My first encounter with physics began in middle school when I naively picked up Steven Holzner's "*Quantum Physics for Dummies*" in the reference section of the public library. My curiosity has led me to where I am today as an undergraduate student majoring in physics and astrophysics. From my first few weeks as an undergrad, I began to develop new curiosities for understanding the structure of the universe, visualizing our natural laws, and going back to the very origin of our existence, all driving me to heights I had never fathomed to be reachable. My undergraduate experience has put me through tough and rewarding coursework, and has opened doors to explore the topics of my passion through the authentic research experience.

Throughout my undergraduate studies, I have developed a profound appreciation for our application of technology which enables our work and for all physical sciences which sharpens our understanding of the natural world. It is honest to say I am grateful to have further honed my analytical and problem-solving skills through the many classes, projects, and problems I have encountered over my academic career thus far. My current research with graduate student Hugh Sharp, involves analyzing the anatomy of Sloan Digital Sky Survey (SDSS) quasars measured from photometric continuum reverberation mapping (RM). While photometric continuum-RM is generally used to primarily probe accretion structure, photometry sufficiently contaminated by emission lines from the Broad-Line Region (BLR) may map sizes more indicative of the BLR. Being able to use photometric BLR mapping of a select criteria of quasars would be pivotal in the future through Rubin/LSST, allowing less expensive determination of black hole mass in comparison to that of spectroscopic RM techniques. The current goal of this project is to carry out a series of tests to deduce a threshold of feasibility for this method. As of the time I started the project I have gained valuable skills such as furthering my data exploration skills, navigating multivariable & dense data sets, and creating statistical tests and visualizations of these results. Additionally, I have learned to prioritize better organization by keeping all updates in my research wiki on github to keep progress consistent and clear, and to roadmap out timelines with my current end goal for this project being a paper.

My broader research experience has also brought other computational challenges, which I wrestled through, nurturing my python prowess. With Dr. Lea F. Santos, through simulating the evolution of spin-1/2 chains with one and with two excitations, and to later compare these results with that of an IBM quantum computer. As much as my passion for astronomy primarily drives my motivation, I have learned to develop an appreciation for our other disciplines of physics and the research methods they employ. Through my previous research experience pertaining to AGN, I had begun my research journey working on luminous quasar spectra projects such as line fitting, under UCONN graduate student Logan Fries. This project gave me a deeper

comprehension of scientific writing and programming tools to maximize efficiency in my project such as my HDF5 files which kept all my data sets, definitions, and variables in a fully sorted & organized directory. My first research experience was extremely challenging, but tremendously rewarding as I acquired the set of fundamental skills which have shaped me into a more independently capable and confident researcher.

Beyond the technical aspects of physics and astrophysics, I am driven by a deep-seated desire to contribute to the pursuit of knowledge in these fields, which not only expands our understanding of the universe but also has the potential to address critical issues facing the scientific community and humanity as a whole. In my freshman year, I participated in a 5-week STEM-focused summer program named Bridge. The main goals of the program are to further prepare students who are underrepresented in the STEM workforce for the rigor of the STEM curriculum at UConn. Bridge specifically targets four core necessities of support in college - Academics, Professionalism, Social, and Financials, while also introducing leadership opportunities along with careers in STEM and helping to familiarize students with the UConn campus and the college experience as a whole. Bridge provided me with the proper mindset on how to tackle rigorous academics, the depth of collaborative teamwork & networking, and the grand importance of diversity within STEM fields. It also introduced me to my undergraduate research advisor I have worked with since my freshman year, Dr. Jonathan Trump. In the summer after my sophomore year, I made it my main goal to make a new opportunity within this program to allow more undergraduate students to serve as teaching assistants in the program's classes. I became the first undergraduate physics TA in the program's history and hope to develop a succession of undergraduates seeking to fill in for such a role within the program, continuing to make the same impact I received going into the future to continue to inspire the next generation of scientists and for the progression of leadership opportunities for undergraduates of all backgrounds.

Through an REU, I hope to experience the broader academic experience that exists in departments past UCONN. The Physics Research Opportunity REU at Boston University would be a perfect opportunity to further expand my network of collaborators and peers, give me a broader perspective of the academic working environment, and broaden my skills as a researcher by learning new techniques. I write this tremendously enthusiastic about the unique opportunities provided by the Boston University physics department, and I am eager to contribute my passion, curiosity, and dedication to the vibrant scientific community at your institution. Thank you for considering my application, and I look forward to the possibility of being part of your program.