

Written Evidence to the Business Innovation and Skills Select Committee Women in the Workplace Inquiry

Institute of Physics response to BIS Select Committee

A full list of the Institute's submissions to consultations and inquiries can be viewed at www.iop.org

Response – BIS Women in the Workplace Inquiry
By Email to: biscommem@parliament.uk

IOP Institute of Physics

Dear Sir or Madam

BIS Women in the Workplace Inquiry

The Institute of Physics (IOP) is a leading scientific society promoting physics and bringing physicists together for the benefit of all. It has a worldwide membership of around 40 000 comprising physicists from all sectors, as well as those with an interest in physics. It works to advance physics research, application and education; and engages with policy makers and the public to develop awareness and understanding of physics. Its publishing company, IOP Publishing, is a world leader in professional scientific communications.

The Institute welcomes the opportunity to submit written evidence to the Inquiry

The attached annex details our response to the relevant questions listed in the Inquiry call for evidence.

If you need any further information on the points raised, please do not hesitate to contact me.

Yours faithfully



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Introduction

1. As the Institute of Physics, while we recognise the overall importance of STEM, our background is in physics and our answers necessary focus on our discipline.
2. For physics to thrive in the UK we believe that it is vital that it capitalises on the skills and talent of the widest pool of potential physicists. Currently, women, people with disabilities, people from ethnic-minority backgrounds and people from lower socio-economic backgrounds are under-represented in physics and we believe that physics is missing out on the knowledge, experience and skills that talented people from these groups can bring, and that they are missing out on valuable career opportunities from physics, and science more generally.
3. Since 2004, the Institute has run a specific Diversity and Inclusion Programme¹, staffed and funded by the Institute, which aims to increase diversity across the whole of the physics pipeline, from education through to employment. One of the main issues is that, while women struggle to fulfil their potential in many different STEM careers, in physics we also face the problem of initial recruitment to the discipline. In parallel to this challenge, it is equally important that physics cultivates an environment where women who have studied physics at school and university remain in physics or STEM employment and progress to senior positions.
4. The Diversity and Inclusion Programme is rooted in a robust evidence base of quantitative data to understand the under-representation of women and other groups in the physics pipeline and qualitative information to develop our understanding of the persistent barriers to participation and how these can be addressed. Initiatives of the Diversity and Inclusion Programme around gender include:
 - **Girls in Physics** – a suite of publications to provide teachers with strategies to develop inclusive classroom practices to address the barriers that stop girls choosing to study physics post-16. Our most recent report *It's Different For Girls*² has highlighted the fact that almost half of all maintained co-ed schools in England (49%) sent no girls on to take A-level physics in 2011.
 - **Project Juno** – recognising and rewarding university physics departments that have taken action to address the under-representation of women in physics higher education.
 - **Mapping the future: Physics and chemistry postdoctoral researchers' experiences and career intentions** – making recommendations to improve the experience of postdoctoral researchers (PDRs), as it is a key attrition point for women in the physics pipeline.
 - **Survey on Childcare** – assessing how childcare issues have affected members' career progression.
 - **Best Practice for Career Breaks** – a guide developed to provide strategies and actions to help those returning to careers in SET after a career break.
5. Whilst we believe that there are robust, comprehensive pieces of legislation governing equalities, part-time working, flexible working, etc. and no further changes are needed, we would strongly urge the Government to ensure that targeted guidance on implementing legislation and going beyond minimum legislative requirements is provided, particularly for SMEs. This is crucial to ensure that it is being implemented effectively across all STEM sectors. This is particularly important, we believe, when it comes to part-time working. There is no longer an expectation that full-time work is solely 35-40 hours per week, and indeed, in many science

¹ For more information, visit www.iop.org/diversity

² *It's Different for Girls: The influence of schools*, Institute of Physics (2012)
http://www.iop.org/education/teacher/support/girls_physics/file_58196.pdf

occupations the expectation is to work in excess of this, with a 60-hour week not being untypical. Employers, therefore, may not see part-time work as a valuable commodity, given that such employees would be working way less than the expectation. This needs to be addressed through targeted guidance to all employees around productivity and work-life balance, as well as highlighting the benefits of highly-skilled, flexible part-time workers.

