Chuen-Ming Michael Wong   Curriculum Vitæ

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Personal   Born October 25, 1989 in British Hong Kong.

Research Interests   Low-dimensional topology. Floer theory. Contact geometry.

Employment

- 2020–2022   **Dartmouth College,** Hanover, NH.
  Lecturer and Research Associate.
  > Mentor: Ina Petkova.

- 2017–2020   **Louisiana State University,** Baton Rouge, LA.
  Postdoctoral Researcher.
  > Mentor: David Shea Vela-Vick.

- 2017   **Columbia University**, New York, NY.
  Lecturer, Summer Sessions.

Education

- 2012–2017   **Columbia University,** New York, NY.
  Ph.D. in Mathematics.
  > *Unoriented skein relations for grid homology and tangle Floer homology.*
  > Advisors: Peter S. Ozsváth and Robert Lipshitz.

- 2008–2012   **Princeton University,** Princeton, NJ.
  A.B. in Mathematics, *magna cum laude,* Phi Beta Kappa.

Grants and Awards

- 2020–2023   **National Science Foundation.**
  NSF Standard Grant DMS-2039688, principal investigator.
  > Project title: Floer Invariants, Cobordisms, and Contact Geometry.
  > Grant amount: USD 122,813.

- 2019–2020   **American Mathematical Society.**
  AMS–Simons Travel Grant.
  > Grant amount: USD 4,800.

- 2017–2019 **Croucher Foundation.**
  Croucher Fellowship for Postdoctoral Research, declined.

- 2012–2017 **Columbia University.**
  Dean's Fellow.

- 2012 **Princeton University.**
  Middleton Miller '29 Prize for best independent work in mathematics.

- 2009 **Princeton University.**
  Shapiro Prize for Academic Excellence for outstanding academic achievement and engagement in intellectual pursuits.

Preprints and Publications

1. Upper bounds for the Lagrangian cobordism relation on Legendrian links, with Joshua M. Sabloff and David Shea Vela-Vick.
   Submitted for publication.
   Available at `arXiv:2105.02390`.

2. On the tau invariants in monopole and instanton Floer theories, with Sudipta Ghosh and Zhenkun Li.
   Submitted for publication.
   Available at `arXiv:1910.01758`.

3. Ribbon homology cobordisms, with Aliakbar Daemi, Tye Lidman, and David Shea Vela-Vick.
   Adv. Math., accepted for publication.
   Available at `arXiv:1904.09721`.

4. An unoriented skein relation via bordered–sutured Floer homology, with David Shea Vela-Vick.
   J. Symplectic Geom. **19** (2021), no. 6, 1495–1561.
   Available at `arXiv:1811.00134`.

5. Lagrangian cobordisms and the Legendrian invariants in knot Floer homology, with John A. Baldwin and Tye Lidman.
   Michigan Math. J. **71** (2022), no. 1, 145–175.
   Available at `arXiv:1907.09654`.

6. Skein relations for tangle Floer homology, with Ina Petkova.
   Quantum Topol. **11** (2020), no. 1, 119–225.
   Available at `arXiv:1611.04065`.

7. Grid diagrams and Manolescu's unoriented skein exact triangle for knot Floer homology.
   Algebr. Geom. Topol. **17** (2017), no. 3, 1283–1321.
   Available at `arXiv:1305.2562`.

8. From self-similar structures to self-similar groups, with D. J. Kelleher and B. A. Steinhurst.
   Internat. J. Algebra Comput. **22** (2012), no. 7, 1250056, 16 pages.
   Available at `arXiv:1011.1817`.

ARTICLES IN PREPARATION

1. On the naturality of grid homology, with Haofei Fan and Marco Marengon.

2. Annular link Floer homology and $\mathfrak{gl}_{1|1}$, with Andrew Manion and Ina Petkova.

3. Cyclic branched covers and combinatorial invariants of transverse knots, with Lucas Meyers,*
   Robert John Quarles,* Brandon Roberts,† and David Shea Vela-Vick.

