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Guess what I am doing now!

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From the time I was very young, my favourite subjects were mathematics and English. When people asked me what I wanted to do when I grew up, I used to have a hard time choosing between being a mathematician and being a writer, though I was always a bit embarrassed to say this, since my father was a mathematician and my mother a writer – I was afraid that people would think that I was displaying a singular lack of imagination in my choice of careers! After my ICSE, I shocked many people by pausing to think about whether I wanted to study further in the sciences or the humanities – it was assumed that all “toppers” would automatically choose science. As it happened, however, I did fulfill expectations by joining the science stream, having reasoned that it was easier to become a scientist who wrote, than a writer who did science in her spare time.

Though I did well in all science subjects, in my schooldays I had a severe physics phobia. This was probably induced by my first physics teacher, who was a real martinet, and made no secret of her dislike of me. She made us learn physics largely through rote memorization, which did not appeal to me, and I remember

sobbing hysterically both before and after my ICSE physics exam. If someone had predicted, at that time, that I would become a physicist, I would have told them that they were crazy! In fact, when I joined St. Xavier's in Bombay for Junior College, I was quite disappointed to discover that physics was a compulsory subject for science students.

Funnily enough, it was my interest in writing that led to my overcoming this aversion to physics – I was asked to script a radio programme for children about Albert Einstein, and when I started reading up about his life and his work, I became fascinated by quantum mechanics and relativity. I learnt more about these subjects in my classes, and was fortunate to have some excellent teachers, such as Sudhir Paranjape, R.V. Kamat, Melky Alvares, Jehangir Mistry and Rajkumar Rao. I think I literally fell in love with physics, it became an obsession, and when my father bought me physics textbooks for my birthday present when I turned sixteen, far from feeling let down, I was actually rather gratified! Socially, my first two years at Xavier's were hard...from being in an all-girls' school, I was suddenly in a class of 4 girls and 75 boys, most of whom refused to talk to me; only much later did I discover that this was partly because of pique at my having done well in examinations. Looking back, maybe I should not entirely blame them, I must have seemed pretty weird – I chose to spend my free time in the library rather than the canteen (I have always read widely and voraciously), and grew misty-eyed when thinking of Werner Heisenberg and Ernest Rutherford, rather than John Travolta or Amitabh Bachchan!

Of course my classmates also found it odd that I did not want to do engineering or medicine! Despite being academically successful, it was completely clear to me that I wanted to do a B.Sc. in physics, also at St. Xavier's – and I have never regretted this decision. I was fortunate in having parents who put no pressure on me, and left me to decide what I wanted to do with my life. After that, I did an M.Sc. in physics at IIT Bombay (where S.H. Patil was inspiring and supportive), and then, very much to my surprise (my confidence hadn't increased hugely since my ICSE time!), I was admitted to the Ph.D. programme at Harvard Uni-

versity in the USA, which was regularly ranked as the topmost university in physics. I went there planning to do either astrophysics or high energy physics, but after a year of coursework, I chose to change fields to condensed matter theory, which is the area I still work in.

After my Ph.D., I worked as a postdoc – first at Brookhaven National Laboratory in the USA, and then at the Fritz-Haber Institute in Berlin, Germany. Though I enjoyed my years studying and working abroad, and made several close friends there, I always felt that India was “home” and where I belonged. So I was happy to accept the offer of a faculty position at the Jawaharlal Nehru Centre for Advanced Scientific Research in Bangalore, where I continue to work to this day.

The field I work in is called ‘ab initio density functional theory’, this is an approach to calculating the properties of materials from ‘first principles’, with no empirical input apart from atomic numbers and atomic masses. For many years I focused primarily on studying the surfaces of objects, but nowadays I am also interested in studying the properties of very small nanosystems (composed of tens of atoms), more specifically, I am interested in studying how the structural, electronic, magnetic, chemical, mechanical and thermal properties of such systems change when their size is changed.

I like doing research because of the intellectual freedom it provides, as well as the challenge of puzzle-solving. I feel a huge satisfaction when I can discern a pattern amongst a collection of seemingly random numbers (from experiments or computation), or when I can explain some phenomenon that seems contradictory or counter-intuitive. Moreover, though I can see the appeal of knowledge-for-knowledge’s-sake, I like the fact that my research may find applications in areas such as the search for better materials for magnetic memory storage, or better catalysts for reducing environmental pollution. I also enjoy teaching, especially trying to teach in a way that emphasizes conceptual knowledge rather than merely facts or formulae.

Almost thirty years after I first decided I wanted to be a physicist – well, I have pretty much exactly what I wanted! I feel

it's wonderful that I am paid to do what I enjoy doing, and that I have the freedom to pick how I spend my time. Though my career path from then to now might seem straight, determined and successful from the outside, on the inside, it has not always been so.

There have been times when I have doubted whether I was good enough to succeed in this field that so fascinated me – either because of my own insecurities, or because of negative remarks from others, or because it seemed overly competitive. But then I tell myself...heck, no, I am good at this AND more importantly, I like doing it...and I feel like hunting out that first physics teacher who so terrified me, and saying: “You used to say I'm no good at physics...well, guess what I'm doing now?!”