

Personal Statement

Sarah E. Smith

I am interested in applying the concepts of physics, especially optics, to the field of medical biology. I feel that taking an approach rooted in physics will add the freshness and perspective needed to solve many of today's most compelling biological problems, such as the ongoing fight against cancer and, more recently, the need to defend ourselves against bioterrorism. Many exciting developments have been happening recently in the area of optical biophysics, including the invention of optical tweezers, the study of fluorescent proteins and upconverting chelates, and advances in cancer detection techniques. I am interested in pursuing these ideas further.

My own experience includes work in the development of the new field of optical microfluidics. I did this research under the supervision of Dr. Gregory Faris in the Molecular Physics Laboratory at SRI International in summer 2002. I found this work very interesting because of its wide range of applications, and its potential to improve experimental techniques in other fields.

My recent work at the Stowers Institute for Medical Research was my most fulfilling to date. There I began to live my vision of working closely with biologists to apply my knowledge of physics to create new ways of imaging biological systems so that more detailed and complete knowledge can be gained. Under the supervision of Dr. James Coffman in summer 2003, I developed a system for creating three dimensional time lapse images of early embryo development in sea urchin. I was able to highlight cellular features with fluorescent dye and record their movement in time and space, something not previously available in live sea urchins. I found this especially satisfying because the data I gathered was used to form a hypothesis regarding the expression of the gene SpRunt-1 in relation to cell size.

In the future, I hope to continue down this path by earning my Ph.D. in biological physics and beginning work in a research laboratory. I intend to specialize in experimental work in optical biophysics.