*: Graduate student
†: Undergraduate student

SOFTWARE

1. KnotFinder, based on a previous version by Jae Choon Cha, and powered by binaries found in
   Knotscape, an interactive program written by Jim Hoste and Morwen Thistlethwaite.
   From the DT notation of a knot diagram, KnotFinder attempts to identify each connected
   summand of the represented knot. Improvements from the previous version include the new
   abilities to recognize the unknot, prime knots of crossing number 14 to 16, and composite
   knots. KnotFinder is hosted on KnotInfo, a knot database maintained by Chuck Livingston
   and Allison Moore.

2. transverse-hfk-revision, with Lucas Meyers,* Robert John Quarles,* Brandon Roberts,† and
   David Shea Vela-Vick.
   A revision of the program TransverseHFK.c, written by Lenhard Ng, Peter Ozsváth, and Dylan
   Thurston, with minor bug fixes and improvements in computational efficiency. Also computes
   invariants in cyclic branched covers.

*: Graduate student
†: Undergraduate student

INVITED CONFERENCE, COLLOQUIUM, AND LECTURE SERIES TALKS

- **Nearly Carbon Neutral Geometric Topology Conference.**   Jun 16–25, 2021
  Online, at `http://ncngt.org/`.
  Upper bounds for the Lagrangian cobordism relation on Legendrian links.

- **Nearly Carbon Neutral Geometric Topology Conference.**   Jun 1–14, 2020
  Online, at `http://ncngt.org/`.
  GRID invariants obstruct decomposable Lagrangian cobordisms (1 talk).
  Ribbon homology cobordisms (2 talks).

- **AMS 2020 Spring Southeastern Sectional Meeting,** canceled due to COVID-19.
  University of Virginia, Charlottesville, VA.   Mar 14, 2020
  Ribbon homology cobordisms.

- **IAS / Park City Mathematics Institute Research Program.**   Jul 5, 2019
  IAS / Park City Mathematics Institute, Park City, UT.
  Floer homologies and ribbon homology cobordisms.

- **AMS 2019 Spring Southeastern Sectional Meeting.**   Mar 16, 2019
  Auburn University, Auburn, AL.
  GRID invariants obstruct decomposable Lagrangian cobordisms.

- **AMS 2018 Fall Southeastern Sectional Meeting.**   Nov 3, 2018
  University of Arkansas, Fayetteville, AR.
  GRID invariants obstruct decomposable Lagrangian cobordisms.

- **Chinese University of Hong Kong EPYMT Colloquium.**   Jul 30, 2018
  Chinese University of Hong Kong, Hong Kong.
  Knot theory and mathematical rigour.

- **AMS 2017 Spring Eastern Sectional Meeting.**   May 7, 2017
  Hunter College, City University of New York, New York, NY.
  An unoriented skein relation for tangle Floer homology.

- **Floer Homologies and Topology of 4-Manifolds.**   Apr 8, 2017
  University of Massachusetts Amherst, Amherst, MA.
  An unoriented skein relation for tangle Floer homology.

- **AMS 2016 Fall Western Sectional Meeting.**   Oct 8, 2016
  University of Denver, Denver, CO.
  An unoriented skein exact triangle for tangle Floer homology.

- **AMS 2015 Fall Central Sectional Meeting.**   Oct 4, 2015
  Loyola University, Chicago, IL.
  An unoriented skein exact triangle for tangle Floer homology.

- **Chinese University of Hong Kong Mathematics Lecture Series (5 talks).**
  Chinese University of Hong Kong, Hong Kong.   Jun 24–Jul 6, 2015
  Introduction to bordered Floer homology and related tangle invariants.

- **AMS 2010 Fall Eastern Sectional Meeting.**   Oct 2, 2010
  Syracuse University, Syracuse, NY.
  From self-similar structures to self-similar groups.

Invited Seminar Talks

- **Washington University in St. Louis Geometry and Topology Seminar.** Mar 22, 2022
  Annular link Floer homology and $\mathfrak{gl}_{1|1}$.

- **Chinese University of Hong Kong.**
  Tau invariants in monopole and instanton Floer theories. Dec 15, 2021
  Annular link Floer homology and $\mathfrak{gl}_{1|1}$. Dec 13, 2021
  Upper bounds for the Lagrangian cobordism relation on Legendrian links. Dec 10, 2021

- **Berkeley String–Math Seminar.** Dec 6, 2021
  Annular link Floer homology and $\mathfrak{gl}_{1|1}$.

