

## Publication List

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### I: Mathematics

1. Classification of closed topological 4-manifolds with infinite cyclic fundamental group, UC San Diego Ph.D thesis, 1993.
2. Mobius invariance of knot energy (with S. Bryson, M. Freedman and Z.-X. He), *Bull. AMS*, **28** (1993), 99-103, arXiv:math/9301212.
3. Mobius energy of knots and unknots (with M. Freedman and Z.-X. He), *Ann. of Math.*, **139** (1994), 1-50.
4.  $CP^2$ -stable theory (with M. Freedman), *Math. Res. Letters*, **1** (1994), 45-48.
5. On Bott polynomials, *J. of Knot Theory and Its Ramifications*, **3** (1994), 537-546.
6. Classification of closed nonorientable 4-manifolds with infinite cyclic fundamental group, *Math. Res. Letters*, **2** (1995), 339-344.
7. Controlled linear algebra (with M. Freedman), *Prospects in Topology*; Proceedings of a conference in honor of William Browder, ed. Frank Quinn, *Ann. of Math. Stud.*, **138** (1995), 138-156, Princeton Univ. Press, NJ.
8. Integral geometry of plane curves and knot invariants (with X.-S. Lin), *J. Diff. Geom.* **44** (1996), 74-95, arXiv:dg-ga/9411015.
9. Burau representation of string links and random walks (with X.-S. Lin and Feng Tian), *Pac. J. of Math.* **182** (1998), 289-302, arXiv:q-alg/9605023.
10. On Ohtsuki invariants of integral homology 3-spheres (with X.-S. Lin), *Acta. Math. Sinica*, **15** (1999), 293-316, arXiv:q-alg/9509009.
11. Fermat limits, and a congruence of Ohtsuki's invariants (with X.-S. Lin), *Geometry and Topology Monographs*, vol.2, 321-333; Proceedings of the Kirbyfest, edited by J. Hass and M. Scharlemann, arXiv:math/9810147.
12. Self-homeomorphisms of 4-manifolds with fundamental group  $Z$  (with R. Stong), *Topology Appl.* **106** (2000), no. 1, 49-56. .
13. The Gassner representation for string links (with P. Kirk and C. Livingston), *Commun. Contemp. Math.* **3** (2001), no. 1, 87-136.
14. Random walks on knot diagrams, colored Jones polynomials, and Ihara-Selberg type zeta functions (with X.-S. Lin), *Knots, braids, and mapping class groups—papers dedicated to Joan S. Birman* (New York, 1998), 107-121, *AMS/IP Stud. Adv. Math.*, **24**, Amer. Math. Soc., Providence, RI, 2001, arXiv:math/9812039.
15. Simulation of topological field theories by quantum computers (with M. Freedman and A. Kitaev), *Commun. Math. Phys.* **227**, 587-603 (2002), arXiv:quant-ph/0001071.

16. A modular functor which is universal for quantum computation (with M. Freedman and M. Larsen), *Commun. Math. Phys.* **227**, 605-622 (2002), arXiv:quant-ph/0001108.
17. The two-eigenvalue problem and density of Jones representation of braid groups (with M. Freedman and M. Larsen). *Comm. Math. Phys.* **228** (2002), 177–199, arXiv:math/0103200.
18. Quantum  $SU(2)$  faithfully detects mapping class groups modulo center (with M. Freedman and K. Walker). *Geom. Topol.* **6** (2002), 523–539 (electronic), arXiv:math/0209150 .
19. Topological quantum computation (with M. Freedman, A. Kitaev and M. Larsen). *Mathematical challenges of the 21st century* (Los Angeles, CA, 2000). *Bull. Amer. Math. Soc. (N.S.)* **40** (2003), no. 1, 31–38, arXiv:quant-ph/0101025.
20. On Freedman's lattice model for topological phases (with J. Brink), *Quantum Information Processing*, vol. 2 (2003), 81-96, arXiv:math-ph/0303018.
21. Quantum logic as motivated by quantum computing (with J. Dunn, T. Hagge and L. Moss), *Journal of Symbolic Logic* **70**, iss. 2 (2005), 353–359, arXiv:math/0412144.
22. Density of the  $SO(3)$  TQFT representation of mapping class groups (with M. Larsen), *Comm. Math. Phys.*, Vol 260 (2005), No 3, 641 - 658, math.GT/0408161.
23. Universal manifold pairings and positivity (with M. Freedman, A. Kitaev, C. Nayak, J. Slingerland, K. Walker), *Geometry & Topology*, Vol. 9 (2005) Paper no. 53, 2303–2317, math.GT/0503054.
24. The  $N$ -eigenvalue problem and two applications (with M. Larsen and E. Rowell), *International Math. Research Notices*, vol. 2005, iss. 64, 3987–4018, math.RT/0506025.
25. Extraspecial 2-groups and the images of braid group representations (with J. Franko, and E. Rowell), *J. of Knot Theory and Its Ramifications*, vol. 15, no. 4 (2006), 1-15, math.RT/0503435.
26. Topologization of electron liquids with Chern-Simons theory and quantum computation, *Nankai Tracts in Mathematics*, vol 10, 2006, Editors Mo-lin Ge and Weiping Zhang, World Scientific, pg. 106-120, cond-mat/0601285.
27. Large quantum Fourier transforms are never exactly realized by braiding conformal blocks (with M. Freedman), *Phys. Rev. A* **75**, 032322 (2007)(5 pages), arXiv:cond-mat/0609411.
28. On  $(2+1)$ -picture TQFTs (with M. Freedman, C. Nayak, and K. Walker), *Topology and Physics—Proceedings of the Nankai Conference in Memory of Xiao-Song Lin*, *Nankai Tracts in Mathematics*, vol 12, 2007, pg. 19-106, World Scientific, arXiv:0806.1926.
29. On exotic modular tensor categories (with S. Hong, E. Rowell), *Commun. Contemp. Math.* **10** (2008), suppl. 1, 1049-1074, math.GT/0710.5761.
30. From string nets to nonabelions (with L. Fidkowski, M. Freedman, C. Nayak, K. Walker), *Commun. Math. Phys.*, Volume 287 (2009), Issue 3, pp.805-827, cond-mat/0610583.
31. On classification of modular tensor categories (with E. Rowell, R. Stong), *Commun. Math. Phys.*, Volume 292 (2009), Issue 2, pp.343-389, math.QA/0712.1377
32. Localization of unitary braid group representations (with E. Rowell), *Commun. Math. Phys.*, Volume 311 (2012), Issue 3, pp 595-615, arXiv:1009.0241.

