Since entering Valparaiso University, I have done research on five diverse projects for a total of seventy weeks. I learned standard observational techniques, basic data reduction and analysis procedures, and even written and run simulation programs, among other things. My experiences have affirmed and increased my fascination of astronomy into a deep commitment to the science and its research. As I consider the next step, I see that pursuing my doctorate in astrophysics at the University of California at Santa Cruz serves me the best. I will formally study my chosen field and thoroughly research one topic for an extended period of time. From my varied research experience, I find myself favoring theoretical research in gravitation or cosmology, and coming to this realization has been remarkably straightforward.

Humorously, my astronomy career actually began with a minor rebellion. I usually heed my older sister's advice, and though she warned me that the astronomy course my high school offered would be unfulfilling, I took the class, determined to make of it what I wanted. I learned more than the history, physics, and theories of astronomy; I discovered that the field resonated with my very essence, which seeks knowledge and understanding. Astronomers study the most beautiful, the grandest objects and phenomena as they strive to answer some of the most profound and fundamental questions: How did the universe begin? When will it end? Where else might there be life? I knew then, in tenth grade, that I wanted to be an astronomer and seek the answers.

Astronomers, I realized during freshman year of college, do research. Intent on being the best astronomer, I relinquished my first college summer to work on the VU astronomy project and study the end-states of stars called protoplanetary nebulae. I learned basic observing and analysis techniques but also proved I could be a researching

astronomer—and decided I wanted to be one. In fact, I sought the next new project I could join and ambitiously applied for one of four positions in the Cerro Tololo Inter-American Observatory Research Experience for Undergraduates program (CTIO REU), which took place in Chile during the spring semester.

As I waited for notification, I decided to go if accepted and miss the spring soccer season. I have played since first-grade and, six years later, made it my goal to play at a Division I university. I fulfilled this dream at VU and played four great years—minus one season—on the varsity squad. Like many other student-athletes, my dedication to my sport molds my dedication to other aspects of my life—activities, academics, research. Ironically, this work ethic first mastered in soccer led me away from my sport for the first time for my soon-to-be CTIO advisor called mid-fall semester to inform me I had been selected. Though, I had never missed a season in fifteen years of play, I sacrificed one of the few competitive seasons left in my career in order to work at CTIO. I was torn between by my passion for soccer and the burgeoning passion for research, and I chose the latter.

My CTIO experience enriched me in more ways than just with respect to science. I lived the life of a researching astronomer. More than learning to use web-based databases, observing on the mountaintop, or attending my first conference, I fondly remember teatime. The CTIO staff, students, and any observer passing through would gather to discuss recent preprints or their current projects over tea and cookies. They amazed me by their level of understanding of subjects not directly related to their work. Though they specialized in particular areas, the CTIO community kept them well versed

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in all subjects pertaining to astronomy. In order to stay close to all aspects of my chosen field, I want to work at a research institute or university.

Even before I left for CTIO, I applied to the Laser Interferometer Gravitational-wave Observatory (LIGO) REU for the summer after I returned. After two observational projects, I sought a theoretical one. Though I enjoy viewing the macrocosmic—indeed nothing has impressed me more than seeing the Magellanic Clouds for the first time, I find ideas more comprehensive and more tantalizing than any cluster or galaxy. Theoretical research arises as the most direct route to answering the fundamental questions and understanding the cosmos. Since first learning about the search to unify the four fundamental forces in high school, gravity, the enigmatic rogue force, has intrigued me. LIGO allowed me to research gravitation for the first time. So enthralled by the subject, I opted to model the effects of the gravitational environment on substellar companion formation in protostellar disks for my senior honors project.

However, cosmology, which strives to answer the essential questions of astronomy, has interested me as long as gravitation. In a small part, this led me to work at CERN, the European Laboratory for Particle Physics, where their new detector will hopefully replicate conditions of the very early universe. I also applied to the CERN REU to give fair chance to the slight possibility that I may be called to a different avenue of astronomy research, which has become very interdisciplinary. But I missed the astronomy community and the chance to observe. Though I want to focus on theory, I need to do some complementary observing because the beauty of the heavens inspires me and moved me to take my first astronomy course in high school. Fortunately, the topics that interest me lend themselves well to theory and observation—gravitational-wave

sources and detection or cosmic microwave background polarization prediction and measurement.

Thus, the University of California at Santa Cruz arises as the ideal university for me. The Department of Astronomy and Astrophysics has a variety of observational and theoretical research projects of interest to me. For instance, Dr. George Blumenthal studies the origins of fluctuations in the cosmic microwave background radiation, and specifically, he examines the effects of the gravitational potential and of Compton scattering in the early universe. Were I to continue research along the lines of my senior honors project, Dr. Peter Bodenheimer utilizes hydrodynamics calculations to characterize star and planet formation. In addition, the eclectic nature of the Department reminds me of the CTIO community, and this assures me that I will be well informed of on-going astronomy research not directly tied to my focus. By associating with Dr. Joel Primack and his study of the cultural implications of recent advances in cosmology research, I would be able to integrate my astronomy life with my natural predilection for the humanities, which led me to Valparaiso University and its liberal arts education. Truly, UC at Santa Cruz has all the characteristics that I am seeking in a graduate school: quality of education, diversity of research, and dedication to astronomy.

Astronomy research is the medium through which I strive to understand the universe, its origins, and its mechanisms. I earned the right to work at serious institutions of research and on quality and varied projects. Through these projects and attention to what resonates with my inner being, I have come to know why I want to research astronomy and what I intend to accomplish in my career. Now I need the time and guidance to begin. I know the Department of Astronomy and Astrophysics at the

University of California at Santa Cruz will dedicate itself to making me the best astronomer possible, and I will devote to them the same diligence and creativity that I showed during my research experiences. This mutually beneficial relationship will only serve to further my goal, which is the goal of the Department and of science as a whole: knowledge.

Kathy Cooksey
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