Workshop report: Intersecting identities—gender and intersectionality in physics

Cite as: AIP Conference Proceedings **2109**, 040001 (2019); https://doi.org/10.1063/1.5110070
Published Online: 03 June 2019

Eden Hennessey, Joanne Cole, Prajval Shastri, Jessica Esquivel, Chandralekha Singh, Rosie Johnson, and Shohini Ghose

Workshop Report: Intersecting Identities—Gender and Intersectionality in Physics

Eden Hennessey[1], Joanne Cole[2], Prajval Shastri[3], Jessica Esquivel[4], Chandralekha Singh[5], Rosie Johnson[6], and Shohini Ghose[1, a)]

[1]*Wilfrid Laurier University, Canada*
[2]*Brunel University, London, UK*
[3]*Indian Institute of Astrophysics, Bengaluru, India*
[4]*Syracuse University, Syracuse, USA*
[5]*University of Pittsburgh, Pittsburgh, USA*
[6]*University of Leicester, Leicester, UK*

[a)]sghose@wlu.ca

Abstract. The concept of intersectionality refers to how our various social identities (e.g., gender, race, class) overlap to create power, privilege, or marginalization. We report on a workshop held at the International Conference for Women in Physics, where physicists discussed equity in physics through an intersectional lens. The workshop content was informed by data from around the world and research from the social sciences. The workshop had a total of three sessions, was designed to be highly participatory, and included interactive group activities and extensive discussions. From the discussions that took place, several recommendations emerged for IUPAP, for the IUPAP Working Group 5 (WG5) and for the country team leaders of the ICWIP conferences. Recommendations included addressing intersectionality in IUPAP policies and initiatives, and encouraging further collaboration with social scientists.

INTRODUCTION

Our goal is to build a physics community in which people of all backgrounds can thrive. Data that are available show, however, that stark gender inequities exist in our profession worldwide. Moreover, the percentage of women physicists decreases significantly towards higher echelons (see the country reviews in this volume). In this workshop we considered the question of multiple marginalized social identities, including gender, that might intersect. Intersectionality is a framework with which to explore the compounded inequities that result from the intersection of multiple identities: marginalization along more than one dimension not only implies that all these dimensions of marginalization will be experienced, but also that the marginalized identities may interact in unexpected ways. Of particular relevance to the mandate of the ICWIP and to the audience of the ICWIP is the intersection of gender with other marginalized identities, such as sexuality, race, class, and caste, among others.

GENDER AND PHYSICS

Before describing the workshop activities, in the next two sections we provide a brief overview of the themes of the workshop and the issues to be addressed. Social science recognizes that gender is a social construct—that is, a result of culture and socialization processes rather than biological sex [1]. When we discuss women in physics, we refer to those who identify themselves as female physicists. Despite ongoing efforts, the gender gap still persists in

Women in Physics
AIP Conf. Proc. 2109, 040001-1–040001-5; https://doi.org/10.1063/1.5110070
Published by AIP Publishing. 978-0-7354-1841-7/$30.00

physics around the world (see country reviews in this volume). Studies from social science can provide some explanation for why physics remains largely demographically homogeneous. For example, such studies reveal that although the number of women in some scientific fields, such as biology, is larger than others, negative perceptions of women in science persist; across several biology classes, female and male students rated their male peers as more competent than their female peers [2]. Women can also internalize stereotypes about women underperforming in math and science and this impacts performance through a well-documented phenomenon known as stereotype threat (i.e., fear that one will act in accordance with a negative stereotype of one's social group) [3]. One previous study manipulated exposure to the threat that women are worse at physics than men [4]. Researchers asked male and female high school students to complete a set of physics problems. Some participants were told that male students do better on physics problems, whereas some were told there was no gender difference. When female (but not male) students were told that women underperformed in physics, their performance deteriorated significantly compared to those who were not told this information. Perhaps not surprisingly, female students report less positive attitudes toward physics than male students; a past study of middle-school students in the UK showed that girls were less likely to like physics and they received less support to pursue physics from their teachers and parents [5].

Why do such negative attitudes about women in science and physics persist? Person perception research proposes that human beings perceive others according to the Stereotype Content Model [6], which suggests that people often see and categorize social groups along dimensions of warmth and competence. Importantly, these dimensions operate in a hydraulic fashion, such that as warmth increases, competence decreases and vice versa. For example, Fiske and colleagues [7] asked American adults to rate different professions along these dimensions. Results showed that scientists are seen as highly competent, but not very warm. This is interesting because women tend to be viewed as higher on warmth than on competence. This paradox may provide a clue as to why women are seen as incongruent with the stereotypical scientist. Indeed, research with over half a million participants in 34 nations showed that many people even hold implicit stereotypes associating males with science more so than females [8].

