

## Mentoring Statement: Jeremy Levy

My approach to mentoring students has evolved significantly over my twenty-five years of being a PhD advisor. When I started as an assistant professor in 1996, I was my own postdoc, spending most of my time building up the experimental laboratory. I had one student whom I supervised very closely and pushed very hard to achieve. While I know that my first student learned an enormous amount that has served him in his future career, this style of mentoring was neither sustainable nor optimal. Back then, I was looking for “outstanding” students with the right background training and “smarts” to perform well in a fast-paced research environment.

What changed? I think that my outlook has evolved to the extent that I view the PhD fundamentally as an education, a journey. Students are not there to work for me; instead, I am there to teach them—how to conduct research, how to solve problems, how to handle rejected manuscripts and unsuccessful attempts. Problem solving, fearlessness, vigilance, and helping others, these are skills and qualities that I try to instill into my students. In my early journey, my mindset about students was “fixed”: they either had what it takes to do research, or they didn’t. Now I have adopted a “growth” mindset: students need to embrace struggle, and they can learn how to face any challenge. Now, my retention rate for students is close to 100%, and my research productivity has never been greater. My team of mostly graduate students (with a small number of undergraduates, and no postdocs) consistently produces top-rate research in top-ranked journals like *Science*, *Nature*, *Nature Physics*, *Phys Rev Lett*, etc. Our research is years ahead of anyone else in the world in our field.

Over the years, I have been fortunate to have students who didn’t always do what I asked. There is an anecdote that I have often told in seminars about how my research one day turned on a dime and led into an impactful new direction. It involved a ticket to the 2006 World Cup Final, given to me by my brother, which prompted an interaction with a researcher in Augsburg (sister city of Pittsburgh), planting the seed of an idea to create a new type of reconfigurable nanoelectronics. But it was my PhD student who made the discovery. I told her to “sketch” the surface of an oxide heterostructure with a conductive atomic force microscope. I believed that conductive “writing” would require negative voltages to be applied, while “erasing” would involve positive voltages. Fortunately, she tried one sign of the voltage and when that didn’t work she reversed the sign—which did work! Sixty published papers later, we are still sketching nanoelectronics using the approach pioneered by my student.

Of course, I knew that this student would eventually graduate and move on with her career. I was desperate to understand just what it was about her that I needed to look for in future students. For several years I tried to find graduate students like her. In retrospect, I now know that my mindset was “fixed”. What is most important for success in a student is not their starting point but the path that you help them set out for themselves.

The present-day makeup of my research group is unusual in one respect that will seem obvious from any recent group photograph: most of my PhD students are women. In my early career, I paid no attention to these factors, but I do remember clearly what caused the transition. I was talking with my NSF program manager, who is female. She told me point blank: “I like the research you are doing, but you really should really go out and try to recruit women into your group.” I don’t know how I could have been so blind to this—my wife is a professor of physics in my own department. But her comment really struck me, and I took her recommendation to heart. That year, I successfully recruited three women into my research group. Since then, the fraction of women has steadily grown, to the point that they

## Mentoring Statement: Jeremy Levy

now make up 75% of the group. Statistically, this is way outside of the norm. On average, women make up 20% of PhD student population, and the number is significantly lower in the area of physics in which I work (quantum information). What I have observed is that many (not all) of the “imposter syndrome” issues dissolve away in this environment. I am very proud of my students and everything they have accomplished, and I am also happy to be doing what I can to counteract the “factor of two” problem in my field, i.e., the extreme lack of representation of women scientists in the Second Quantum Revolution.

When I think about my accomplishments now, I think less about just the technical aspects of what my group has achieved and more about all of the highly trained scientists that I have produced. Recently, I had the great fortune to visit a former student of mine, Vanita Srinivasa, who started research with me as an undergraduate and then continued with her PhD with me. Vanita recently was hired as an Assistant Professor of physics at the University of Rhode Island, where she is launching a new graduate program in quantum information science. When I was invited to present a keynote speech for the kickoff event that she organized, the Department Chair gave me a long and embarrassing introduction. What I said after that came to me spontaneously: “Thank you for that kind introduction, but I think it would have sufficed to introduce me as Vanita Srinivasa’s PhD advisor.” Truly, I feel like my greatest accomplishments as a professor are my scientific mentees. Seeing my PhD students thrive, whether it is in an industry job, an educational capacity, or a research environment, is the part of my role that is most satisfying to me.