN 2022.
- 2020 – 2021 Co-chair of the workshop [Artificial Intelligence for Future Digital Health](#). Programme committee membership at the international conferences [Topology-based methods in Visualisation 2017-22](#)
- Since 2017 [Mathematical Foundations of Computer Science 2018](#)
[Computational Topology in Image Context 2019](#).
- Since 2017 Memberships in EPSRC [peer review college](#), Carnegie Trust [panel](#), [European Crystallographic Association](#), UK [Higher Education Academy](#).

Professional experience at the University of Liverpool

Since 2017 I have led of the Data Science Theory and Applications [group](#) in the MIF.

- two postdocs: university teacher Dr Phil Smith, one more is starting in November
- two PhD graduates in 2021 became postdocs at Universities of Oxford and Liverpool
- two finishing PhD students got jobs in a US national lab, Wellcome Sanger Institute
- first supervisor for seven PhD students (three students were co-funded by industry)
Matthew Bright, Daniel Widdowson, Milo Torda, Thomas Welsch (£18K by Unilever), Jonathan McManus (£34K by CCDC), Danny Ritchie, Will Jeffcott (£30K by Unilever).

- Since 2021 Director of the UoL doctoral network [AI for Future Digital Health](#), which now has 17 PhD students co-supervised with industry across three cohorts.
- Since 2019 Founder and organiser of the cross-departmental research network seminar [MIF++](#), which has attracted over £1M of funding in collaborative projects.
- 2018–2021 Interview panels in departments of Chemistry, Communication and Media.
- 2017–2020 Departmental representative in the Science and Engineering impact network.
- Since 2017 Main organiser of the UK network [Applied Algebraic Topology](#) funded by the London Mathematical Society between Liverpool, Southampton, Queen Mary.

Research experience (over £1.2M of PI's grant income for Liverpool since 2017)

- 2022 – 2024 **EPSRC New Horizons** grant (£250K), PI with a postdoc for 20 months.
Title: Inverse design of periodic crystals.
- 2021 – 2023 **RAEng Industrial Fellowship** (£220K) covering a teaching replacement, the Cambridge Crystallographic Data Centre contributed £60K for a postdoc.
- 2020 – 2023 **NERC £965K grant** led by Liverpool Chemistry, co-I responsible for the Data Science part to improve plastic waste recycling for the Net Zero target.
- 2018 – 2023 **EPSRC £3.5M grant** with Oxford and Swansea, lead co-I at Liverpool with the budget £700K+. *Title:* Application-driven Topological Data Analysis.
- 2017 – 2019 **Royal Society International Exchanges** programme (£12K) with IST Austria.
Title: Topological Data Analysis for a faster discovery of materials.
- 2011 – 2013 **EPSRC first grant** (£125K) with a postdoctoral assistant for 14 months.
Title: Persistent topological structures in noisy images, ref. [EP/I030328/1](#).
- 2005 – 2007 **Marie Curie International Incoming Fellowship** (€142K), Liverpool.
- 2003 – 2004 Postdoctoral Fellowship by the Council of Burgundy (€22K), France.
- 2001 – 2003 **INTAS PhD Fellowship** (€10K), Moscow State University.

