

The Current Situation of Women in Physics in Ireland

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We present statistics on the current representation of female physics students, teachers, and researchers at second- and third-level education in the Republic of Ireland. Our findings show that girls who take physics in secondary (high) school represent less than 4% of all students who complete their secondary school studies. At third-level the situation is also grim, with some institutes reporting less than 7% female participation in physics-based courses. We also present Institute of Physics findings on the female percentages at the different academic career levels for some of the major third-level institutes in Ireland. These show that women are underrepresented at all levels. We report on initiatives that have been launched by Science Foundation Ireland under its Women in Science and Engineering Programme. These aim to address the lack of women in the science and engineering sectors and encourage qualified women back into the academic arena.

STUDENT AND STAFF PROFILES IN SECONDARY EDUCATION

Approximately 850 physics teachers, 40% of whom are female, are currently employed in secondary schools in the Republic of Ireland. Secondary education is equivalent to high school, with the student age profile lying between 12 and 18 years old. About 85% of graduates currently in teacher training courses are female, indicating that the percentage of female physics teachers will increase dramatically over the coming years. It will be interesting to note whether this change will have a positive influence on the number of girls who study physics in secondary school.

Each year about 55,000 students take the Leaving Certificate exam, which is used for third-level course placement. About 15% of these students take the Leaving Certificate physics exam, approximately 2,000 of them girls. This exam is divided into two levels, Ordinary and Higher. 30% of all students taking the Higher Level physics exam are girls, whereas girls represent just 15% of students taking the Ordinary Level exam. Therefore, the percentage of girls qualifying with a physics grade represents less than 4% of all students leaving high school. This indicates that, although few females choose to study physics through to the end of their secondary education, those who do have a higher ability in it than their male counterparts and choose the more difficult of the two available levels. These are the students who should be targeted by third-level institutes (technical institutes or universities) in order to increase the female profile through all stages of physics education. Without a feed into the system, equality of representation in leadership roles will never be achieved.

STUDENT AND STAFF PROFILES IN HIGHER EDUCATION

We surveyed a number of third-level institutes that offer physics to the bachelor degree level and found that female participation in physics-major undergraduate courses within the universities typically lies between 20% and 46%. However, a major physics department within the Institute of Technology sector revealed disturbing trends, with less than 7% female participation in undergraduate physics courses out of a sample of more than 200 students. This low representation is possibly due to two factors:

1. Courses offered within the Institutes of Technology tend to be more applied in nature than courses within the universities. Students would typically end up working in the processing or manufacturing industries—career options that may have little appeal for 18-year old girls.
2. Girls' higher achievement in physics on the Leaving Certificate examination may cause them to choose third-level courses that require higher grades on the exam. Traditionally, science courses in universities are more attractive to high-achieving students and therefore attract a higher percentage of female physics students.

Further study into these factors is required.

Staff profiles within selected physics departments were also examined by the Institute of Physics. Of the physics departments that participated in the survey, 13% of the staff were female. Of these, 12% were experimentalists Experimental Physics and only 1% were theoreticians. Females were also underrepresented in senior positions within individual departments and in the management structures of third-level institutes across both sectors.

WOMEN IN PHYSICS RESEARCH IN THIRD-LEVEL INSTITUTES

Science Foundation Ireland (SFI), the main research-funding agency in Ireland, prioritizes research in biotechnology and information and communication technologies (ICT) and manages the Research Frontiers Programme across all science and engineering disciplines. Women represent 11% of all grant applications to SFI but only 9% of successful applicants. In spring 2005 SFI profiled the 41 women they fund. Data show that female physicists are most likely to request funding from the ICT division of SFI and the number of successful female applicants in this division drops significantly compared with biotechnology. We have compiled statistics for some of the SFI programs:

- 271 projects have been funded through the Research Frontiers Program in 2004 and 2005. However, only two female physicists have been successful in this program and both of these were awarded in 2004. In 2005, the female success rate across all disciplines was 15%, similar to that of their male colleagues. No funding was awarded to women in physics in 2005, despite six applications being submitted.
- Of 22 Walton Fellowships, two have been awarded to women. No woman has yet won the prestigious Research Professor Grant, though 17 have been awarded.
- After the Research Frontiers Program, most applications for funding within SFI are made to the Principal Investigator program, which awards up to €1M (approx. \$1.2 million) for up to 4 years for a single project. Between 2001 and 2004 SFI made 55 Principal Investigator awards in ICT. Four of these were to women, representing a 7% female participation rate.

It is clear that women are underrepresented in all of SFI's grant programs, and this becomes ever more apparent as the prestige associated with an award increases.

FUTURE INITIATIVES

Science Foundation Ireland seeks to address the imbalance of women in science and engineering departments in academic institutes through three recently launched schemes:

1. *The Principal Investigator Career Advancement Award* will be given to academics who have interrupted their career for maternity, adoptive, carer, or parental leave.
2. *The Institute Development Award* will give higher education institutes the opportunity to enhance participation of women in science and engineering research activities and management.
3. *The Junior Scholarship* will identify and encourage high-achieving girls into third-level science and engineering education and support them during their undergraduate career.

We strongly support these and similar initiatives. All should be operating in time for the next IUPAP International Women in Physics Conference, due to be held in 2008. The first stage, to be completed by September 2005, requires that academic institutes perform a self-assessment of the role played by women in science and engineering research and management. By 2008 we should be able to ascertain whether these initiatives have had a positive influence on women in physics in Ireland.

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