My most recent research has taken place at MIT under guidance of Professor Winslow as a second-year physics student. My work is focused on the Cryogenic Underground Observatory for Rare Events (CUORE)—which holds the record for achieving the lowest temperature in the universe over such a large volume and time. My research involves the full-scale adaptation of CUORE into a particle detector for exotic, incident, track-like particles—a task well outside of its original purpose. The ultimate aim is to conduct a search for magnetic monopoles as well as dark matter candidates (LIPs). So far, I have had much success in the construction of CUORE-data analysis frameworks in Python which allow for the study of coordinated macro-events across CUORE’s crystal array.

At this point I have been able to track and characterize muon events which will be highly relevant for background exclusion for much the work currently being performed on CUORE by other researchers. These analysis frameworks involve standard statistical techniques, Monte Carlo simulations, as well as some frontier algorithmic work, such as multi-objective optimization. I am currently pursuing the publication of my developed methods in a technical paper.

Throughout this process I have gained much practical experience not only in technical physics research, but also in cooperation and coordination with others. I have presented my work at several CUORE collaboration wide meetings, gaining feedback, and discussing future approaches for my work with other scientists.