

# Jacob Grant

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## Education

B.S. Physics and Computer Science (Dual Degree)  
University of Maryland  
GPA: 3.88

Expected May 2020  
College Park, MD

## Technical Skills

**Software:** ANSYS Maxwell, ANSYS HFSS, COMSOL, AutoCAD, LaTeX, Microsoft Office, Siemens NX 11, CAD Drawings

**Programming (Proficient/Familiar):** Java (P), MATLAB (P), C (P), Ruby (P), OCaml (P), Unix (P), Python (F), R (F), Swift (F), Git (F), Rust (F)

**Hands On:** Soldering, Lab Work in Optics and Circuits, Mill Machine, Machine Tools

**Other:** Leadership, Public Speaking, Communication

## Experience

### University of Maryland Hyperloop Team

January 2017 – Present

#### Powertrain Sub-Team Lead

College Park, MD

- Acted as a critical member of a student organized engineering and science design team whose goal is to build a subscale prototype hyperloop pod to compete in SpaceX's Hyperloop Pod Competition in Hawthorne, California.
- Responsible for overseeing design/integration of electric components of pod. Assign necessary tasks/deadlines to team members, using results to make decisions about best next step for pod completion.
- Wrote MATLAB script to model hysteresis loss and resulting temperature rise in drive wheel tread, ensuring it wouldn't melt. Wrote acceleration profile script, considering the propulsive power, rolling resistance losses and other heat related losses.
- Determined heat generated from current pod's motor/motor controller and developed a liquid cooling loop. System consists of pump, pressure sensors, high temperature tubing, pressure relief valves, ice-water heat sink and clamps.
- Previously, as a simulation analyst, modeled magnetic braking/levitation arrays in ANSYS. Optimized for required force to stop pod and force to lift pod at various speeds. Additionally, modeled Linear Induction Motor in ANSYS, optimizing for maximal thrust and minimal lift, determining efficiency/power factor and V/F ratio, as proof of concept for propulsion system.
- Team placed 5<sup>th</sup> in design judging and awarded the Performance in Operations Award at Competition Weekend 1.

### Quantum Computing at the Laboratory for Physical Sciences

June 2018 – August 2018

#### Internship

College Park, MD

- Developed a new qubit design based on the XMON structure using COMSOL and HFSS.
- Used MATLAB to analyze frequency and admittance data to tune the geometry of the XMON's cavity/qubit frequencies, loaded quality factors, coupling strength of the resonator-qubit, qubit-qubit and resonator-resonator, and how adding a layer to simulate the loss from fabrication errors effects the decoherence of the qubit. Presented work to mentor to aid in fabrication.
- Learned how to implement a conditional NOT gate with two qubits and how to optimally drive a two-qubit system to avoid spectral crowding (the SWIFT method).
- Used AUTOCAD to design a new 'tail' and coupling structure (to attach to refrigerator in lab) used to house future qubits inside refrigerator.

### LIGO Scalar Gravitational Wave Search

May 2017 – August 2017

#### Undergraduate Researcher

College Park, MD

- Worked with LIGO Research Scientist Peter Shawhan on two questions: Is a scalar gravitational wave analysis more sensitive at detecting scalar signals than the normal tensor analysis; is it possible to tell if a signal is scalar or tensor polarization with the current number of detectors?
- Analyzed simulated and real LIGO data by running a program in Unix called Coherent WaveBurst on the Atlas Supercomputer.
- Determined efficiencies of each analysis, produced sky-maps of signal locations, and determined probabilities of false alarm signals from background noise.
- Wrote ~5-page detailed report on findings from the analysis and ideas for possible future studies. Submitted report to LIGO Atlas cluster for viewing of all LIGO scientists and published in the University of Maryland's Digital Repository.

### Undergraduate Physics Teaching Assistant

Fall 2017- Present

- Lead two weekly discussion sections consisting of 30 students. Review key concepts, answer questions and give quizzes. Hold weekly office hours and grade tests/quizzes.
- PHYS161 (mechanics – Fall 2017) and PHYS270 (electromagnetism and relativity– Spring 2018, Fall 2018, Spring 2019)

## Awards and Activities

- College of Computer, Math and Natural Science Dean's List: Fall 2016, Spring 2017, Fall 2017, Spring 2018, Fall 2018
- Citation for successful completion of University of Maryland Scholars: Science, Discovery and the Universe and awarded Outstanding Achievement Award by program faculty.
- Member of Winston Churchill Cross Country/Track Team (2012-2016), UMD Club Running (2016-Present).