With formal training in physics and a longstanding interest in discovering how the world works, I am a scientist who works at the exciting interface between physics and biology. My graduate research passion is for *in vivo* fluorescence microendoscopy. Headed by Professor Mark Schnitzer, my lab has developed novel techniques to image brain activity in deep structures of the brain during free behavior, and I am eager to lead the development of more techniques to track cellular network activity in freely behaving animals. Last September I gave a research talk at the Stanford Photonics Research Symposium. I was very excited to share my lab's research with the scientists and professionals attending the symposium. I look forward to giving talks and writing papers about my research endeavors of the coming years. In my proposed plan of research essay, I describe a project to study the temporal dynamics in individual animals of Arc, a neuronal activity reporter protein which regulates memory formation. Broader impacts of this project include advancing understanding of memory-related diseases, such as Alzheimer's. In my previous research experience essay, I present my background in experimental research and detail some of my current work. In this essay, I describe my journey to develop myself as a responsible scientist and my goals for the future, which will be all the more attainable with the support of the National Science Foundation.

My cultivation to become a scientist began in my early years. Since my nursery school days I have been fascinated by figuring out *how* things work and *why* they function as they do. In elementary school, I excelled in math and science while continually observing and commenting on my surroundings. In middle school, I skipped a year of math and took honors courses in chemistry and biology, where my curiosity about natural phenomena continued to mature. In high school, I realized my enthusiasm and passion for physics when I took two years of physics classes with Mrs. Kristy Beauvais. Her perpetual energy for teaching, love for physics, and devotion to her students came through every day in class, and I eagerly absorbed everything she taught. To her, no question was insignificant and each student deserved personal attention; for me, she is an unforgettable teacher and a role model who showed me that having passion for what I do will light up my life. I strive to emulate her when I work with young students, and my goal is to bring an equal enthusiasm for teaching to my academic career.

I believe that responsible scientists should be proficient at communicating with and educating the larger community about their work and should have solid leadership skills. I am actively involved in giving back to the broader community, and I have been for many years. In high school, my curiosity for biology and medical science led me to volunteer for 380 hours at the Emerson Hospital in Concord, MA, and I worked with my Girl Scout troop on a year-long Silver Award project collecting donations for a battered women's shelter in Boston. In college, one of my first activities was an annual CityDays volunteer program, where I helped ready a public school kindergarten room for the new school year. I participated in CityDays again the next fall, this time with additional responsibility as a project leader. In my junior year, I developed leadership skills as a sorority executive board member. As Vice-President of Alumnae Relations, I improved alumnae networking for recent graduates' employment searches, facilitated communication between local alumnae and current undergraduates, and published a bi-annual newsletter describing chapter events and alumnae updates. Additionally, I volunteered at annual Pan-Hellenic Children's Carnivals for the Cambridge community, helped to raise campus awareness of domestic violence, and participated in city-wide Charles River clean-up days.

An especially valuable teaching and leadership experience for me was as a tutor for Shania, a Cambridge public school fifth-grade student, during my sophomore year of college. I was paired with Shania through the Outreach Tutor program coordinated by the Public Service Center at MIT.

I worked with Shania twice weekly on her English and writing skills at the Cambridge YMCA after-school program. I prepared engaging language and writing activities and also aided her with school assignments. Being a tutor reinforced to me that teaching is not as easy as simply presenting information; the teacher is responsible for ensuring that the information is processed and that the student can successfully internalize the lessons.

Since starting graduate school, I've pursued community involvement through new avenues. I am actively involved in mentorship programs to support women in sciences and to support younger students. Last year I joined a local mentoring program for women in sciences which pairs graduate students with older women scientists as mentors. I participate in monthly discussion sessions on how women can continue to succeed in science-related careers and have a very enriching mentoring relationship. At one meeting my mentor, a post-doctoral student, shared notable tips and strategies for interview techniques which I successfully applied during my interview for my thesis research lab. I look forward to becoming a mentor for female graduate students to help instill confidence at persevering in competitive scientific research. Separately, this fall I will mentor a biological sciences undergraduate student through a mentoring program for pre-graduate students, and next summer I will participate in a mentoring program for under-represented local high school students interested in biomedical sciences, who would often be first-generation college students. I look forward to helping to increase the diversity of college students through these programs and find mentoring to be a very meaningful experience.

I also enjoy working with young students to build their enthusiasm for science. In January 2007, I volunteered as a Science Fair Judge for local middle school students. I judged two different projects and had great discussions about the methodology and strong points of the projects. I will continue volunteering for this event over the coming years and will encourage my colleagues to volunteer as well. Last spring, I participated in Stanford's annual Community Day for the surrounding towns' families by volunteering to run a booth about the wonders of fluorescence. I displayed various fluorescent materials and fielded questions about the interactive display from young inquisitive children as well as from their equally inquisitive parents. In 2008, I would like to become a science mentor for a local fifth-grade classroom, visiting several times over the year to have discussions with the class about current science in the news and to share my excitement about how science allows us to understand the workings of the world.

My academic and intellectual abilities support my potential to become a scientific innovator. I have excelled in rigorous physics coursework at MIT, earning induction into Phi Beta Kappa and Sigma Pi Sigma, a national physics honor society. My undergraduate thesis on the development of prototype triple-GEM (Gas-Electron Multiplier) particle detectors, described in my previous research experience essay, contributed to the implementation of a GEM detector into the Solenoidal Tracker at the Relativistic Heavy Ion Collider. At Stanford, I have taken graduate classes in physics, advanced microscopy imaging techniques, and signal processing in neural circuits while doing biophysics graduate research. Being involved in both collaborative and independent projects, I utilize leadership and research planning skills daily.

In conclusion, I believe I embody the sprit of the NSF graduate fellowship program. I have already taken many steps towards developing myself as an experimental scientist, and the future lies ahead of me. Being supported by the National Science Foundation will allow me to freely pursue my current passion for *in vivo* fluorescence microendoscopy, to apply quantitative methods to research on biological problems, and to achieve my career goal of becoming a responsible academic researcher who is actively involved with the greater community.