33.  $|Z_{Kup}| = |Z_{Henn}|^2$  for Lens spaces (with L. Chang), *Quantum Topology*, Volume 4, Issue 4, 2013, pp. 411—445, arXiv:1106.3313.
34. Solutions to generalized Yang-Baxter equations via ribbon fusion categories (with A. Kitaev), *Proceedings of the Freedman Fest, Geometry & Topology Monographs 18* (2012), 191-197, arXiv:1203.1063.
35. Quantum Computing: a quantum group approach, *Symmetries and groups in contemporary physics—Proceedings of the XXIX International Colloquium on Group-Theoretical Methods in Physics*, Tianjin, China 2026 August 2012, pp.41-50, arXiv:1301.4612.
36. On Arithmetic Modular Categories (with O. Davidovich, T. Hagge), arXiv:1305.2229.
37. The third life of quantum logic: quantum logic inspired by quantum computing (with J. M. Dunn, L. S. Moss), *Special issue of Journal of Philosophical Logic*, June 2013, Volume 42, Issue 3, pp 443-459.
38. Complexity Classes as Mathematical Axioms II (with Shawn X. Cui, M. Freedman), arXiv:1305.6076.
39. On Metaplectic Modular Categories and their applications (with M. Hastings, C. Nayak), arXiv:1303.1202.
40. On Modular Categories (with P. Bruillard, S.-H. Ng, E. Rowell), arXiv:1310.7050.

## II: Mathematics and Physics

1. A class of P,T invariant topological phases of interacting electrons (with M. Freedman, C. Nayak, K. Shentgel and K. Walker), *Annals of Physics*, vol 310 (2004), 428-492, arXiv:cond-mat/0307511.
2. Interacting anyons in topological quantum liquids: The golden chain (with A. Feiguin, S. Trebst, A. W. W. Ludwig, M. Troyer, A. Kitaev, M. Freedman), *Phys. Rev. Lett.* 98, 160409 (2007)(5 pages), cond-mat/0612341.
3. A classification of symmetric polynomials of infinite variables—a construction of Abelian and non-Abelian quantum Hall states (with X.-G. Wen), *Phys. Rev. B* 77, 235108 (2008) (21 pages), cond-mat/0801.3291.
4. Topological properties of Abelian and non-Abelian quantum Hall states from the pattern of zeros (with X.-G. Wen), *Phys. Rev. B* 78, 155109 (2008)(27 pages), arXiv: cond-mat/0803.1016.
5. Non-Abelian statistics from an Abelian model (with J. R. Wootton, V. Lahtinen, and J. K. Pachos), *Phys. Rev. B* 78, 161102(R) (2008)(4 pages), arXiv:0804.0931.
6. A short introduction to Fibonacci anyon models (with S. Trebst, M. Troyer, A. Ludwig), *Prog. Theor. Phys. Suppl.* No. 176, 2008, 384-407, arXiv:0902.3275.
7. Topology-driven quantum phase transitions in time-reversal-invariant anyonic quantum liquids (with C. Gils, S. Trebst, A. Kitaev, A. Ludwig, M. Troyer), *Nature Physics* 5, 834 - 839 (2009), arXiv:0906.1579.
8. Anyonic Quantum Walks (with G. K. Brennen, D. Ellinas, V. Kendon, J. K. Pachos, I. Tsochantjis), *Ann. Phys* 325, 664681 (2010), arxiv:0910.2974.