- **Michigan State University Geometry and Topology Seminar.** Nov 9, 2021
  Obstructing and constructing Lagrangian cobordisms of Legendrian links.

- **California State University Fullerton Geometry Seminar.** Oct 15, 2021
  Obstructing and constructing Lagrangian cobordisms of Legendrian links.

- **Chinese University of Hong Kong.** Jan 10, 2020
  Ribbon homology cobordisms.

- **Philadelphia Area Contact Topology Seminar,** at Bryn Mawr. May 14, 2019
  Some developments in the Legendrian GRID invariants.

- **Columbia Symplectic Geometry, Gauge Theory, and Categorification Seminar.**
  Heegaard Floer homology and ribbon homology cobordisms. May 3, 2019

- **Brandeis Topology Seminar.** Feb 26, 2019
  Unoriented skein relations for link and tangle invariants in Heegaard Floer theory.

- **Dartmouth Topology Seminar.** Feb 21, 2019
  Some developments in the Legendrian GRID invariants.

- **Boston College Geometry / Topology Seminar.** Feb 14, 2019
  Some developments in the Legendrian GRID invariants.

- **Princeton University / IAS Symplectic Geometry Seminar,** at Princeton. Nov 26, 2018
  Some developments in the Legendrian GRID invariants.

- **Chinese University of Hong Kong.**
  An unoriented skein relation for bordered sutured Floer homology. Aug 9, 2018
  GRID invariants obstruct decomposable Lagrangian cobordisms. Aug 2, 2018
  Combinatorial invariants of transverse links via cyclic branched covers. Jul 30, 2018

- **Caltech Geometry and Topology Seminar.** May 4, 2018
  Unoriented skein relations for link and tangle invariants in Heegaard Floer theory.

- **UCLA Topology Seminar.** May 2, 2018
  Combinatorial invariants of transverse links via cyclic branched covers.

- **Joint Georgia Tech–UGA Geometry Topology Seminar,** at Georgia Tech. Feb 19, 2018
  Unoriented skein relations for link and tangle invariants in Heegaard Floer theory.

- **Triangle Topology Seminar,** at North Carolina State University. Jan 23, 2018
  Combinatorial invariants of transverse links via cyclic branched covers.

- **Dartmouth Geometry & Topology Seminar.** Jan 31, 2017
  Unoriented skein relations for grid homology and tangle Floer homology.

- **Columbia Symplectic Geometry, Gauge Theory, and Categorification Seminar.**
  Unoriented skein relations for grid homology and tangle Floer homology. Nov 4, 2016

- **Chinese University of Hong Kong.** Aug 31, 2015
  The unoriented skein exact triangle for grid homology.

- **Rice Topology Seminar.** Apr 20, 2015
  The unoriented skein exact triangle for grid homology.

- **Princeton Low-Dimensional Topology Seminar.** Dec 6, 2011
  Grid diagrams and Manolescu's unoriented skein exact triangle for knot Floer homology.

OTHER TALKS

- **Tech Topology Conference Lightning Talk.** Dec 12, 2021
- **Foam Evaluation (ICERM) Lightning Talk.** Nov 6, 2021
- **Dartmouth College Mathematics Colloquium.** Sep 23, 2021
- **Indiana University Bloomington Graduate Student Topology Seminar.** Apr 1, 2021
- **LSU Virtual Topology Seminar.** Feb 19, 2020
- **Tech Topology Conference Lightning Talk.** Dec 6, 2019
- **LSU Informal Topology Seminar.** Jan 23, 2019
- **Chinese University of Hong Kong.** Aug 6, 2018
- **LSU Virtual Topology Seminar.** Nov 8 & 15, 2017
- **LSU Virtual Topology Seminar.** Oct 4, 2017
- **LSU Virtual Topology Seminar.** Sep 13, 2017
- **Columbia Topology Reading Seminar.** Apr 18, 2017
- **Columbia Topology Reading Seminar.** Feb 14, 2017
- **Columbia Topology Reading Seminar.** Jan 24, 2017
- **Columbia Graduate Student Morse Theory Seminar.** Apr 8, 2016
- **Columbia Graduate Student Topology Seminar.** Nov 25, 2014
- **Columbia Undergraduate Mathematics Seminar.** Oct 29, 2014

