References

[1] V. Alvarez, J.A. Armario, M.D. Frau, and P. Real. Calculating cocyclic hadamard matrices in mathematica: Exhaustive and heuristic searches. In Andres Iglesias and Nobuki Takayama, editors, *Mathematical Software - ICMS 2006*, volume 4151 of *Lecture Notes in Computer Science*, pages 419–422. Springer Berlin Heidelberg, 2006.

[2] N. Andruskiewitsch, C. Galindo, and M. Müller. Examples of finite-dimensional Hopf algebras with the dual Chevalley property. *ArXiv e-prints*, September 2015.

[3] J.S. Bailes. *Cohen-Lenstra Heuristics and the Cohomology of the Braid Group*. PhD thesis, University of Melbourne. University of Melbourne, 2011.

[4] Mohamed Barakat. The homomorphism theorem and effective computations. *Habilitationsschrift, Aachen http://www.mathb.rwth-aachen.de/˜barakat/habil/habil.pdf*, 2018.

[5] Ethan Berkove and Alexander D. Rahm. The mod 2 cohomology rings of SL_2 of the imaginary quadratic integers. *J. Pure Appl. Algebra*, 220(3):944–975, 2016. With an appendix by Aurel Page.

[6] L.R. Bosko. *Schur Multipliers of Nilpotent Lie Algebras*. BiblioBazaar, 2012.

[7] Piotr Brendel, Pawel Dlotko, Graham Ellis, Mateusz Juda, and Marian Mrozek. Computing fundamental groups from point clouds. *Applicable Algebra in Engineering, Communication and Computing*, 26(1-2):27–48, 2015.

[8] A. T. Bui and Graham Ellis. Computing bredon homology of groups. *Journal of Homotopy and Related Structures*, 11(4):715–734, 2016.

[9] A.T. Bui, A. Rahm, and M. Wendt. The Farrell-Tate and Bredon homology for $PSL_4(\mathbb{Z})$ and other arithmetic groups. *ArXiv e-prints*, November 2016.

[10] Martin Čadek, Marek Krčál, Jiří Matoušek, Lukáš Vokřínek, and Uli Wagner. Polynomial-time computation of homotopy groups and Postnikov systems in fixed dimension. *SIAM J. Comput.*, 43(5):1728–1780, 2014.

[11] Erin Wolf Chambers and Mikael Vejdemo-Johansson. Computing minimum area homologies. *Computer Graphics Forum*, 34(6):13–21, 2015.

[12] Maura Clancy and Graham Ellis. Homology of some Artin and twisted Artin groups. *J. K-Theory*, 6(1):171–196, 2010.

[13] I.S. Costa. Presentation complexes with the fixed point property. *Geometry and Topology*, 21:1275–1283, 2017.

[14] Paul de Lange. The physics & mathematics of microstates in string theory and a monstrous farey tail. *PhD thesis, Univ. van Amsterdam*, 2016.

[15] Heiko Dietrich, Bettina Eick, and Dörte Feichtenschlager. Investigating p-groups by coclass with GAP. In *Computational group theory and the theory of groups*, volume 470 of *Contemp. Math.*, pages 45–61. Amer. Math. Soc., Providence, RI, 2008.

[16] Mathieu Dutour Sikirić and Graham Ellis. Wythoff polytopes and low-dimensional homology of Mathieu groups. *J. Algebra*, 322(11):4143–4150, 2009.

[17] Mathieu Dutour Sikirić, Graham Ellis, and Achill Schürmann. On the integral homology of $PSL_4(\mathbb{Z})$ and other arithmetic groups. *J. Number Theory*, 131(12):2368–2375, 2011.

[18] Graham Ellis. Homological algebra programming. In *Computational group theory and the theory of groups*, volume 470 of *Contemp. Math.*, pages 63–74. Amer. Math. Soc., Providence, RI, 2008.

[19] Graham Ellis. Cohomological periodicities of crystallographic groups. *J. Algebra*, 445:537–544, 2016.

[20] Graham Ellis and Fintan Hegarty. Computational homotopy of finite regular CW-spaces. *J. Homotopy Relat. Struct.*, 9(1):25–54, 2014.

[21] Graham Ellis and Simon King. Persistent homology of groups. *J. Group Theory*, 14(4):575–587, 2011.

[22] Graham Ellis and Luyen Van Le. Homotopy 2-types of low order. *Exp. Math.*, 23(4):383–389, 2014.

[23] Graham Ellis and Le Van Luyen. Computational homology of n-types. *J. Symbolic Comput.*, 47(11):1309–1317, 2012.

[24] Graham Ellis and Roman Mikhailov. A colimit of classifying spaces. *Adv. Math.*, 223(6):2097–2113, 2010.

[25] Graham Ellis, Hamid Mohammadzadeh, and Hamid Tavallaee. Computing covers of Lie algebras. In *Computational group theory and the theory of groups, II*, volume 511 of *Contemp. Math.*, pages 25–31. Amer. Math. Soc., Providence, RI, 2010.

