

doi:10.1038/nindia.2012.48; Published online 30 March 2012

Interview

# 'Higgs search will direct future of particle physics'

Particle physicist **Rohini Godbole** of the Indian Institute of Science is part of a select group of scientists who will decide the design of the next-generation particle accelerator based on the outcome of experiments being run on CERN's Large Hadron Collider (LHC). She speaks to *Nature India* about her work and life.

**Vijaysree Venkatraman**

In a parallel universe, Rohini Godbole would have been a Bank of Maharashtra employee — she was offered a job after she topped Pune University in B.Sc., Physics. "The salary was almost as much as my father's at that time," she recalls. A scholarly life, she decided, would suit her better.

**Q** . The story about a Japanese scientist bowing to you at the Frankfurt airport is widely known. What was that all about?

**A** . Oh, this happened very early on in my career when I was returning from a conference in Poland. I had presented a paper on short-lived 'charmed' particles containing charm quarks, which I had co-authored with D. P. Roy of Tata Institute of Fundamental Research.

When one is young, one tends to be beset with fundamental doubts: "Am I cut out for this career? Do I have what it takes?" The airport incident, along with similar ones, boosted my confidence. Thanks to such informal recognition, I continued in research.

**Q** . What has been the central theme of your work?

**A** . I entered this field as a graduate student at Stonybrook University, where I got my PhD in 1979. From the mid 20th century, Standard Model (SM), a theoretical construct, has described the fundamental workings of matter but it is by no means complete. With other particle physicists, I have worked to formulate another theory super symmetry — SUSY for short — and authored a graduate-level textbook on the subject.

All science progresses by testing theories. Particle physics is no different except that here while theories proliferate, it takes time to run experiments. For one, High Energy particle accelerators are not built overnight. Phenomenologists like me act as a bridge between developments in theory and experimental investigations. Part of my work is to propose efficient ways and means to search for hypothetical particles and suggest measurements to establish their crucial properties.

**Q** . Please give us an example.

**A** . Take, for instance, the case of the top quark, the heaviest constituent of matter. Proton-antiproton collision generates this particle, which theorists knew should exist. But the production of this short-lived particle is only



Rohini Godbole

© Rohini Godbole

one in a million events following the collision — the proverbial needle in a haystack situation for experimentalists. From our calculations, we were able to pinpoint one aspect of the produced particles that helps colour the tip of this needle a bright brilliant red, so when it does show up, it can't be missed. And the particle was detected in 1995.

**Q** . And the Higgs boson, a cornerstone of SM, still remains at large.

**A** . Before the end of the year, the LHC will be able to find some indications of the particle with properties predicted by the theory. If we don't, we can rule out the existence of SM Higgs, but not that of a Higgs whose properties are governed by new physics. There are theories for Beyond the Standard Model (BSM) physics and we have to see which model is most consistent with the non-sighting of the Higgs under these conditions.

The new physics will have to be confirmed by more experiments at LHC. Particle physics is at the crossroads and the present search will decide the direction we will proceed in.

**Q** . Lots of work ahead! How did your anthology on Indian women scientists come about?

**A** . I used to be gender-blind. Science had been my hero, rather than scientists. Then, I was invited to speak on the topic of 'Women in Physics' at a conference ten years ago. In the audience, there were researchers from smaller developing countries. From their feedback I realized how valuable it was for women in science to have role models of their gender, and from their own country, if possible.

Fortunately, there are highly accomplished women scientists in India even if they are not highly visible. The anthology *Lilavati's Daughters*, commissioned by the Indian Academy of Science, features their life stories. The online version is available for free.

With *The Girls Guide to a Life in Science*, a stylistically different version, we want to reach students at a more tender age to make them aware that doing science is a viable career option. To tell them this path is worth treading on, it can be done and has been done by others just like them.

**Nature India** EISSN 1755-3180

**About NPG**

**Contact NPG**

**RSS web feeds**

**Help**

**Privacy policy**

**Legal notice**

**Accessibility statement**

**Terms**

**Naturejobs**

**Nature Asia**

**Nature Education**

Search:

go

© 2012 Nature Publishing Group, a division of Macmillan Publishers Limited. All Rights Reserved.

partner of AGORA, HINARI, OARE, INASP, ORCID, CrossRef and COUNTER