- **Columbia Reading Group on Categorical Dynamics and Symplectic Topology.**

  Sep 10 & 17, 2014
- **Columbia Graduate Student Topology Seminar.** Sep 9 & 23, 2014
- **Columbia Informal² Topology Seminar.** May 1, 2013
- **Columbia Informal² Topology Seminar.** Jan 30, 2013
- **Columbia Undergraduate Mathematics Seminar.** Oct 25, 2012
- **Princeton Riemannian Geometry Junior Seminar.** Dec 15, 2010

TEACHING

- **Dartmouth College.**
  - **Instructor.**
    - Math 13, *Calculus of Vector-Valued Functions,* 2 sections. Spring 2022
    - Math 13, *Calculus of Vector-Valued Functions.* Winter 2022
    - Math 54, *Topology I.* Summer 2021
    - Math 10, *Introductory Statistics.* Spring 2021
    - Math 13, *Calculus of Vector-Valued Functions,* 2 sections. Winter 2021
    - Math 11, *Accelerated Multivariable Calculus.* Fall 2020

- **Louisiana State University.**
  - **Instructor.**
    - MATH 4997, *Vertically Integrated Research,* with D. Shea Vela-Vick. Spring 2020
    - MATH 4997, *Vertically Integrated Research,* with D. Shea Vela-Vick. Fall 2019
    - MATH 1553, *HONORS: Analytic Geometry and Calculus II.* Fall 2019
    - MATH 4997, *Vertically Integrated Research,* with D. Shea Vela-Vick. Spring 2019
    - MATH 4997, *Vertically Integrated Research,* with D. Shea Vela-Vick. Fall 2018
    - MATH 7590, *Heegaard Floer Homology.* Fall 2018
    - MATH 1550, *Analytic Geometry and Calculus I.* Fall 2017

- **Columbia University.**
  - **Instructor.**
    - MATH S1102, *Calculus II.* Summer 2017
    - MATH UN3952, *Undergraduate Seminars II.* Spring 2017
    - MATH UN3951, *Undergraduate Seminars I.* Fall 2016
    - MATH S2500, *Analysis and Optimization,* with S. Ali Altuğ. Summer 2016
    - MATH V1101, *Calculus I.* Spring 2016
    - MATH V1102, *Calculus II.* Fall 2014
  - **Teaching Assistant.**
    - MATH S1102, *Calculus II.* Summer 2016
    - MATH V1201, *Calculus III.* Fall 2015
    - MATH V1201, *Calculus III.* Spring 2015
    - MATH S4061, *Introduction to Modern Analysis I.* Summer 2014
    - MATH V2010, *Linear Algebra.* Spring 2014
    - MATH V1201, *Calculus III.* Fall 2013

- ○ **Summer Undergraudate Research Teaching Assistant.**
  - – *Left-orderable groups and knot surgery.* Summer 2014
- ○ **Department Assistant.** Summer 2016
- ○ **Science Honors Program Instructor.**
  - – *Knots and Manifolds.* Spring 2016
  - – *Knots and Manifolds.* Fall 2015
  - – *Knot Theory,* with Andrea Heyman. Fall 2014
  - – *Knot Theory,* with Andrea Heyman. Spring 2014

- **Chinese University of Hong Kong.**
  - ○ **Enrichment Programme for Young Mathematics Talents Teaching Assistant.**
    - – *Towards Differential Geometry.* Summer 2013

SHORT-TERM VISITS

- **Chinese University of Hong Kong,** Hong Kong. Jan 6–11, 2020
  Academic Visitor.

- **IAS / Park City Mathematics Institute,** Park City, UT. Jun 30–Jul 20, 2019
  Research Program.

- **Chinese University of Hong Kong,** Hong Kong. Jul 26–Aug 7, 2018
  Academic Visitor.

- **Chinese University of Hong Kong,** Hong Kong. Jun 22–Aug 19, 2015
  Academic Visitor.

- **Simons Center for Geometry and Physics,** Stony Brook, NY. May 6–10, 2013
  Visitor.

