**Personal Statement**

Please outline your educational and professional development plans and career goals. How do you envision graduate school preparing you for a career that allows you to contribute to expanding scientific understanding as well as broadly benefit society?   
  
Describe your personal, educational and/or professional experiences that motivate your decision to pursue advanced study in science, technology, engineering or mathematics (STEM). Include specific examples of any research and/or professional activities in which you have participated. Present a concise description of the activities, highlight the results and discuss how these activities have prepared you to seek a graduate degree. Specify your role in the activity including the extent to which you worked independently and/or as part of a team. Describe the contributions of your activity to advancing knowledge in STEM fields as well as the potential for broader societal impacts (See Solicitation, Section VI, for more information about Broader Impacts).   
  
NSF Fellows are expected to become globally engaged knowledge experts and leaders who can contribute significantly to research, education, and innovations in science and engineering. The purpose of this statement is to demonstrate your potential to satisfy this requirement. Your ideas and examples do not have to be confined necessarily to the discipline that you have chosen to pursue.

**Important questions to ask yourself before starting the essay:**

1. Why are you fascinated by your research area?

**I am fascinated by theoretical physics because it is always amazing to me that math and physics are so closely interrelated, though not obviously derived from whatsoever similar principles (in the sense that physics is essentially empirical / deductive while math is essentially constructive). I am fascinated by nuclear physics and particularly nuclear physics through hydrodynamics because I have (by somewhat of a surprise) found that I really like statistical mechanics and fluid dynamics (it is a fascinating challenge to deduce ways to solve 1024 relatively simple problems), and I think it is cool to couple high energy physics with condensed matter physics / statistical mechanics in hopes of making the problems tractable.**

1. What examples of leadership skills and unique characteristics do you bring to your chosen field?

**A diverse research and academic background – I have worked in experimental physics, engineering, theoretical, and computational physics, and though I have found my calling in the latter two my experiences in the first two inform my research and give me a better idea of the problems faced in those fields.**

1. What personal and individual strengths do you have that make you a qualified applicant?

**I am unusually hard-working and dedicated to research.**

1. How will receiving the fellowship contribute to your career goals?

**Receiving the NSF fellowship would allow me to enter graduate school as a researcher, which is unusual, particularly in theory where there isn’t a whole lot of money floating around.**

1. What are all of your applicable experiences?
2. For each experience, what were the key questions, methodology, findings, and conclusions?
3. Did you work in a team and/or independently?
4. How did you assist in the analysis of results?
5. How did your activities address the Intellectual Merit and Broader Impacts criteria?

**Why am I fascinated by my research area?**

**Research Activities**

2011 – 2012: Participated in outreach through Colorado Space Grant Consortium at several events designed for disadvantaged elementary school students from dominantly-Hispanic local schools to participate in science- and engineering-oriented after-school and weekend events on the CU Boulder campus. I also participated in the design and implementation of a rocket payload that was chosen as the design for NASA’s 2012 Rock On! workshop, which is designed to increase awareness of the opportunities available to university students across the nation at Space Grant consortiums.

2012 REU: Developed aurora detector through a program to disseminate aurora detectors throughout tribal colleges on Native American reservations in Montana in order to increase access to science and technology for college students and increase excitement about science for younger local students in an effort to increase Native American representation in higher education.

2013: Developed automated data analysis algorithms balloon-borne imagers designed to detect leaks at CO2 sequestration sites. The broader impacts of this research are to provide feedback mechanisms for ensuring that CO2 leaks are detected prior to becoming a significant problem, and also to study quantitatively the effect of sequestered CO2 on local vegetation. During the spring our group also visited Bozeman High School physics classes to give demonstrations on infrared optics and encourage students to explore engineering or physics research in college.

2012 – 2013: Liquid Crystal Materials Research Center (conducted under a research fellowship from the College of Engineering and Applied Science). I conducted experimental research on the interactions between particles in liquid crystal field using a variety of optical techniques, and became involved in a theoretical and computational project writing simulations of liquid crystal dynamics. I began to see the cool applications of my computer programming experience, not only to data analysis (which I had done in the past), but to science itself, and became interested in theoretical and computational physics.

2013 – Present: Nuclear Theory and Computational Hydrodynamics (conducted under research fellowships from the Undergraduate Research Opportunities Program, University of Colorado at Boulder)

2013 – Present: Involvement in CU PRIME, an organization of physics graduate students at CU Boulder born in 2013, modelled after the Compass Project at UC Berkeley to increase retention of female and minority students in physics by promoting community and providing access to mentorship opportunities and exposure to modern research topics for all undergraduate students. I am a CU PRIME mentor and was heavily involved in the design and development of the inaugural CU PRIME course, “Fundamentals of Scientific Inquiry”, which will run for the first time in fall of 2014 to accompany an existing lecture series where graduate students give bi-weekly presentations on their research aimed at undergraduate audiences. I also had the task of developing a system for effective data analysis and storage of information collected from attendees at talks and census data on program members. As CU PRIME is growing quickly into a full-fledged organization with hundreds of members, this project was very important to easing its growing pains and providing analysis on the demographics that the organization served in its first year.

2014 REU: Theoretical and Computational Magneto-hydrodynamics

I have been involved in the CU Boulder chapter (?) of Society of Physics Students (SPS) since 2012.

**Research Plan**

Present an original research topic that you would like to pursue in graduate school. Describe the research idea, your general approach, as well as any unique resources that may be needed for accomplishing the research goal (i.e., access to national facilities or collections, collaborations, overseas work, etc.) You may choose to include important literature citations. Address the potential of the research to advance knowledge and understanding within science as well as the potential for broader impacts on society. The research discussed must be in a field listed in the Solicitation (Section X, Fields of Study).

**Important questions to ask yourself before starting the essay:**

1. What issues in the scientific community are you most passionate about?
2. Do you possess the technical knowledge and skills necessary for conducting this work, or will you have sufficient mentoring and training to complete the study?
3. Is this plan feasible for the allotted time and institutional resources?
4. How will your research contribute to the "big picture" outside the academic context?
5. How can you draft a plan using the guidelines presented in the essay instructions?
6. How does your proposed research address the Intellectual Merit and Broader Impacts criteria?