Talks at international conferences since July 2019

- January 2023 Joint Mathematics Meetings, Boston, US (30-min talk)
- October 2022 Fall Workshop in Computational Geometry, Raleigh, US (20-min talk)
- October 2022 17th International Symposium on Visual Computing, San Diego (20-min talk)
- September 2022 The interdisciplinary world of tangling, Potsdam, Germany (30-min talk)
- July 2022 32nd International Symposium on Chirality, Chicago, US (30-min talk)
- July 2022 Applied Topology in Frontier Sciences, Singapore (50-min invited talk)
- July 2022 Int. Congress of Mathematicians (geometry sec.), Copenhagen (15-min talk)
- July 2022 Applied Topology, Bedlewo Conference Centre, Poland (45-min invited talk)
- June 2022 Computational Topology workshop, CGWeek in Berlin (30-min invited talk)
- October 2021 Data and Computation for Materials Science and Innovation (20 min)
- August 2021 International Union of Crystallography Congress (two talks: 20+25 min)
- June 2021 Online workshop in Geometric Topology (30-min invited talk)
- May 2021 The geometry and topology behind fabrics at multiple scales (40 min)
- April 2021 Mini-symposium Mathematics for Materials Science at BAMC (20 min)
- September 2020 Machine Learning and Dynamical Systems, Fields Institute (30 min)
- June 2020 SIAM mini-symposium on Topological Image Analysis (25 min), Zoom
- January 2020 Applied Machine Learning Days, AI & Topology track (30 min), EPFL
- November 2019 Artificial Intelligence for Materials Discovery (30 min), Southampton
- August 2019 Mathematical Crystallography (30-min contributed talk), Vienna
- July 2019 Extreme Weather Event Generation (45-min invited talk), Lorentz centre
- July 2019 Accelerating materials discovery (40-min invited talk), Liverpool, UK

Industrial collaboration

- Impact case study**, since 2021 200B+ pairwise comparisons of all 660K+ periodic crystals in the world's largest collection of real materials (Cambridge Structural Database) confirmed the new **Crystal Isometry Principle** : any real crystalline materials has a unique geographic-style location in a common Crystal Isometry Space, see papers J34, C27.
- [Cambridge Crystallographic Data Centre](#) since 2018 [RAEng Industrial Fellowship](#) at the is based on joint work J34, C20-22 and led to the £60K cash investment into a shared post-doc in addition to the £94K cash to fund three PhD students.
- [Unilever](#) since 2018 Partner in the £3.5M EPSRC grant (2018-2023), which I lead in Liverpool, and the £965K NERC grant (2020-2023) and co-funded £42K cash in 2019 and 2021 for my PhD students, who work on automating data processing and plastic waste reduction.
- [Intel Parallel Computing Centre](#), 2017 – 2020 Funded the [PhD of Grzegorz Muszynski](#) at Liverpool via the Lawrence Berkeley lab (US). Papers J22-25 and C17 applied Topological Data Analysis to Climate Science for the first time.
- [Microsoft Research](#), Cambridge, 2014–2016 Knowledge Transfer Secondment : £20K from EPSRC plus £75K in-kind contribution from Microsoft led to the new method of image segmentation into superpixels, see papers J19-21, C8, C10.

Public engagement

- 2019 [Science Slam talk award](#) at the European Crystallographic Meeting (Vienna).
- 2017 Public talk "What can Deep Learning do with Big Data?" at Pint of Science.

Peer-reviewed journal articles (over 1000 citations on Google Scholar)

The key papers developing the new research area [Geometric Data Science](#) for applications in Materials Science and Crystallography are J40, J38, J35, J34, J31, J30, J29, J27, C27.

Three journal papers in 2023

- J41.** M.Torda, J.Goulermas, R.Půček, V.Kurlin. Entropic trust region for densest crystallographic symmetry group packings. *SIAM J. on Scientific Computing*, to appear.
- J40.** M. Bright, A. Cooper, V. Kurlin. Geographic-style maps for 2-dimensional lattices. *Acta Crystallographica A*, v. 79 (2023), p. 1-13, [doi:10.1107/S2053273322010075](https://doi.org/10.1107/S2053273322010075).
- J39.** C.Hargreaves, M.Gaultois, L.Daniels, E.Watts, V.Kurlin, M.Moran, Y.Dang, R.Morris, A.Morscher, K.Thompson, M.Wright, B.Prasad, F.Blanc, C.Collins, C.Crawford, B.Duff, J.Evans, J.Gamon, G.Han, B.Leube, H.Niu, A.Perez, A.Robinson, O.Rogan, P.Sharp,

E.Shoko, M.Sonni, W.Thomas, A.Vasylenko, L.Wang, M.Rosseinsky, M.Dyer. A Database of Experimentally Measured Lithium Solid Electrolyte Conductivities Evaluated with Machine Learning. *npj Computational Materials*, 9, 9 (2023), [doi:10.1038/s41524-022-00951-z](https://doi.org/10.1038/s41524-022-00951-z).