6. In this written evidence to the Inquiry, we are focusing on one key issue: **How should the gender stereotyping prevalent in particular occupations, for example in engineering, banking, construction, and the beauty industry, be tackled?**
7. The Institute is working in the following ways to tackle the gender stereotyping that may be prevalent in physics, and other STEM disciplines:
 - Understanding under-representation
 - Addressing childcare and part-time working as barriers to progression
 - Providing targeted support
 - Implementing holistic culture change

Understanding under-representation

8. Despite significant changes in the education system over the last 20 years, women continue to make up around 20% of those choosing to study physics at post-16 and degree level.
9. At the school level, the Institute's long-standing Girls in Physics programme³ aims to encourage teachers to examine their teaching methods and shares information on successful teaching and learning strategies to engage girls with physics. Research has shown that as girls go through secondary schooling, they increasingly feel that physics is not for them⁴. The teaching objectives of the curriculum align less well with their personal goals and they feel less confident about their mathematical ability, even if this is not borne out by their actual performance. Good teaching is particularly vital for girls; often teaching physics can be done in a gender-stereotyped way and the situations and activities that are commonly used in physics teaching are often more male-oriented – ie what boys pay attention to is judged more relevant in physics. Girls are therefore more sensitive to poor physics teaching than boys. Our Stimulating Physics Network (SPN)⁵, a Department for Education funded initiative, aims to improve the uptake of A-Level physics by working directly with schools. They have seen a colossal rise in the number of girls taking physics (an increase of 200%, compared to 70% in boys) in the SPN partner schools. This clearly shows that targeted initiatives can and do work.
10. In 2012, the Institute's most recent publication on girls in physics, *It's Different for Girls* threw a media spotlight on the participation of girls in physics across English schools. The report highlighted the fact that almost half of all maintained co-ed schools in England (49%) sent no girls on to take A-level physics in 2011. Action must now be taken to address this and the Institute is working with key partners, including Ofsted, to address gender stereotyping using a whole-school culture approach. Such gender stereotypes will persist through degrees and into employment.

³ For more information, visit http://www.iop.org/education/teacher/support/girls_physics/page_41593.html

⁴ Girls in the Physics Classroom: A Review of the research on the participation of girls in physics, Murphy and Whitelegg, IOP, 2006

⁵ For more information, visit <http://www.stimulatingphysics.org/>

11. The percentage of females taking physics degrees is around 22%, although there are some gender differences detected in the take-up of BSc (3-year) degrees and MPhys (enhanced, 4-year undergraduate degrees, often seen as the preferred route to doctoral research). The Institute is currently doing more research in this area.
12. Around 26% of PhD students are women, but as the academic route progresses from PhD through postdoctoral positions, women drop out with greater frequency than men: women initially constitute around 17% of PDRs, which then falls further as positions progress. The demands of short-term contracts and frequent need to move location are more likely to discourage women, especially as they move into their thirties. A recent survey of postdoctoral researchers⁶, found that as the number of postdoctoral positions increased, men became significantly more likely than women to say that they were aiming for a permanent academic position. In addition, the PDR population has many more people from international backgrounds, where the gender-balance is higher than in the UK; other countries, it seems, are better at attracting more women into science.
13. Whilst the IOP has a good understanding of how women fare in academia, it has much less data on career progression of women in industry and the challenges that they face. The Institute could seek to do further research in this area and try to engage more employers. However, we recognise that this is more difficult than in academia as the drivers for employers are very different: those in the public sector (including HEIs) have an overarching public sector duty to eliminate discrimination and promote equality, under the Equality Act 2010. Companies are often reluctant to release data and SMEs can prove particularly difficult to engage with, given their small size and their need to focus on their priority of simply continuing to exist and thrive. Several years ago, we tried to engage with companies on a similar basis to the award scheme we run in academia (Project Juno – see paragraph **Error! Reference source not found.** below), but this was unsuccessful. We believe that more robust data is needed to fully understand the extent of the under-representation of women in the physics, and whole science, workforce. The government should do more to encourage more science-based companies to specifically become involved in Think, Act, Report and such schemes could be extended to smaller companies.

