Chiu Fan Bowen (Leo) Lo

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Education

Harvard University GSAS *2022-current*
- Condensed matter theory and quantum information research in Ashvin Vishwanath's group
- Supported by the NSF Graduate Research Fellowship

Columbia University, class of 2022 *2018-2022*
- Bachelor of Arts in Physics and Mathematics
- Elected to Phi Beta Kappa

Selected Preprint & Publications

C.F.B. Lo, A. Lyons, Dan Gresh, Michael Mills, Peter E. Siegfried, Maxwell D. Urmey, N. Tantivasadakarn, H. Dreyer, A. Vishwanath, R. Verresen, M. Iqbal. "Universal Topological Gates from Braiding and Fusing Anyons on Quantum Hardware", arXiv:2601.20956.

M. Christos, **C.F.B. Lo**, V. Khemani, R. Sahay. "Non-Abelian Quantum Low-Density Parity Check Codes and Non-Clifford Operations from Gauging Logical Gates via Measurements", arXiv:2602.12228.

C.F.B. Lo[*], A. Lyons[*], R. Verresen, A. Vishwanath, N. Tantivasadakarn. "Universal Quantum Computation with the Quantum Double: A Pedagogical Exposition", arXiv:2502.14974.

A. Lyons, **C.F.B. Lo**, N. Tantivasadakarn, A. Vishwanath, R. Verresen. "Protocols for Creating Anyons and Defects via Gauging", *Physical Review Letter* **135**, 200405 (2025).

M. Iqbal, A. Lyons, **C.F.B. Lo**, N. Tantivasadakarn, et al. "Qutrit Toric Code and Parafermions in Trapped Ions", *Nature Communications* **16**, 6301 (2025).

C.F.B. Lo, H. Po, A. Nevidomskyy. "Inherited topological superconductivity in two-dimensional Dirac semimetals". *Physical Review B* **105**, 104501 (2022).

Research Talks

Coherent moving of nonabelian anyons in quantum double models
- Contributed poster at QIP 2026 (accepted by QIP; declined to participate due to time conflict)
- Invited talk at Purdue Quantum Information seminar (Nov 2025)
- 2025 March meeting, Anaheim CA

Universal Quantum Computing with S_3 Quantum Double
- Invited talk at Vedika Khemani's group meeting (Aug 2025)
- Invited talk at Boston University Condensed matter seminar (May 2024)
- Contributed poster at Les Houches Spring School "Topological Order: Anyons and Fractons" (April 2024)

Majorana States from Magnetic Skyrmions-Superconductor Interface with Spin-orbit Coupling
- 2022 March meeting, Chicago IL

A two-dimensional analog of a doped Weyl superconductor
- 2021 March meeting, online

Awards

2022 **Alfred Moritz Michaelis Prize**
Awarded to the top graduating senior majoring in physics in Columbia University

2021 **Goldwater Scholar**
Awarded for science research achievements in undergraduate

2018 **Columbia University Rabi Scholar**
Awarded to a cohort of ~10 upon admission for science research achievements

2018 **Regeneron Science Talent Search Finalist**
Top 40 nationwide among research projects across all fields of sciences

2018 **Intel International Science and Engineering Fair (ISEF) 3rd place Grand Award**
In the *Physics Category; out of ~90 projects qualified for the international level*

2018 **National Merit Scholarship Winner**
Winners are the top 0.1% of about 1.6 million students who entered the 2018 National Merit Program

2017 **USA Physics Olympiad Gold Medal**
Top ~40 nationwide

Previous Research Experiences

On topological Obstruction in pairing parameter, virtual *May 2021-March 2022*
Advisor: Yi Li
- Generalized a topologically obstructed superconducting order from a $\mathbb{Z}_2$ to a $\mathbb{Z}_4$ invariant.
- Investigated hosting Majorana bound state using magnetic skyrmion textures.

On topological Superconductivity, virtual *May 2020-August 2021*
Advisor: Hoi Chun (Adrian) Po, Andriy Nevidomskyy
- Constructed Dirac superconductor model inheriting topologically protected node from the normal-state.

Basov Infrared Laboratory, Columbia University *August 2018- June 2021*
Advisor: Alex McCleod, Dmitri Basov
- Investigated Cooper-pair polaritons and plasmons hybridization in cuprates/graphene heterostructures.
- Analyzed isotope effects in hyperbolic phonon polaritons in hBN and MoO_3.
- Modeled near-field optical contrasts of few layers WTe_2 and VO_2 metallic domain.

Liu Ultrafast & Nano-spectroscopy group, Stony Brook University *June 2016-2018*
Advisor: Mengkun Liu
- Developed a simulation platform for the scattering-type scanning near-field optical microscopy.

Teaching Experience and Outreach

Fall 2026 **SPS Directed Reading program**
- Guided two undergraduates on reading on topics in quantum information and statistical mechanics

Spring 2025 **Statistical Mechanics and Thermodynamics (Physics 181)**, *teaching assistant*
- Upper-level physics course on statistical mechanics; ~50 students
- Held bi-weekly section, prepared problem set solution, and graded problem sets.

Fall 2022 & spring 2023 **SPS Polaris Undergraduate mentorship program**

- Served as a mentor to one undergraduate, advising on course selection, research topics

Spring 2021 & 2022 **EM Waves & Optics (Physics UN3008),** *teaching assistant*

- A 2nd semester continuation of upper-level physics course on electromagnetic theory; ~60 students
- Graded problem sets, prepared solutions, and held recitations/office hours.

Fall 2020 & 2021 **Electricity & Magnetism (Physics UN3007),** *grader*

- An upper-level physics course on electromagnetic theory; ~60 students
- Graded problem sets and prepared solutions.

Fall 2020 & 2021 **Proof Writing Workshop,** *teaching assistant*

- Taught basic proof writing skills to undergraduates taking their first proof-based math course. We prepare lecture notes and hold weekly practice sessions for the first 5 weeks of the semester.

Summer 2020 & 2021 **iResearch Institute,** *research mentor*

- Mentored high school students through a 5-week intensive research program virtually

Spring 2020 **The Reading Team,** *math teacher*

- Taught pre-schoolers in Harlem math through games

Skills

Software: Mathematica, MATLAB, CST Studio Suite
Programming Language: Julia, Python, Java