Six journal papers in 2022

J38. V. Kurlin. Mathematics of 2-dimensional lattices (59 pages). *Foundations of Computational Mathematics*, 2022, [doi:10.1007/s10208-022-09601-8](https://doi.org/10.1007/s10208-022-09601-8).

J37. A. Vriza, I. Sovago, D. Widdowson, P. Wood, V. Kurlin, M. Dyer. Molecular Set Transformer: Attending to the co-crystals in the Cambridge Structural Database. *Digital Discovery*, v.1 (2022), p.834-850, [doi:10.1039/D2DD00068G](https://doi.org/10.1039/D2DD00068G).

J36. M. Torda, Y. Goulermas, V. Kurlin, G. Day. Densest plane group packings of regular polygons. *Physical Review E*, 2022, 106, 5, 054603.

J35. Q. Zhu, J. Johal, D. Widdowson, Z. Pang, B. Li, C. Kane, V. Kurlin, G. Day, M. Little, A. Cooper. Analogy Powered by Prediction and Structural Invariants: Computationally-Led Discovery of a Mesoporous Hydrogen-Bonded Organic Cage Crystal. *J Amer. Chem. Society*, 2022, 144, 22, 9893–9901.

J34. D. Widdowson, M. Mosca, A. Pulido, V. Kurlin, A. Cooper. Average Minimum Distances of periodic point sets are fundamental invariants for mapping all periodic crystals. *MATCH Communications Math. Comp. Chemistry*, v.87(3), p.529-559 (2022).

J33. M. Bright, O. Anosova, V. Kurlin. A formula for the linking number in terms of isometry invariants of straight line segments. *Computational Mathematics and Mathematical Physics*, 2022, v. 62, no. 8, p. 1217-1233.

Three journal papers in 2021

J32. Y. Elkin, V. Kurlin. Isometry invariant shape recognition of projectively perturbed clouds by the mergegram extending 0D persistence. *Mathematics*, 2021, 9(17), 2121.

J31. P. Smith, V. Kurlin. Skeletonisation algorithms with guarantees for unorganised point clouds with high levels of noise. *Pattern Recognition*, v.115 (2021), 107902.

J30. K.Vriza, A.Canaj, R.Vismara, L.Cook, T.Manning, M.Gaultois, P.Wood, V.Kurlin, N.Berry, M.Dyer, M.Rosseinsky. One class classification as a practical approach for accelerating $\pi - \pi$ co-crystal discovery. *Chemical Science*, v.12 (2021), p. 1702-1719.

Four journal papers in 2020

J29. C. Hargreaves, M. Gaultois, V. Kurlin, M. Rosseinsky. The Earth Mover's Distance as a Metric for the Space of Inorganic Compositions. *Chemistry of Materials*, v. 32 (24), p. 10610-10620 (2020).

J28. M. Bright, V. Kurlin. Encoding and Topological Computation on Textile Structures. *Computers & Graphics*, v. 90 (2020), p. 51-61.

J27. M. Mosca, V. Kurlin. Voronoi-based similarity distances between arbitrary crystal lattices. [Crystal Research & Technology](#), 1900197 (2020), extended at [arxiv:2002.11165](#).

J26. V. Kurlin, G. Muszynski. Persistence-based resolution-independent meshes of superpixels [Pattern Recognition Letters](#), v. 131 (2020), p. 300-306.

Three journal papers in 2019

J25. S. Kalisnik, V. Kurlin, D. Lesnik. A Higher-dimensional Homologically Persistent Skeleton. [Advances in Applied Mathematics](#), v.102 (2019), p.113-142.