[26] Graham Ellis and Emil Sköldberg. The $K(\pi, 1)$ conjecture for a class of Artin groups. *Comment. Math. Helv.*, 85(2):409–415, 2010.

[27] Graham Ellis and Paul Smith. Computing group cohomology rings from the Lyndon-Hochschild-Serre spectral sequence. *J. Symbolic Comput.*, 46(4):360–370, 2011.

[28] P. Fernández Ascariz. *Módulos cruzados de álgebras conmutativas, homología y HAP*. Teses de doutoramento da Universidade de Santiago de Compostela. Universidad de Santiago de Compostela, Servizo de Publicacións e Intercambio Científico, 2007.

[29] Matthias R. Gaberdiel, Daniel Persson, Henrik Ronellenfitsch, and Roberto Volpato. Generalized Mathieu Moonshine. *Commun. Number Theory Phys.*, 7(1):145–223, 2013.

[30] Terry Gannon and Corey Jones. Vanishing of categorical obstructions for permutation orbifolds. *arXiv:1804.08343*, 2018.

[31] S. Hatui. A characterization of finite p-groups by their schur multiplier. *arXiv:1608.06322*, 2016.

[32] Sumana Hatui. Finite p-groups having Schur multiplier of maximum order. *J. Algebra*, 492:490–497, 2017.

[33] F. Hegarty. *Computational Homology of Cubical and Permutahedral Complexes*. PhD thesis, National University of Ireland Galway. National University of Ireland Galway, 2012.

[34] Jnathan Heras, Vico Pascual, and Julio Rubio. A system for computing and reasoning in algebraic topology. In JamesH. Davenport, WilliamM. Farmer, Josef Urban, and Florian Rabe, editors, *Intelligent Computer Mathematics*, volume 6824 of *Lecture Notes in Computer Science*, pages 295–297. Springer Berlin Heidelberg, 2011.

[35] A. Holzinger. On topological data mining. *Lecture Notes in Computer Science*, 8401:331–356, 2014.

[36] Andreas Holzinger and Igor Jurisica. Knowledge discovery and data mining in biomedical informatics: The future is in integrative, interactive machine learning solutions. In *Interactive Knowledge Discovery and Data Mining in Biomedical Informatics - State-of-the-Art and Future Challenges*, pages 1–18. 2014.

[37] A. Hoshi, M.-c. Kang, and A. Yamasaki. Multiplicative invariant fields of dimension ≤ 6. *arXiv.org, arXiv:1609.04142*, pages 1–105, 2016.

[38] A. Hoshi, M.-c. Kang, and A. Yamasaki. Degree three unramified groups and noether's problem for groups of order 243. *arXiv.org, arXiv:1710.01958*, pages 1–61, 2017.

[39] Akinari Hoshi and Aiichi Yamasaki. Rationality problem for algebraic tori. *Mem. American Math. Soc. (to appear)*, pages 1–146, 2016.

[40] U. Jezernik. *Universal Commutator Relations*. PhD thesis, University of Ljubljana. University of Ljubljana, 2016.

[41] Urban Jezernik and Primož Moravec. Bogomolov multipliers of groups of order 128. *Exp. Math.*, 23(2):174–180, 2014.

[42] T. Johnson-Freyd. The moonshine anomaly. *arXiv:1707.08388*, pages 1–15, 2017.

[43] T. Johnson-Freyd and D. Treumann. $H^4(Co_0; Z) = Z_{24}$. *arXiv:1707.07587v1*, pages 1–14, 2017.

[44] A. Joshi. *MATHIEU MOONSHINE: From M_{24} to M_{12}*. MSc thesis, IIT Madras. Indian Institute of Technology Madras, 2016.

[45] David Joyner. A primer on computational group homology and cohomology using GAP and SAGE. In *Aspects of infinite groups*, volume 1 of *Algebra Discrete Math.*, pages 159–191. World Sci. Publ., Hackensack, NJ, 2008.

[46] Tomasz Kaczynski and Marian Mrozek. The cubical cohomology ring: an algorithmic approach. *Found. Comput. Math.*, 13(5):789–818, 2013.

[47] Anton Kapustin and Ryan Thorngren. Anomalous discrete symmetries in three dimensions and group cohomology. *Phys. Rev. Lett.*, 112:231602, Jun 2014.

[48] V. Kurlin. Computing invariants of knotted graphs given by sequences of points in 3-dimensional space. *Topological methods in data analysis and visualization IV : theory, algorithms, and applications. Mathematics and visualization. (Springer)*, 2017.

[49] Larry A. Lambe. An algebraic study of the Klein bottle. *J. Homotopy Relat. Struct.*, 11(4):885–891, 2016.

[50] Rafał Lutowski and Bartosz Putrycz. Spin structures on flat manifolds. *J. Algebra*, 436:277–291, 2015.

[51] I. Michailov, I. Ivanov, and N. Ziapkov. Algorithmic generation of isoclinism classes for 4-generator groups of nilpotency class 2. *Proceedings of the University of Ruse Conference, 2015.* `http:conf.uni-ruse.bg/bg/docs/cp15/6.1/6.1-3.pdf`, pages 24–27, 2015.