SERVICE AND SYNERGISTIC ACTIVITIES

- **Referee** for *Forum Math. Sigma*, *Sel. Math. New Ser.*, *Algebr. Geom. Topol.*, and *Topol. Appl.*

- **Reviewer** at zbMATH Open.

- **Coding contributor to KnotInfo,** an online database of knot invariants.

- **Ph.D. exam committees.**

  - ○ **Ph.D. Dissertation Defense Committee.**
    - – Zachary Winkeler (Advisor: Ina Petkova). Jun 2022
    - – Samuel Willis Tripp (Advisor: Ina Petkova). May 2022
    - – Douglas D. Knowles (Advisor: Ina Petkova). Apr 2021

  - ○ **Ph.D. Advancement Exam (Orals) Committee.**
    - – Ryan Maguire (Advisor: Vladimir Chernov). Mar 2021

- **Supervision of undergraduate and graduate research.**

  - **Cofounded an undergraduate summer research program** at Dartmouth.   2021–
    - *Summer Hybrid Undergraduate Research program,* designed for students interested in both theoretical computational problems in mathematics, corun with Petkova.
    - Students combine theoretical research in topology with programming, and explore solving research problems using new methods from computer science.
    - Inaugural project on a graphical calculator for Legendrian knots. Second project on Legendrian invariants in filtered grid homology.

  - **Provide additional guidance** to Ph.D. students of Petkova and Vela-Vick.   2017–
    - Meetings on characteristic classes, Kirby calculus, and Heegaard Floer theory.
    - Help with tackling theoretical and computational problems in research projects.
    - Organized reading sessions and seminars on career-related activities.

  - **Supervised students in research courses** at LSU.   2018–2020
    - Groups of graduate and undergraduate students together learned advanced materials in knot theory, resulting in currently ongoing research projects.
    - Graduate students took on a leadership role in their respective groups.
    - With D. Shea Vela-Vick, mentored students in lecturing, research, and leadership.

  - **Supervised undergraduate students in an REU** run by Jennifer Hom.   Summer 2014
    - Taught concepts from fundamental groups to Heegaard Floer theory to students ranging from rising sophomores to rising seniors.
    - Provided hands-on guidance in computing knot groups of twisted torus knots.
    - Project resulted in a published paper, showing certain twisted torus knots have non-left-orderable knot groups, as evidence for the L-space conjecture.

- **Dissemination of knowledge.**

  - **Instructor** of a graduate topic course in Heegaard Floer homology at LSU.   Fall 2018
    - Held in coordination with the Department of Mathematics of the U of Arkansas.
    - Broadcast online to Arkansas using sophisticated technology that allows seamless, real-time interaction with the online audience.

  - **Cofounding developer** of a long-term project of inter-university learning.   2017–
    - Coordination with mathematics departments in the Southeastern Conference (SEC).
    - Courses offered so far include the graduate topic course above, a course on symplectic geometry, and a course on linear wave phenomena.

- **Community outreach.**

  - **Association for Women in Mathematics Local Essay Contest Selection Committee.**
    - Dartmouth Chapter.   Spring 2021

  - **STEM demonstrations for Girl Scouts Louisiana East.**   Fall 2019

- **Trained ally.**

  - ○ **LSU Safe Space training** to be a better LGBTQ+ ally.   2018–2020

- **Seminar organizer.**

  - ○ **LSU Virtual Topology Seminar,** with D. Shea Vela-Vick.   2017–2020
    - – Broadcast online in real time and attended by researchers in the US Southeast.

  - ○ **Columbia Topology Reading Seminar,** with Akram Alishahi.   Fall 2016

  - ○ **Columbia Graduate Student Topology Seminar.**   Fall 2014

MISCELLANEOUS

- **Programming languages:** Bash, C, C++, Java, Python, Sage, Mathematica, HTML, PHP.

- **Typesetting and graphics editing:** LaTeX, BibTeX (including `.bst`), XƎTeX, xfig.

- **Languages:** Native in Cantonese and English; fluent in Mandarin Chinese; proficient in Japanese; reading comprehension and basic conversational ability in Italian; mathematical reading comprehension in French.

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Last updated:  Jun 30, 2022.
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