

Women in Physics in India—2008

Nutan Chandra^a, Rohini M. Godbole^b, Neelima Gupte^c, Pratibha Jolly^d, Anita Mehta^e, Shobhana Narasimhan^f, Sumathi Rao^g, Vinita Sharma^h, and Sumati Suryaⁱ

^aJamshedpur Women's College, Jamshedpur; ^bIndian Institute of Science, Bangalore; ^cIndian Institute of Technology Madras, Chennai; ^dMiranda House, University of Delhi; ^eS.N. Bose National Centre for Basic Sciences, Calcutta; ^fJawaharlal Nehru Centre for Advanced Scientific Research, Bangalore; ^gHarish-Chandra Research Institute, Allahabad; ^hDepartment of Science and Technology, New Delhi; ⁱRaman Research Institute, Bangalore

Abstract. In this paper we summarize the situation for women in physics in India. We provide some statistics, describe new initiatives, and provide comments collated from the widely varying backgrounds of the authors.

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As in everywhere else in the world in 2008, in India women constitute a minority of physics students, and an even smaller minority among faculty members and senior scientists. However, this situation (which is not unique to physics, but applies to mathematics and the natural sciences in general) is improving, albeit slowly. In the last few years there has been an increasing awareness that the shortage of women scientists, and the sometimes poor working conditions for women scientists, need amelioration. A number of high-profile initiatives have begun to address these issues. While it is too early to judge how much of an impact these initiatives will have, it is encouraging that the issue of women in science is, at the very least, receiving notice.

STATISTICS

Statistics on physics students and physicists in India (sorted by gender or otherwise) are not separate from the rest of the natural sciences because there is no active physics society in India to collect such data. Thus, some of our assessment of women in physics as distinct from women in science is qualitative or anecdotal [1]. In a previous report we provided some statistics on the number of women in some prominent physics departments in India [2].

Because many parents are reluctant to allow their daughters to study in a coeducational environment in India, a steady growth in women's colleges (learning units of universities), whose total number was estimated to be 1,902 in 2005, should help increase the number of women in science. In the last 50 years, the percentage of university students who are women has increased fourfold, and women now constitute slightly more than 40% of university students [3]. In the humanities, sciences, medicine, and engineering, women comprise 44%, 39%, 44%, and 22%, respectively, of the undergraduate student body. These percentages change only slightly at the postgraduate level—43% of master's students and 37% of doctoral students in the sciences are women.

At first these numbers may appear encouraging, except perhaps for engineering; however, women constitute a significantly lower percentage of working scientists. For example, in institutions of the Council for Scientific and Industrial Research in 2008, women constituted only 13% of scientists (this number dropped from 16% in 2005) and 14% of technical staff. In institutions funded by the Department of Science and Technology (DST), the Defense Research and Development Organization, and the Department of Atomic Energy—some of the major funding organizations for physics research in India—only 21%, 10%, and 17% of scientists were women. Informal surveys suggest that the percentage of women among physicists in these institutions is lower than these numbers [2]. For example, at the Indian Institute of Science only 7% of faculty members were women; astonishingly, this number includes faculty in biology, where typically the percentage of women is higher than in physics.

The numbers become even more abysmal when one examines how many women have had their scientific efforts acknowledged by their peers by being elected to the Fellowship of Academies. In India there are three major scientific academies: the National Academy of Sciences, the Indian National Science Academy, and the Indian Academy of Sciences (IAS). The percentages of fellows of these academies who are women are 6%, 4%, and 5%—and fewer than 10 women are fellows of all three. In some cases women who are fellows of foreign societies are not fellows of Indian academies—a situation that does not apply to Indian male scientists, to the best of our knowledge.

Two scenarios could account for these facts: one is that the situation is improving as a function of time, so that there are few senior women scientists but several women students of science. The other possible scenario is that, in contrast to many Western countries where there is a “leaky pipeline” and the percentage of women drops steadily at every stage, the situation in India is different: up to the doctoral degree, there is a significant number of women in science, but there is a precipitous drop at the postdoctoral level. Both surveys and anecdotal evidence suggest that, unfortunately, in India it is the latter situation that prevails: we have not a leaky pipeline but a catastrophic postdoctoral outflux! This is largely due to societal pressure on these women to give up their careers for marriage and motherhood, though discrimination in hiring and other practices cannot be ruled out [4].

NEW INITIATIVES

In earlier papers we highlighted various initiatives taken by the academies and the DST to improve the visibility of women in all branches of science [2, 5, 6]; some of these initiatives (such as DST’s Women Scientists scheme) specifically target women who have had a break in their careers at the postdoctoral stage, because that has been identified as the “problem stage” in India. Other initiatives that have borne fruit in the last three years are:

- DST and IAS have created websites for women in science containing a variety of data on working women scientists, as well as on women who, for a range of reasons, have dropped out of science.
- IAS established a Women in Science panel and is preparing *Lilavati’s Daughters*, a book of essays by 100 women scientists. (Lilavati was the name of an ancient Indian mathematician whose father, Bhaskara, dedicated his mathematical treatise, also called *Lilavati*, to her.)
- Stree Shakti, an independent nongovernmental organization, has set up an award for women scientists, and has been a valuable source of support to individual women scientists in other respects, as well.
- In 2005, India hosted the Third World Organization for Women in Science. At its inauguration the Minister for Science and Technology announced a Task Force for Women in Science. After meeting with women scientists all over India, the task force is in the process of formulating its final recommendations.
- At a conference of women scientists on International Women’s Day 2008, the government announced further initiatives to aid women in science. Particularly heartening is the introduction of flexible working hours for mothers of children under 3 years old and financial support to establish state-of-the-art nurseries, a package of immediate benefit to many women at the postdoctoral and faculty levels.
- Some institutes and universities have set up women’s grievance cells. A landmark sexual harassment judgment of the Indian Supreme Court in 1991 made it mandatory for all public-sector organizations to have such cells; however, implementation has been rather recent in areas that would affect women physicists.
- The Women Scientists scheme of the DST has become more popular. 131 scholarships were awarded in 2005, with 24 going to physicists and mathematicians.

The working climate for women in physics and other disciplines has been changing slowly but surely in India, and we hope that this will bear visible fruit in years to come. While many of the efforts to improve awareness of women’s issues and the working environment for women have been spearheaded by women physicists in India, we have found it more useful to join hands with women in science and technology issues as a whole, as well as with nongovernmental organizations involved with women’s rights, in our overall interactions.

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