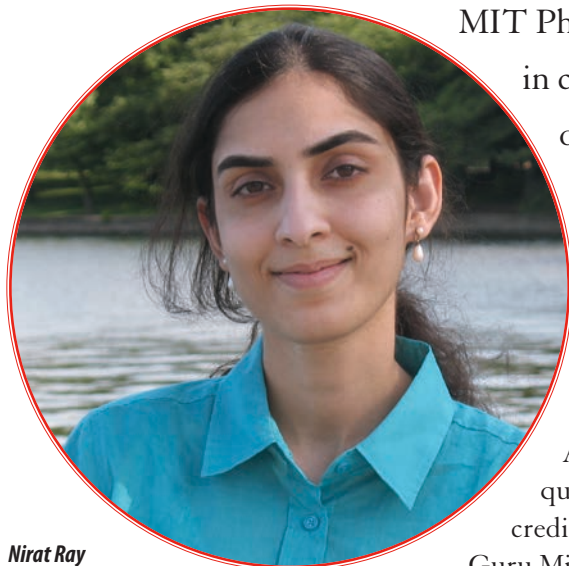


In the early 17th century, an English poet musing upon humanity's condition noted that "no man is an island entire of itself; every man is a piece of the continent, a part of the main."¹ Nearly four hundred years later and in another continent, that insight still holds. Here at

MIT Physics, **Nirat Ray**, fifth-year PhD candidate in condensed matter experiment, is a modern-day example of the supportive, and reciprocal, power of the human network.



Nirat Ray

A native of Delhi, India, from a close-knit and traditional Hindu family, Nirat arrived at MIT in fall 2009 as a newlywed with BSc and MSc degrees in physics, an International Fulbright Science and Technology Award (2009–2012), and staggering jet lag. Almost immediately, she faced the Department's daunting qualifying exams. In meeting this challenge, Nirat readily credits the affectionate loyalty of her husband, data analyst Guru Mishra, plus the intellectual guidance of her PhD supervisor,

Dean of Science Marc Kastner. Their support, she says, was critical to her successful transition into a new country and culture, and launching a career in experimental physics.

Nirat's growth as a young physicist continues to be sustained by philanthropic support: in 2013, the Schlumberger Foundation awarded her a renewal grant of its 2012 Faculty for the Future fellowship. Created to help increase the overall number of women pursuing scientific careers, the program targets women from developing countries who demonstrate both scientific talent and leadership ability. Upon completing their advanced studies abroad at the world's leading institutions, Faculty for the Future fellows are expected to return to their home countries to continue their careers and, in turn, inspire other young women. With her passion for physics enriched by a multifaceted support network, Nirat plans on doing just that.

physics@mit: Nirat, congratulations on your renewal grant as a Schlumberger Foundation Faculty for the Future fellow. It must be particularly meaningful for you, as the daughter of a woman physicist who experienced strong cultural pressure to drop

1. John Donne, *Meditation XVII, Devotions upon Emergent Occasions*, 'No Man is an Island', 1624.

out of her own advanced studies in physics. In what key ways have the changing cultural climate in India, and your own extended family's support, affected your aspirations?

Nirat Ray: Thanks, Carol. I feel very fortunate to be a recipient of the Schlumberger fellowship, and am extremely grateful for the renewal. The Schlumberger fellowship provides active encouragement to women pursuing higher studies, and that is not something I witnessed a lot growing up. But things are different now. There is definitely a marked change in India as many women are pursuing higher education, as well as men and women competing on equal terms in the job market. However, once a woman gets married, the equation is no longer simple. A married woman in India definitely needs a lot of support and encouragement from both her husband *and* her new in-laws, if she wants to continue her studies. My husband, Guru Mishra, has been extremely supportive of my opportunity to pursue a PhD at MIT. We had to make some difficult decisions along the way: Guru had to give up a well-paying data analysis job in Amsterdam to come with me to Cambridge. But, he has always stood by me—as my best friend and my pillar of strength.

Then, there's my family back home in India: my father-in-law (a professor of mechanical engineering) and my mother-in-law (a teacher) also understand what it means to be a graduate student, and the challenges that come with it. Their support, encouragement and guidance have helped me through some tough times. Not least, my own parents have always been incredibly supportive. As the only child of two people with a physics background, I share a unique relationship with them. I believe that my mother, especially, feels as if I am living her dream; in her youth, she did not have quite the support system I do. Had it not been for the support from all of the people I love, I would never have been able to pursue my own dream of being a physicist.

physics@mit: One of the outstanding strengths of the MIT physics department is its mentoring of graduate students. How has your work with Dean Marc Kastner over the past four years most affected you, and your physics career?

Nirat: Marc took me into his group when I was still struggling to adjust to life at MIT, and gave me the courage to believe in myself as a physicist. After working with him for four years, I now know why people say that choosing your advisor is the most important decision you make in graduate school. I really admire his positive outlook, which is very refreshing when things in the lab are not working out as you want them to! Those of us who work with Marc enjoy a lot of freedom in solving problems and even in finding problems worth solving. He has always given me the freedom to explore, and that in turn has given me confidence in my capabilities as a

researcher. Marc has a deep understanding of all physical phenomena and he explains even the most esoteric of these in a clear, elegant way. I admire his ability to identify important physical phenomena in data, and his excellent judgment in deciding on the most efficient way to investigate them. I now strive to inculcate those qualities in myself.

physics@mit: As you enter the final year of your PhD studies and look ahead to a return to India and an academic career there, what do you see as the principal ‘take-aways’ from your MIT physics experience? What about the experience of interdisciplinary work with other MIT scientists and engineers, such as Mounqi Bawendi’s group in Chemistry and the Microsystems Technology Laboratories (MTL)?

Nirat: A big part of the MIT grad student experience is the general exams. I believe their purpose is to make certain that MIT physics graduates have a broad background in physics and a firm understanding of the particular branch of physics they are specializing in. When I think about a career in research, both of these are crucial. At the end of the day, research is about finding problems and then trying to solve them. The problems and their subsequent solutions can require a good understanding of the whole, and a complete understanding could involve cutting right across borders of the subject matter. This is where having some interdisciplinary research experience becomes crucial. The beauty of working in experimental condensed matter physics is that you can fabricate something new and all sorts of fascinating physics can come out of that. When it comes to fabrication, I’ve been very fortunate to have experienced both the chemistry and the engineering routes of making something new.

It has also been wonderful to interact with other students and professors from these fields, as they have a completely different outlook on things. Another thing that I will definitely take back to India is the mentoring/support system that the department and MIT as a whole provide, especially for women. At the end of the day, what I would like to take away from my experience at MIT are a good understanding of physics, and the ability to think about problems—to try and figure out what might be interesting, not just to the physics community but to the scientific community.



Nirat and her husband, Guru Mishra, on their honeymoon in June 2009, surrounded by cheese in a Dutch farmhouse outside Amsterdam.

—Carol Breen, *Communications & Pappalardo Fellowships Program Administrator, MIT Physics*