J24. J. Rutz et al. The Atmospheric River Tracking Method Intercomparison Project: Quantifying Uncertainties in Atmospheric River Climatology. [Journal Geophysical Research: Atmospheres](#), v.124 (24), 2019, 13777-13802.

J23. G. Muszynski, K. Kashinath, V. Kurlin, M. Wehner, Prabhat. Topological Data Analysis and Machine Learning for Recognizing Atmospheric River Patterns in Large Climate Datasets. [Geoscientific Model Development](#), v. 12 (2019), p. 613-628.

Earlier journal papers before 2019

J22. C. Shields et al. Atmospheric River Tracking Method Intercomparison Project. [Geoscientific Model Development](#), v. 11 (2018), p. 2455-2474.

J21. J. Forsythe, V. Kurlin. Convex Constrained Meshes for superpixel segmentations of images. [Journal of Electronic Imaging](#) (2017), 26(6), 061609 (13 pages).

J20. V. Kurlin. A fast persistence-based segmentation of noisy 2D clouds with provable guarantees, [Pattern Recognition Letters](#), v. 83P1 (2016) p. 3-12.

J19. V. Kurlin. A one-dimensional Homologically Persistent Skeleton of an unstructured point cloud in any metric space. [Computer Graphics Forum](#), v. 34-5 (2015), p. 253-262.

J18. A. Chernov, V. Kurlin. Reconstructing persistent graphs structures from noisy images. [Journal Image-A](#), v. 3 (2013), no. 5, p. 19-22.

J17. V. Kurlin, L. Mihaylova. How many wireless sensors are needed to guarantee connectivity of a 1-dimensional network with random inter-node spacings? [Journal of Applied Probability and Statistics](#), v. 8 (2013), no. 2, p. 27–50.

J16. V. Kurlin. Computing braid groups of graphs with applications to robot motion planning. [Homology, Homotopy and Applications](#), v. 14 (2012), no. 1, p. 159-180.

J15. T. Fiedler, V. Kurlin. Recognizing trace graphs of closed braids. [Osaka J. Mathematics](#), v.47 (2010), no. 4, p. 885–909

J14. T. Fiedler, V. Kurlin. A one-parameter approach to links in a solid torus. [J. Math. Soc. of Japan](#), v. 62 (2010), no. 1, p. 167–211. The order of authors is alphabetical. I have learned and applied singularity theory to make all proofs rigorous.

J13. T. Fiedler, V. Kurlin. Fiber quadriseccants in knot isotopies. [J. Knot Theory Ramifications](#), v. 17 (2008), no. 11, p. 1415–1428.

- J12.** C. Kearton, V. Kurlin. All 2-dimensional links live inside a universal 3-dimensional polyhedron. [Algebraic and Geometric Topology](#), v. 8 (2008), no. 3, p. 1223–1247.
- J11.** V. Kurlin. Gauss paragraphs of classical links and a characterization of virtual link groups. [Math. Proc. Camb. Phil. Soc.](#), v. 145 (2008), no. 1, p. 129–140.
- J10.** V. Kurlin, D. Lines. Peripherally specified homomorphs of link groups. [J. Knot Theory Ramifications](#), v. 16 (2007), no. 6, p. 719–740.
- J9.** V. Kurlin. The Baker-Campbell-Hausdorff formula in the free metabelian Lie algebra. [J. Lie Theory](#), v. 17 (2007), no. 3, p. 525–538.
- J8.** V. Kurlin. Three-page encoding and complexity theory for spatial graphs. [J. Knot Theory Ramifications](#), v. 16 (2007), no. 1, p. 59–102.
- J7.** V. Kurlin. Compressed Drinfeld associators. [J. Algebra](#), v. 292 (2005), p. 184–242.
- J6.** V. Kurlin, V. Vershinin. Three-page embeddings of singular knots. [Functional Analysis and Its Applications](#), v. 38 (2004), no. 1, p. 14–27.
- J5.** V. Kurlin. Basic embeddings of graphs and Dynnikov’s method of 3-page embeddings. [Russian Mathematical Surveys](#), v. 58 (2003), no. 2, p. 163–164.
- J4.** V. Kurlin. Three-page Dynnikov’s diagrams of spatial 3-valent graphs. [Functional Analysis and Its Applications](#) v. 35 (2001), no. 3, p. 230–233.
- J3.** V. Kurlin. Basic embeddings into a product of graphs. [Topology and Its Applications](#), v. 102 (2000), p. 113–137.
- J2.** V. Kurlin. Reduction of framed links to ordinary links. [Russian Mathematical Surveys](#), v. 54 (1999), p. 845–846.
- J1.** V. Kurlin. Invariants of colour links. [Moscow University Mathematical Bulletin](#), v. 54 (1999), p. 42–44.

