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Women in Physics in the UK: Update 2011–2014

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Abstract. The interests of women in physics in the UK are being addressed by two strands of work by the Institute of Physics—Girls in Physics and Project Juno—and by several nationwide efforts, including the Athena SWAN awards. Both Project Juno and the Athena SWAN awards recognize academic departments for graded levels of gender equity.

THE INSTITUTE OF PHYSICS

The Institute of Physics (IOP) is the UK's national physical society supporting those interested in and studying physics at all levels from schools and universities, through to career physicists and policy makers. The work of the IOP's Diversity Programme and the Women in Physics Group (WIPG) is recognized as being at the forefront of progress for women in science in the UK [1].

The IOP currently has two main strands of work to promote women in physics in the UK: Girls in Physics and Project Juno. In England, the proportion of girls among those taking physics beyond the age of 16 has fallen from about 23% to 21% over the last 30 years or so, during which period many initiatives have attempted to increase that ratio; indeed, the only one shown to work has been to improve the quality of physics teaching [2]. Seeking a new direction on this issue, the Institute of Physics recently published two influential reports: *It's Different for Girls* in 2012 [3] and *Closing Doors* in 2013 [4]. The first report showed that whether a girl chooses to pursue her study of physics beyond the age of 16 is heavily influenced by the type of school she attends. Building on that observation, the second report looked at progression in six gendered subjects, three favored by boys, including physics and mathematics, and three by girls, including English and biology. The results showed that, to improve the ratio of girls in physics, it was necessary to address gender stereotyping across the whole school.

In parallel with this work, two longitudinal research studies, ASPIRES [5] and UPMAP [6], have provided robust evidence on the factors affecting subject choice for both boys and girls. The outputs are rich, but one important message is that traditional, outreach-based interventions, one-off visits by scientists to schools, and similar efforts are highly unlikely to make a difference to subject choices.

As a result of this evidence, the Institute has been granted substantial government and charity funding to set up a series of projects, broadly along three themes. The first is to increase the confidence of girls in their ability to do physics so they are empowered to overcome barriers, many within the school, that prevent them from doing physics. The second theme is to work with teachers to provide more inclusive classroom management. The final theme is very ambitious: addressing gender stereotyping across the whole school, working with head teachers and staff towards targets for a gender balance in all subjects. These are difficult projects, but the easier alternatives have been tried and have had little effect.

In addition, as part of the government's response to earlier findings about girls and science [7], the Institute is working with the Government Equalities Office on a pilot scheme, Opening Doors [8], which aims to work with two networks of partner schools to create a code of practice on gender equity issues. This code of practice will then be

rolled out across the country. Jenny Willott, MP,* who launched the pilot scheme in June 2014, has written, “In order to maximize creativity, innovation and competitiveness more women need to be attracted to working in physics and engineering. In the UK the Coalition Government’s Opening Doors project is supporting girls to get into science-based careers by today’s generation of female scientists and engineers going into schools and inspiring other young women to follow in their footsteps. This is helping to ensure that the UK doesn’t miss out on talent, and skills shortages are filled” [9].

The second strand of IOP work to promote women in physics in the UK is Project Juno [10], an award scheme that recognizes and rewards higher education physics departments that are working to address the underrepresentation of women in physics at all levels of academia. The IOP Diversity Team works closely with departments to support them in understanding their own issues, providing data for national comparison, running workshops, and providing bespoke advice.

There are three levels of engagement with Project Juno: Supporter, Practitioner, and Champion. As a Supporter, a physics department endorses the principles set out in the Juno Project. Practitioner status requires the department to demonstrate that its Juno journey is well underway and to develop an initial evidence-based action plan indicating how the department aims to achieve Champion status. As a Champion, a physics department is confirmed to have embedded the five principles throughout. There are currently 10 Champion, 11 Practitioner, and 25 Supporter departments across the UK and Ireland—75% of all physics departments.

An independent evaluation of Project Juno conducted in 2013 after Juno’s first five years [11] revealed tangible improvements in workplace culture in many Juno departments, including increased awareness on the part of staff and senior management about issues of women in science, technology, engineering, and mathematics (STEM); discussion on gender issues within the department; and visibility of female staff. Surveys of staff in Juno and non-Juno departments found that those in Champion departments rated departmental practices (such as appraisals, promotions, and flexible working) more highly than respondents from Juno Supporter departments and non-Juno departments.

Over the past six years, the percentages of female physics staff in the UK have risen: The proportion of professors who are female rose from 5% to 9% (19 to 52 women), senior lecturers/lecturers who are female rose from 14.8% to 19%, and researchers who are female rose from 17% to 19% of the total staff at that level.

The WIPG continues to support its members, awarding the annual Very Early Career Women Physicist of the Year, holding careers events for students, and supplying role models for outreach events. In addition, following a membership survey with WIPG, the IOP established a Carers’ Fund to assist carers to attend conferences. This fund is now administered by the IOP Benevolent Fund [12] and is available for any type of caring, whether provided to children or to elderly or disabled relatives or friends.

NATIONAL GENDER INITIATIVES IN STEM

Numerous initiatives to increase the participation of women in STEM (which includes women in physics) have continued to develop across the UK. Examples include the following:

- The Royal Society’s “Leading the Way” project, which aims to remove barriers to entry, retention, and progression of underrepresented groups, including women, within the scientific workforce. They held their second Diversity Day in June 2014.
- The Diversity Forum of the Science and Technology Facilities Council, a major national funding body, has a “Leadership for Women” program and is exploring unconscious bias during the interview process.
- The Athena SWAN Charter award scheme [13] recognizes STEM departments in their efforts to address the underrepresentation of women in higher education. The scheme is currently run by the Equality Challenge Unit.

Recently, there has been a marked increase in gender activities within academic science, particularly in medical departments, since their funding council linked grant awards to attaining a silver Athena SWAN award. Both Project Juno and the Athena SWAN Charter programs were highly commended in a 2014 government report on women in scientific careers. The report also noted that despite issues having been long identified and multiple initiatives having been undertaken, little had changed and much was still to be done. The government response [7] includes national campaigns (such as Your Life [14]) to bring the different partners, including business and industry, together to make a

* Jenny Willott is the member of Parliament for Cardiff Central and was minister for Employment Relations and Consumer Affairs in the Department for Business, Innovation, and Skills from December 2013 until June 2014, covering Jo Swinson’s maternity leave. Jo Swinson has now returned to this post.

real difference, to pledge new concrete actions, and to continue existing actions. With benchmark data in place the government will monitor trends and consider further action if “significant progress” is not made in three years.

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