[52] Pascal Michel. Homology of groups and third busy beaver function. *Internat. J. Algebra Comput.*, 20(6):769–791, 2010.

[53] M. Mignard and P. Schauenburg. Morita equivalence of pointed fusion categories of small rank. *HAL Id: hal-01573708*, pages 1–46, 2017.

[54] Roman Mikhailov and Jie Wu. On homotopy groups of the suspended classifying spaces. *Algebr. Geom. Topol.*, 10(1):565–625, 2010.

[55] Yasushi Mizusawa. On certain 2-extensions of $\mathbb{Q}$ unramified at 2 and ∞. *Osaka J. Math.*, 53(4):1063–1088, 10 2016.

[56] Mohammad Reza R. Moghaddam and Peyman Niroomand. Some properties of certain subgroups of tensor squares of p-groups. *Comm. Algebra*, 40(3):1188–1193, 2012.

[57] M. Muller Lopes Rocha. *Ejemplos de lgebras de Hopf semisimples y de algebras de Hopf con la propiedad de Chevalley dual.* PhD thesis, Universidad National de Cordoba. University Universidad National de Cordoba, 2016.

[58] D. Müllner. *Orientation Reversal of Manifolds.* Bonner mathematische Schriften. D. Müllner, 2008.

[59] Neha Nanda, Mahender Singh, and Manpreet Singh. Knot invariants from derivations of quandles. *arXiv:1804.01113*, 2018.

[60] P. Niroomand and R. Rezaei. On the exterior degree of finite groups. *Comm. Algebra*, 39(1):335–343, 2011.

[61] Peyman Niroomand and Rashid Rezaei. The exterior degree of a pair of finite groups. *Mediterr. J. Math.*, 10(3):1195–1206, 2013.

[62] A. Odabaş, E.Ö. Uslu, and E. Ilgaz. Isoclinism of crossed modules. *J. Symbolic Comput.*, 74:408–424, 2016.

[63] Nansen Petrosyan and Bartosz Putrycz. On cohomology of crystallographic groups with cyclic holonomy of split type. *J. Algebra*, 367:237–246, 2012.

[64] Alexander D. Rahm. The homological torsion of PSL_2 of the imaginary quadratic integers. *Trans. Amer. Math. Soc.*, 365(3):1603–1635, 2013.

[65] Alexander D. Rahm. Accessing the cohomology of discrete groups above their virtual cohomological dimension. *J. Algebra*, 404:152–175, 2014.

[66] Alexander D. Rahm. The subgroup measuring the defect of the abelianization of $SL_2(\mathbb{Z}[i])$. *J. Homotopy Relat. Struct.*, 9(2):257–262, 2014.

[67] Pradeep K. Rai and Manoj K. Yadav. On Sh-rigidity of groups of order p^6. *J. Algebra*, 428:26–42, 2015.

[68] J. Roberts. *ALGORITHMS FOR UPPER BOUNDS OF LOW DIMENSIONAL GROUP HOMOLOGY.* PhD thesis, University of Kentucky. University of Kentucky, 2010.

[69] Joshua Roberts. An algorithm for low dimensional group homology. *Homology, Homotopy Appl.*, 12(1):27–37, 2010.

[70] Marc Röder. Geometric algorithms for resolutions for Bieberbach groups. In *Computational group theory and the theory of groups, II*, volume 511 of *Contemp. Math.*, pages 167–178. Amer. Math. Soc., Providence, RI, 2010.

[71] Ana Romero, Graham Ellis, and Julio Rubio. Interoperating between computer algebra systems: Computing homology of groups with kenzo and gap. In *Proceedings of the 2009 International Symposium on Symbolic and Algebraic Computation*, ISSAC '09, pages 303–310, New York, NY, USA, 2009. ACM.

[72] Ana Romero and Julio Rubio. Computing the homology of groups: the geometric way. *J. Symbolic Comput.*, 47(7):752–770, 2012.

[73] Ana Romero and Julio Rubio. Homotopy groups of suspended classifying spaces: an experimental approach. *Math. Comp.*, 82(284):2237–2244, 2013.

[74] S. Schönnenbeck. Resolutions for unit groups of orders. *ArXiv e-prints*, September 2016.

[75] Bui Anh Tuan and Graham Ellis. The homology of $SL_2(\mathbb{Z}[1/m])$ for small m. *J. Algebra*, 408:102–108, 2014.

[76] Wayne Zheng, Jia-Wei Mei, and Yang Qi. Classification and monte carlo study of symmetric Z_2 spin liquids on the triangular lattice. *arXiv:1505.05351*, 2015.

[77] V. lvarez, J.A. Armario, M.D. Frau, and P. Real. A mathematica notebook for computing the homology of iterated products of groups. In Andres Iglesias and Nobuki Takayama, editors, *Mathematical Software - ICMS 2006*, volume 4151 of *Lecture Notes in Computer Science*, pages 47–57. Springer Berlin Heidelberg, 2006.