

Shuhul Mujoo, Pasadena, CA
408 886 0958, smujoo@caltech.edu

Dear Recruiting Manager,

My name is Shuhul Mujoo, and I'm writing to express my interest in a research summer internship at the Lawrence Berkeley National Laboratory in the field of Quantum Hardware and Devices. As a freshman at Caltech majoring in applied physics, I would love this chance to conduct research with QuantISED. I am available in the summer from June to August in person at LBL, full time.

My specific area of interest is quantum engineering and the QuantISED group. I found the idea of Quantum Computation for High Energy Physics fascinating. I love connecting experiments to theory with detailed calculations, and am excited by the fact that quantum algorithms can provide an exponential speedup over classical calculations. Dark matter detection using quantum materials is a promising approach. I especially enjoyed reading about the quantum information paradox and quantum teleportation (an algorithm I have worked on before).

As an applied physics major, I love experimental physics, and strongly believe that experiments will lead to new theories of physics that change how we understand the universe. I would like to highlight my research experience so far.

In the realm of quantum computing, I have written a paper on Quantum K Nearest Neighbors (<https://www.jsr.org/hs/index.php/path/article/view/3431/1679>). As part of the research, I developed implementations of Novel Enhanced Quantum Representation (NEQR) and Quantum Teleportation (QT) algorithms. After being challenged by the unavailability of Quantum RAM while creating an implementation of quantum computing subroutine (Amplitude Estimation), one of my life goals is to help invent and develop Quantum RAM.

Another one of my experiences is an internship at the Search For Extraterrestrial Intelligence (SETI) Institute. I completed a research project and a [final presentation](#) on Gas Temperature Prediction For Accretion Disks. I coded simulations using Fortran and Python, and worked with Mathematica. I went through the entire machine learning workflow, from cleaning (exponent overflows), to training (64 neuron 3 layer RELU) architecture, to testing (3d input space plots and precision recall curves).

Additionally, I wrote a research paper (<https://arxiv.org/abs/2209.08608>) on Simultaneous Localization and Mapping (SLAM), specifically a novel loop closure detection system that integrates geometric and human salient features. Building off the state of the art system, ORB-SLAM, I was able to improve the algorithm in organic environments where there were few features. I then tested my localization algorithm on a robot that I built for a robotics competition. With the improved accuracy, my robotics team won first place in California and became a world finalist.

Please let me know if there are any opportunities available. I am extremely interested in working at the LBL!

Sincerely,
Shuhul