INTERSECTIONALITY

Real-world events such as the Women's March on Washington and the March for Science indicate that women in science represent an important societal intersection; that is, the overlap of one's identity as a woman and as a scientist. The concept of how different identities intersect was proposed by Crenshaw [9], who suggested that the more marginalized identities one occupies, the more likely one will be to encounter marginalization. In 1976, a book called *The Double Bind* [10] provided a framework for examining experiences of women of color in science. According to this work, women of color are caught in a "double bind" because of the intersection of their race and gender, which renders them invisible. Dually occupying marginalized identities can lead to personal, professional, and societal repercussions that majority members do not experience [10]. Ong [11] examined experiences of women of color in science, and showed that the climate in science, technology, engineering, and mathematics (STEM) is unwelcoming for people with more than one marginalized identity. The more marginalized identities were reported, the more participants also indicated isolation and a lack of institutional support. Similarly, a study of lesbian, gay, bisexual, and transgender (LGBT) physicists [12] showed that the more marginalized identities were occupied, the more participants reported low support from peers, greater isolation, discrimination, and harassment.

In physics, prominent social intersections such as race and gender interact to produce a shortage of women physicists of color. For instance, data from the National Science Foundation [13] show that from 1973 to 2012, 22,172 physics PhDs were awarded to white males, whereas only 66 were awarded to black women. This corresponds to a ratio of 1 black female to 333 white males. Such a lack of diversity in the physics pipeline results in systemic underrepresentation of women of color at the faculty level. A report from the National Science Foundation stated that in 2010 there were fewer than 75 African-American or Hispanic female physics and astronomy faculty members in the entire United States [14]. The IUPAP global survey of physicists showed that there is a broader gap (between men and women in STEM) in less developed countries, especially in terms of funding opportunities for women; however, this gap also exists in highly developed countries. This finding illustrates how the intersection of gender and nationality can create obstacles to women pursuing physics. Across different intersections, it is clear that in science, more marginalized identities are associated with a greater number of interpersonal and systemic challenges.

American civil rights activist Audre Lorde said, "There is no such thing as a single-issue struggle because we do not live single-issue lives." Indeed, this is the primary reason to consider intersectionality; that is, all people, including physicists, have multifaceted identities that can help or hinder a career in science. Moreover, previous research

indicates that there are serious health consequences to holding multiple, marginalized identities; Seng and colleagues [15] conducted research with women in the United States and found that a greater number of marginalized identities was associated with lower quality of life ratings and greater incidence of post-traumatic stress disorder. Such findings indicate that there can be negative consequences for intersectional physicists, who may be more likely to experience discrimination and isolation, and ultimately suffer adverse effects. In the face of greater structural and individual obstacles to success in physics, it is not surprising to see such low numbers of intersectional physicists. However, given that diversity and inclusion are associated with creativity and the ability to generate a greater number of solutions to problems [16], it is essential that we acknowledge and focus on intersectionality issues explicitly in order to attract and retain the best scientific minds.

WORKSHOP ACTIVITIES

The workshop consisted of three sessions of 1.5 hours each and included group activities and discussions. Participants were asked to agree that all conversations would be confidential and all discussions would be respectful and nonjudgmental. Twenty-five highly engaged delegates from 13 countries across five continents participated. Attendees discussed intersectional theory and statistics about gender and intersectionality, and completed an interactive activity, in which they "mapped" their own intersectional identities on paper. Following a demonstration, each person drew boxes that represented their different identities (e.g., gender, race, sexual orientation, nationality), where the size of boxes was roughly proportional to the relative prominence of the corresponding identity. Some identities might intersect (represented on the map by overlapping boxes) and some might be connected (represented by curves connecting boxes). These maps were collected from attendees to gain insight into what particular intersections may be relevant to the physics context on an international scale. Attendees were from Taiwan, Finland, Lithuania, Japan, Australia, Mexico, Germany, the United States, India, Ghana, the United Kingdom, and Austria. According to attendee maps, almost everyone who attended indicated that gender played an important role in their lives, and many also indicated the importance of ethnicity, race, age, health, caste, and occupation. Despite some differences, all maps shared commonalities, such that each person occupied at least five different social categories that they felt intersected to influence their experiences. These identity maps suggest that discussing multiple intersecting identities is highly relevant to those who study and work in the field of physics.

Workshop attendees formed small groups and discussed their own intersectional identities. Specifically, attendees were asked to reflect on which identities they were most and least aware of and which create challenges or privileges. Groups also discussed the identities most relevant to their physics workplaces and cultures and how best to acknowledge intersectionality in their own departments. In general, attendees acknowledged that current efforts to promote diversity and inclusion may not be accessible to all women. In doing so, physics does not benefit from the full participation of all potential scientists, and structures can actually marginalize some groups (e.g., women of color).

Groups were also asked to discuss the following questions: What are three similarities between each of the intersectionality maps? What are three differences? Are there any boxes you forgot to include or take for granted? Which of the identity boxes gives you privilege? Attendees discussed identities that could be both a privilege and a challenge depending on the circumstances.