9. Non-Abelian Quantum Hall States and their Quasiparticles: from the Pattern of Zeros to Vertex Algebra (with Y.-M. Lu, X.-G. Wen, Z. Wang), *Phys. Rev. B* 81, 115124 (2010)(42 pages), arxiv:0910.3988.
10. Projective Ribbon Permutation Statistics: a Remnant of non-Abelian Braiding in Higher Dimensions (with M. Freedman, M. B. Hastings, C. Nayak, X.-L. Qi, K. Walker), *Phys. Rev. B* 83, 115132 (2011) [35 pages], arXiv:1005.0583.
11. Quantum Walks with Non-Abelian Anyons (with L. Lehman, V. Zatloukal, G. K. Brennen, J. K. Pachos), *Phys. Rev. Lett.* 106, 230404 (2011), arXiv:1009.0813.
12. A classification of 2D fermionic and bosonic topological orders (with Z.-C. Gu, X.-G. Wen), arXiv:1010.1517.
13. (3+1)-TQFTs and Topological Insulators (with K. Walker), *Front. Phys.*, 2012, 7(2): 150-159, arXiv:1104.2632.
14. Galois Conjugates of Topological Phases (with M. Freedman, J. Gukelberger, M. Hastings, S. Trebst, M. Troyer), *Phys. Rev. B* 85, 045414 (2012), arXiv:1106.3267.
15. Pattern-of-zeros approach to Fractional quantum Hall states and a classification of symmetric polynomial of infinite variables (with Xiao-Gang Wen), *Conformal field theories and tensor categories*, Proceedings of a Workshop held at BiCMR, Beijing University, China, Yi-Zhi Huang et al editors, 2013, pp.33-66, arXiv:1203.3268.
16. Metaplectic Anyons, Majorana Zero Modes, and their Computational Power (with M. Hastings and C. Nayak), *Physical Review B* 87, 165421 (2013), arXiv:1210.5477.
17. Test of Einstein-Podolsky-Rosen steering (with C. Wu, J.-L. Chen, . X.-J. Ye, H.-Y. Su, D.-L. Deng, and C.-H. Oh), preprint.
18. Anyonic quantum spin chains: Spin-1 generalizations and topological stability (with C. Gils, E. Ardonne, S. Trebst, D.A. Huse, A.W.W. Ludwig, M. Troyer), *Physical Review B* 87, 235120 (2013), arXiv:1303.4290.
19. Quantum fidelity, modular transformations, and topological orders in two dimensions (with F. Liu, Y.-Z. You, X.-G. Wen), arXiv:1303.0829.

### III: Physics

1. Collective States of Interacting Anyons, Edge States, and the Nucleation of Topological Liquids (with C. Gils, E. Ardonne, S. Trebst, A. Ludwig, M. Troyer), *Phys. Rev. Lett.* 103, 070401 (2009)(5 pages).
2. Critical theory of the topological quantum phase transition in an  $S=2$  chain (with H.-C. Jiang, S. Rachel, Z.-Y. Weng, S.-C. Zhang), *Phys. Rev. B* 82, 220403(R) (2010)(4 pages), arXiv:1010.4273.
3. Identifying topological order by entanglement entropy (with H.-C. Jiang, L. Balents), *Nature Physics* 8, 902–905(2012), doi:10.1038/nphys2465, arXiv:1205.4289.
4. Lattice Model for Fermionic Toric Code (with Z.-C. Gu, X.-G. Wen), arXiv:1309.7032.

#### IV: Books and Special Issues

1. Topological Quantum Computation (Author)  
CBMS Regional Conference Series in Mathematics, vol. 112, 115 pages.  
American Mathematical Society (May 2010).
2. Topology and Physics (Editor)  
Proceedings of the Nankai International Conference in Memory of Xiao-Song Lin Tianjin, China 27-31 July 2007, Nankai Tracts in Mathematics, vol 12, Kevin Lin (Editor), Zhenghan Wang (Editor), Weiping Zhang (Editor) World Scientific Publishing Company (September 2008).
3. Proceedings of the Freedman Fest (Editor)  
Geometry & Topology Monographs 18 (2012)  
Editors: Rob Kirby, Vyacheslav Krushkal and Zhenghan Wang
4. Third life of quantum logic: special issue of Journal of Philosophical logic, June 2013, Volume 42, Issue 3 (Editor)  
Editors: J. M. Dunn, L. S. Moss and Zhenghan Wang
5. *Book review of An introduction to topological quantum computing by J. Pachos* (Reviewer)  
Quantum Information Process (2012) 11:1969–1973.

#### V: Chinese Articles

1. Knotting and Quantum Computing, Bulletin des Sciences Mathématiques (ShuXueTongBao), vol.5, pgs. 1-5, 2010, vol.6, pgs. 6-10, 2010.
2. Biography of Xiao-Song Lin, Twenty Century Important Chinese Scientists—Mathematicians, vol. 4, 2012, Academic Press, China.
3. From the fractional quantum Hall effect to topological quantum computation (with X. Wan and K. Yang), Physics—Publication of the Chinese Physics Society, Vol. 42, issue 8, pp. 558—567.