Taj Dyson

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Education

Stanford University Sep. 2021 – Jun. 2026
PhD, Physics

McGill University Aug. 2018 – May 2021
Bachelor of Science, Honours Physics

Dawson College Aug. 2016 – May 2018
DCS, First Choice Sciences, Honours List

Awards

NSERC Undergraduate Summer Research Award (USRA) 2020

FRQNT Supplement to the USRA 2020

BLUE Fellowship at McGill's Building 21 2020

McGill Physics Hackathon Winner – Arts & Science 2019

Dawson College ScienceFest Best Poster Winner 2018

Dawson College ScienceFest Hackathon Winner 2018

Governor General's Academic Medal Bronze Level 2016

Publications

(Click to view)

- **T. Dyson** *et al.*, "Radio-Frequency Interference at the McGill Arctic Research Station," *Journal of Astronomical Instrumentation*, Submitted 15 Dec. 2020, Published 12 May 2021.
- H. C. Chiang, **T. Dyson** *et al.*, "The Array of Long Baseline Antennas for Taking Radio Observations from the Sub-Antarctic," *Journal of Astronomical Instrumentation*, Submitted 27 Aug. 2020, Published 21 Dec. 2020.

Presentations and Outreach

(Click to view)

Radio Frequency Interference at the McGill Arctic Research Station Sep. 2020
Soup and Science Public Talks, McGill University

Emergent Computation Aug. 2020
Project Presentation, Building 21

Interviewed in "ALBATROS radio astronomy Product Showcase" Sep. 2019
Article, The MagPi Magazine

Research Experience

Graduate Research Assistant – Axion Haloscope Sep. 2021 – Present
Stanford University, supervised by Prof. Chao-Lin Kuo

- Characterized the resonances of a novel prototype haloscope for axion dark matter detection.
- Developed a script for automatically aligning the haloscope based on measurements possible at cryogenic temperatures.
- Verified the alignment by mapping electric field intensity.
- Trained in modern high-precision metrology techniques for construction of the next haloscope model.

Graduate Research Assistant – Novel Cryogenic Detectors May 2022 – Present
Stanford University, supervised by Prof. Chao-Lin Kuo

- Took cryogenic measurements of the noise performance of a novel detector type, thermal kinetic inductance detectors (TKIDs).

- Collaborating with Bryan Steinbach, Lorenzo Minutolo, and Albert Wandui at Caltech to deploy a test tile of detectors to the south pole with BICEP.
- Helped design the cryogenic radio-frequency readout chain for a receiver in the BICEP array.

Graduate Research Assistant – Qubit-Based Sensors Mar. 2022 – Jun. 2022

SLAC and Stanford University, supervised by Dr. Noah Kurinsky

- Characterized a cutting-edge superconducting travelling wave parametric amplifier (TWPA), finding optimal operating parameters and its noise temperature.
- Took measurements of a qubit at cryogenic temperatures, verifying its transition between states under an excitation, and the AC Stark shift of the transition frequency.
- Measured the critical temperature of superconducting samples for use in transition edge sensors.
- Learned firsthand to operate a dilution refrigerator.

Graduate Research Assistant – Atom Interferometry with MAGIS Jan. 2022 – Mar. 2022

Stanford University, supervised by Prof. Jason Hogan

- Designed, built, & tested an optical assembly critical to the MAGIS experiment.
- Set up a magneto-optical trap for manipulating atoms in a vacuum using lasers.
- Locked may lasers' frequencies using PID feedback with a known frequency comb.
- Built & aligned a 922 nm (infrared) laser.

Undergraduate Research Assistant – Radio Cosmology Field Work Sep. 2018 – Jul. 2021

McGill University, supervised by Prof. Cynthia Chiang

- Developed and deployed solar and wind power solutions for radio interferometer stations in remote locations such as Uapishka Station and the McGill Arctic Research Station.
- Designed & built electronic devices and wrote C++ Arduino firmware for power control & logging.
- Flagged radio-frequency interference in radio astronomy data using Python.

Undergraduate Research Assistant – Radio Interferometry Analysis Sep. 2020 – May. 2021

McGill University, supervised by Prof. Jonathan Sievers

- Synchronized independent interferometer antenna clocks using the time delay of a known signal between them.
- Used the Niagara cluster of Compute Canada to run Python.
- Gave a summary talk to peers and faculty.

BLUE Fellow – Emergence and Complexity May 2020 – Jul. 2020

Building 21

- Independently researched emergence and its relation to the computational capacity of a system.
- Led group discussions about several research topics.
- Wrote computer simulations of cellular automata using Python.

Teaching Experience

Teaching Assistant Jan. 2022 – Mar. 2022

Stanford University *Introductory Undergraduate – Mechanics*

- Taught in an active learning classroom.
- Organized and led study sessions and office hours.
- Graded assignments and exams.

TEAM Undergraduate TA Jan. 2021 – May 2021

McGill University *Advanced Undergraduate – Data Science and Observational Astrophysics*

- Mentored students through coding labs in an online active learning environment.

Instructor Feb. 2017 – Sep. 2017

Kids Code Jeunesse

- Taught coding to kids of all ages in several workshops and events, including Scratch, HTML, and Python.

Technical Skills

Languages: Python, C, C++ (Arduino), Rust, Java, Lua
CAD: SOLIDWORKS
Manufacturing: machine shop, 3D printing, Hexagon metrology

Graduate-Level Courses

Quantum Field Theory I *Stanford University*
Cosmology *Stanford University*
Physics of Energy *Stanford University*
Quantum Theory *McGill University*
Electromagnetic Theory *McGill University*
General Relativity *McGill University*
Particle Physics *McGill University*
Advanced Statistical Mechanics *McGill University*
Biophysics *McGill University*