Peer-reviewed proceedings or book chapters

Six conference papers in 2022

- C27.** D. Widdowson, V. Kurlin. Resolving the data ambiguity for periodic crystals (13 pages). *Advances in Neural Information Processing Systems (NeurIPS 2022)*, v.35.
- C26.** P. Smith, V. Kurlin. A practical algorithm for degree-k Voronoi domains of three-dimensional periodic point sets (14 pages). *Proceedings of International Symposium on Visual Computing 2022*, *Lecture Notes in Computer Science*, v.13599.
- C25.** O. Anosova, V. Kurlin. Density functions of periodic sequences. *Proceedings of Discrete Geometry and Mathematical Morphology 2022*, *Lecture Notes in Computer Science*, v.13493, p.395-408.
- C24.** Y. Elkin, V. Kurlin. Counterexamples expose gaps in the proof of time complexity for cover trees introduced in 2006 (9 pages). *Proceedings of TopoInVis 2022*.

C23. G. Muszynski, V. Kurlin, D. Morozov, M. Wehner, K. Kashinath, P. Ram. Topological Methods for Pattern Detection in Climate Data. *Big Data Analytics in Earth, Atmospheric and Ocean Sciences*, p. 227-242, Wiley.

C22. J. Ropers, M. Mosca, O. Anosova, V. Kurlin, A. Cooper. Fast predictions of lattice energies by continuous isometry invariants of crystal structures (15 pages). *Proceedings of DAMDID: Data Analytics and Management in Data Intensive Domains*, p. 178-192.

Two conference papers in 2021

C21. O. Anosova, V. Kurlin. An isometry classification of periodic point sets. *Proceedings of Discrete Geometry and Mathematical Morphology 2021*, Lecture Notes in Computer Science, v.12708, p. 229-241.

C20. H.Edelsbrunner, T.Heiss, V.Kurlin, P.Smith, M.Wintraecken. The density fingerprint of a periodic point set, 16 pages. *Symposium Computational Geometry 2021*.

Five conference papers in 2020

C19. M. Bright, O. Anosova, V. Kurlin. A proof of the invariant-based formula for the linking number and its asymptotic behaviour. *Proceedings of NumGrid 2020 (Numerical Geometry, Grid Generation and Scientific Computing)*. *Springer Lecture Notes in Computational Science and Engineering*, v.143, p.37-60.

C18. Y. Elkin, V. Kurlin The mergegram of a dendrogram and its stability. *Proceedings of MFCS 2020 (Mathematical Foundations of Computer Science)*.

C17. G. Muszynsky, Prabhat, J. Balewski, K. Kashinathy, M. Wehner, V. Kurlin. Atmospheric Blocking Pattern Recognition in Global Climate Model Simulation Data. *Proceedings of ICPR 2020 (International Conference on Pattern Recognition)*.

C16. T. Welsch, V. Kurlin. Synthesis through Unification Genetic Programming. *Proceedings of GECCO 2020 (Genetic and Evolutionary Computation Conference)*.