Addressing childcare and part-time working as barriers to career progression

14. The Institute conducted a childcare survey of its members in 2009⁷ and found that childcare and flexible working continue to be perceived as major barriers to career progression in physics, particularly for women. Although over half (58%) of respondents thought that their career progression might have been affected by childcare issues, women were almost twice as likely to report this than men (80% compared to 47% respectively).
15. However, it is the hidden effects of childcare issues and part-time working that may have a more detrimental effect on career progression. For example, almost 75% of respondents reported attending fewer conferences and events once they had caring responsibilities. Women were significantly more likely to report this than men. As one female respondent said, *“I avoid attending international meetings unless unavoidable – in a multinational company that amounts to putting your career on hold”*. In addition, whilst 80% of respondents, both men and women, reported that it was difficult to make additional childcare arrangements outside of working hours, again,

⁶ Mapping the Future: Physics and Chemistry postdoctoral researchers' experiences and career intentions, IOP and RSC (2011) http://www.iop.org/education/teacher/support/girls_physics/page_41593.html

⁷ http://www.iop.org/publications/iop/2010/page_45280.html

women were significantly more likely to find it “very difficult” or “difficult” compared to men.

16. Finally, although more than 80% of respondents worked full-time, almost 50% of women respondents worked part-time compared with only 3.5% of men. Interestingly, a significantly smaller proportion of women with childcare responsibilities worked part-time in permanent university roles than in other areas. A possible explanation for this is that university staff may feel that they have relative flexibility to organise their commitments enough and work at home when the need arises. However, there might also be an issue regarding the perception that your career may be “over” if you work part-time and that may mean people see working part-time as too much of a risk. More work needs to be done to assess how part-time working, in terms of career progression, is perceived.
17. Whilst we have not done specific work on the impact of maternity leave on female physicists’ career progressions, we have anecdotal evidence from many of our members in academia that this leave is often organised ad-hoc, poorly implemented at the departmental level and that women are not properly informed of their entitlements and colleagues are asked to cover rather than posts being backfilled. The Institute’s Project Juno (see paragraph **Error! Reference source not found.** below) seeks to address this, and other issues. We would encourage the Government to ensure that women, and men, across all employment sectors, are fully aware of their entitlements.
18. Under-represented groups often need more specific, targeted support to ensure that they have access on a level playing field. Therefore, the Institute provides a range of services for all members that support them throughout their professional development. Although open to all, women may find some of these services particularly beneficial at certain stages of their careers. For example, members can take advantage of the IOP’s mentoring service, which allows members to match themselves with other members who can give them advice and guidance in how to progress their careers. Members on a low income, such as those on maternity leave, pay a reduced subscription to the Institute. The IOP Benevolent Fund can also provide assistance to members on a career break. In addition, the IOP’s Women in Physics Group encourages its members to participate in all activities of the Institute. As well as organising meetings, the group has a number of interests that it works on, including: education, women in research and academia – especially those on short term contracts, career breaks, career management workshops and networking. The Institute’s initiatives in this area are admired by other professional bodies.
19. All the easy and obvious approaches to increase the percentages of women in physics have been tried with little effect. The reasons appear to be far more deep-seated, so there is a real need to bring together social scientists and education professionals to understand the interaction between how physics is taught and learnt and the roles that girls have to play in society to be accepted. A recent paper⁸, published as part of the ASPIRES programme, has brought together all the current, high-quality, international research evidence from the fields of science and mathematics education to make recommendations for change. Evidence from all this research suggests that families, teachers and schools play a part in creating gendered patterns of subject choice through, for instance, differential encouragement of boys and girls to pursue science. The research provides examples of teachers favouring boys and perceiving them to be ‘better’ (and more ‘naturally able’) at

⁸ Ten Science Facts and Fictions: The Case for Early Education about STEM Careers, <http://www.kcl.ac.uk/sspp/departments/education/research/aspires/10FactsandFictionsfinalversion.pdf>

science than girls, even where attainment data indicate otherwise. Examples notified to us, such as the school that timetabled A Level Biology and A Level Physics at the same time, and another where a very high achieving girl was specifically told not to take Triple Science GCSEs reinforce unacceptable gender stereotypes. Indeed, we have recently begun discussions with Ofsted about encouraging schools to tackle gender stereotyping across the whole curriculum, not just girls in physics, and we believe that only when such issues are embedded into the school inspection framework, will school culture really start to change.

