# Zach Gillis

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## Education

**University of Chicago** — Chicago, IL
*B.S. Physics with Honors, B.S. Mathematics* — *Sept. 2021 – June 2025*
- GPA: 3.84/4.00
- Quad Undergraduate Research Scholar
- Dean's List

**Walter Payton College Preparatory High School** — Chicago, IL
*High School Diploma* — *Sept. 2017 – June 2021*
- GPA: 4.00/4.00
- SAT: 1580

## Research Experience

**Research Assistant** — July 2023 – Present
*University of Chicago, Department of Physics (with Prof. Young-Kee Kim)* — *Chicago, IL*
- Working in UChicago's arm of the ATLAS experiment at CERN's Large Hadron Collider
- Developed distributed computing framework to run Higgs pair production Monte Carlo simulations (with POWHEG)
- Co-authored paper placing novel constraints on quartic Higgs self-coupling from inclusive cross section
- For bachelor's thesis, conducting a phenomenology analysis to produce constraints from differential cross section information

**Summer Research Intern** — June 2024 – Aug. 2024
*Stanford SLAC National Accelerator Laboratory (with Prof. Caterina Vernieri)* — *Menlo Park, CA*
- Worked on the ATLAS experiment with SLAC and Stanford faculty
- Completed project on trigger efficiency in analysis of VBF-produced Higgs decaying into bottom/anti-bottom or charm/anti-charm pairs (VBF $H \to bb/cc$)
- Presented work to SLAC ATLAS group and VBF $H \to bb/cc$ analysis group in ATLAS

**Research Assistant** — Oct. 2022 – Present
*University of Chicago, Pritzker School of Molecular Engineering (with Prof. Tian Zhong)* — *Chicago, IL*
- Working in lab focused on quantum engineering, including quantum transduction and rare-earth doped material platforms
- Designed microwave and optical cavities for magneto-optic quantum transduction to enable quantum networking

**Summer Research Intern** — June 2022 – Aug. 2022
*National Radio Astronomy Observatory* — *Charlottesville, VA*
- Selected to competitive internship focused on radio astronomy, radio telescope design, astrophysics, and astrochemistry
- Completed project enabling reduction in required computing resources for the Next Generation VLA (ngVLA)
- Co-authored ngVLA computing memo analyzing averaging techniques with focus on achieving ngVLA science use cases

**Summer Research Intern** — June 2021 – Aug. 2021
*Northwestern University, Lurie Cancer Center* — *Chicago, IL*
- Selected to competitive research internship program focused on cancer research and bioinformatics
- Completed a project using R on exercise-induced gene expression and resulting pathway perturbations
- Presented project at research symposium and awarded best poster among 27 ResearcHStart participants

## Teaching Experience

**Math Teacher and Curriculum Planner** — Feb. 2022 – Sept. 2023
*Math Circles of Chicago* — *Chicago, IL*
- Responsible for teaching math and statistics classes for high school students on Chicago's South Side
- Worked with teaching assistants and administrators to streamline current curriculum

## Publications

Bizoń, W., Haisch, U., Rottoli, L., Gillis, Z., Moser, B., & Windischhofer, P. — Feb. 2024
"Addendum to: Constraints on the quartic Higgs self-coupling from double-Higgs production at future hadron colliders."
*Journal of High Energy Physics*, vol. 2024, no. 2, https://doi.org/10.1007/JHEP02(2024)170.

Steeb, J.W. & Gillis, Z. — May 2023
"Time Averaging Limits and Baseline Dependent Averaging for the ngVLA."
*Next Generation Very Large Array Computing Memo Series*, https://library.nrao.edu/public/memos/ngvla/NGVLAC_08.pdf.

## Selected Presentations

"Determining Trigger Efficiency of VBF Higgs to Bottom/Charm Background Events." Aug. 2024
*SLAC Summer Undergraduate Laboratory Internship Colloquium*

"Cubic and Quartic Higgs Self-Coupling Parameterizations of Di-Higgs Production at Next-to-Leading Order." April 2024
*APS April Meeting*

"Designing a Microwave Cavity to Enable Magneto-Optic Transduction in Quantum Networking." April 2023
*University of Chicago Undergraduate Research Symposium*

"Utilizing Baseline-Dependent Averaging in the ngVLA." Sept. 2022
*National Radio Astronomy Observatory Summer Assistantship Colloquium*

"Post-Exercise Regulation of the AP-1 Transcriptional Program." Aug. 2021
*ResearcHStart Summer Symposium*

## Technical Skills

**Languages**: Python (advanced), R, Java, JavaScript
**Software/Tools**: HTCondor, Ansys HFSS, Fusion 360
**Libraries/Frameworks**: ROOT, NumPy, SciPy, Pandas, Matplotlib, Xarray, Dask, Scikit-learn, Keras