C15. A. Siddiqui, V. Kurlin. Polygonal Meshes of Noisy Images based on a new Thinning Algorithm with Theoretical Guarantees. *Proceedings of VISAPP 2020 (International Conference on Computer Vision Theory and Applications)*.

Three conference papers in 2019

C14. P. Smith, V. Kurlin. Resolution-independent meshes of superpixels. *Advances in Visual Computing (Proceedings of International Symposium on Visual Computing 2019)*, v. 11844, p. 194-205

C13. N. Ban, W. Yamazaki, V. Kurlin. Development of a Reconstruction Method for Major Vortex Structure around Tandem Flapping Wing Object via Vortex Trajectory Method. *American Institute of Aeronautics and Astronautics SciTech Forum (2019)*.

C12. V. Kurlin, G. Muszynski. A persistence-based approach to automatic detection of line segments in images. *Proceedings of CTIC 2019 (Computational Topology in Image Context)*, LNCS, v. 11382 (2019), p. 137-150.

Earlier conference papers before 2019

C11. G. Muszynski, K. Kashinath, V. Kurlin, M. Wehner, Prabhat. Towards a topological pattern detection in fluid and climate simulation data. Proc. [Climate Informatics 2018](#).

C10. V. Kurlin, D. Harvey. Superpixels Optimized by Color and Shape (SOCS). Proceedings of [EMMCVPR 2017](#), LNCS, v. 10746, p. 297-311.

C9. V. Kurlin. Computing invariants of knotted graphs given by sequences of points in 3D. In *Topological Methods in Data Analysis and Visualization IV*, Springer series [MathVis: Mathematics and Visualization](#) (2017), p.349-363 (post-proceedings of [TopoInVis 2015](#)).

C8. J. Forsythe, V. Kurlin, [A. Fitzgibbon](#). *Convex Constrained Meshes of superpixels without small angles*. Proceedings of [ISVC 2016: International Symposium on Visual Computing](#), Lecture Notes in Computer Science, v. 10072 (2016), p. 223-233.

C7. V. Kurlin, C. Smithers. A linear time algorithm for embedding arbitrary knotted graphs into a 3-page book. In *Computer Vision, Imaging and Computer Graphics Theory and Applications*. Springer series [CCIS: Communications in Computer and Information Science](#) (2016), p. 99-122 (extended from proceedings paper [C4] in [IVAPP 2015](#)).

C6. V. Kurlin. A Homologically Persistent Skeleton is a fast and robust descriptor of interest points in 2D images. [Lecture Notes in Computer Science](#), v. 9256 (2015), p. 606-617 (Proceedings of [CAIP 2015: Computer Analysis of Images and Patterns](#)).

C5. H. Edelsbrunner, M. Iglesias-Ham, V. Kurlin. Relaxed disk packing. Proceedings of [CCCCG 2015: Canadian Conference on Computational Geometry](#), p. 128–135.

C4. V. Kurlin. A linear time algorithm for visualizing knotted structures in 3 pages. Proceedings of [IVAPP 2015: Information Visualization Theory & Applications](#), p.5-16.

C3. V. Kurlin, M. Safi-Samghabadi. Computing a skeleton of the configuration space of 2 round robots on a metric graph. Proceedings of [ICRoM 2014: IEEE International Conference on Robotics and Mechatronics](#), p. 723-729.

C2. V. Kurlin. Auto-completion of contours in sketches, maps and sparse 2D images. Proceedings of [CTIC \(Computational Topology in Image Context\)](#) at [SYNASC 2014 \(Symposium on Symbolic & Numeric Algorithms for Scientific Computing\)](#), p. 594-601.

C1. V. Kurlin. A fast and robust algorithm to count topologically persistent holes in noisy clouds. Proceedings of [CVPR 2014: Computer Vision Pattern Recognition](#), p. 1458-1463.