20. For universities, the Institute runs Project Juno⁹, an award scheme that recognises and rewards physics departments that are working to address the under-representation of women. A department moves through levels of recognition as they identify issues, develop an action plan and work through it. They start out as Supporters then progress through Practitioner and to Champion level. At each stage they receive individual guidance and feedback from an independent panel on their work. We currently have six Juno Champions, six Practitioners and a further 21 Supporters working towards Practitioner. This represents 33 out of the 46 physics departments in the UK and two out of the 11 in Ireland. This has enabled all of our Champion departments to engage in holistic culture change, addressing gender issues from the bottom up and to seek to embed practice at every level within their departments. Indeed, this year one of our Juno Champions has, so far, reported a rise to almost 34% of applications from girls to take physics degrees. This is unprecedented and highlights a real step-change taking place in culture in physics HE. This proves that voluntary reward schemes can, and do, work, provided that they are well supported and resourced.
21. One of the major areas that Project Juno has been particularly successful is in that of encouraging more openness and transparency in promotions processes. Promotion systems that require individuals to put themselves forward do tend to disadvantage women, as generally women are less likely to apply until they are 100% certain that they will be successful; whereas men generally will apply even if they are in some doubt about their success. We know it is the case, from our work with Juno, that women need more encouragement to see themselves in leadership positions, particularly technical leadership ones. Senior managers must foster a culture where diversity of talent is encouraged.
22. The Institute believes that, whilst a Juno programme outside of academia may not be entirely appropriate for many reasons, the good practice gained from the culture change required to attain Champion status can be spread. There needs to be some mechanism for doing this in a more-joined up way. Various equality schemes exist for businesses and organisations; however, there is no one “kite mark” for gender equality in STEM industries. Whilst the Institute is not advocating a further strengthening of equality legislation, it does recognise that some industries may only develop better gender equality models on the threat of litigation and not as a matter of good practice. More could be done to encourage and spread the good practice, which already exists, amongst specific industries where there is a clear issue of gender under-representation. The Government should do more to promote Think, Act, Report, to science companies and ensure that they publish diversity information regularly. Remuneration committees should be encouraged to examine this when approving pay settlements and should be required to show evidence of equality of pay and opportunity. Changing the culture of employers takes time. Organisations have to be persuaded that it is worth their time and effort to enhance diversity within their workforce – a business case has to be built and communicated to them. Change

⁹ For more information, visit www.iop.org/diversity/juno

needs to be led by the people who are respected by those employers – champions from within industry will provide the best role models and convincing examples.

23. The Government can help by taking a bold stance in the implementation of equalities legislation. Employers need examples of good practice, highlighting how diversity can be achieved with minimal expense and resource and it must be inter-related with talent management - equality and diversity needs to be embedded within recruitment and retention processes in all sectors of employment to ensure that all employers are recruiting from the widest possible talent pool and therefore secure in the knowledge that they are getting the very best staff. A voluntary scheme, such as Juno or its counterpart across all science, Athena SWAN, could be a valuable tool to encourage diversity in STEM employment, as would a requirement on government procurement, to ensure that all those involved in procuring government contracts had appropriate equality and diversity measures in place.
24. The Institute recognises that there is a long way to go to reach a gender-balanced physics community and membership, but we believe that we have established robust mechanisms for monitoring, review and action to ensure that we will continue to make progress and move in the right direction. Key to this is the monitoring and expansion of our evidence base to ensure that we fully understand the issues, pipeline and attrition points, so that we are able to identify appropriate action to address the barriers. We would urge the government to do the same. If gender stereotyping in physics is to be tackled, it must include a focus on understanding the need for holistic cultural change, tackled on different levels involving partnerships between schools, parents, educators, employers and professional bodies like ourselves.