Delegates from different countries described how demographic diversity is addressed in their nations. While some countries indicated having explicit policies and programs in place to support minority physicists (e.g., requiring an equal number of male and female speakers for a conference to proceed), others reported that various inequities in physics are not even recognized as problematic. Many discussions centered on traditional gender role expectations across countries; in most instances, women continue to fulfill a majority of family responsibilities while also occupying professional roles. Groups also discussed how disability and mental and physical health challenges can be visible or invisible, so accessibility should be part of any discussion that aims to promote inclusivity in physics.

Some attendees expressed concerns about addressing inequities involving many marginalized identities (e.g., race, ethnicity or class) simultaneously instead of examining and focusing only on gender inequities, which in itself remains a prevalent issue in physics. Indeed, adopting an intersectionality framework is more complicated, and challenging, compared to addressing the question of gender alone. However, if different marginalizations are addressed independently, it is possible that those who focus on addressing one kind of marginalization might inadvertently uphold another kind of marginalization. Furthermore, independent efforts to address different kinds of marginalization in physics may lead to conflict, rather than harmony, rendering people at some intersections invisible, as Crenshaw [9] argued. Thinking of gender inequity as one example, and being mindful of intersectionality early in our efforts, is likely

to bring people working toward an equitable profession together, rather than into conflict. An integrated approach is therefore warranted. If we do not use an intersectionality framework, our ICWIP conferences themselves could become structures that perpetuate rather than challenge the other dimensions of marginalization. In the future, social science research will be useful to include in ICWIP programming because this type of information provides context for experiences of all physicists aiming to create an inclusive, scientific environment.

RECOMMENDATIONS FROM WORKSHOP DISCUSSIONS

Recommendations for IUPAP

- IUPAP-funded conferences should include a session devoted to discussing diversity and inclusion in the physics profession.
- Organizers of such conferences should be encouraged to include expertise from the social sciences at these sessions, and in particular, consider intersectionality issues.

Recommendations for IUPAP WG5

- The planned global gender gap survey sponsored by ICSU should include intersectionality.
- The ICWIP conferences should include social scientists both as plenary speakers and workshop organizers.
- Country teams that wish to include a social scientist should be allowed one extra space above the normal limit.
- Members should reconsider the name "International Conference on Women in Physics" and discuss adding the word "gender."

Recommendations for ICWIP Country Team Leaders

- In meetings and workshops that are locally organized on gender in physics, organizers are encouraged to include expertise from the social sciences, and in particular, consider intersectionality issues.
- Organizers are encouraged to provide reports of these local events to the IUPAP WG5.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the workshop attendees for their contributions, as well as the support of the University of Birmingham, the working group on gender, and the Institute of Physics.

REFERENCES

1. C. L. Muehlenhard and Z. D. Peterson, "Distinguishing between sex and gender: History, current conceptualizations, and implications," Sex Roles, 64(11–12), 791–803 (2011).
2. D. Z. Grunspan, S. L. Eddy, S. E. Brownell, B. L. Wiggins, A. J. Crowe, and S. M. Goodreau, "Males under-estimate academic performance of their female peers in undergraduate biology classrooms," PloS One, 11(2), e0148405 (2016).
3. S. J. Spencer, C. M. Steele, and D. M. Quinn, "Stereotype threat and women's math performance," Journal of Experimental Social Psychology, 35 (1), 4–28 (1999).
4. G. C. Marchand and G. Taasoobshirazi, "Stereotype threat and women's performance in physics," International Journal of Science Education, 35(18), 3050–3061 (2013).

5. T. Mujtaba and M. A. Reiss, "A survey of psychological, motivational, family and perceptions of physics education factors that explain 15 year-old students' aspirations to study post-compulsory physics in English schools," International Journal of Science and Mathematics Education, 12(2), 371–393 (2014).
6. A. J. Cuddy, S. T. Fiske, and P. Glick, "Warmth and competence as universal dimensions of social perception: The stereotype content model and the BIAS map," Advances in Experimental Social Psychology, 40, 61–149 (2008).
7. S. T. Fiske and C. Dupree, "Gaining trust as well as respect in communicating to motivated audiences about science topics," Proceedings of the National Academy of Sciences, 111(Supplement 4), 13593–13597 (2014).
8. B. A. Nosek, F. L. Smyth, N. Sriram, N. M. Lindner, T. Devos, A. Ayala, Y. Bar-Anan, R. Bergh, H. Cai, K. Gonsalkorale, and S. Kesebir, "National differences in gender–science stereotypes predict national sex differences in science and math achievement," Proceedings of the National Academy of Sciences, 106(26), 10593–10597 (2009).
9. K. Crenshaw, "Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics," University of Chicago Legal Forum, 1989 (1), 8 (1989).
10. S. M. Malcom, P. Q. Hall, and J. W. Brown, *The Double Bind: The Price of Being a Minority Woman in Science*" (American Association for the Advancement of Science, Washington, DC, 1976).
11. M. Ong, C. Wright, L. L. Espinosa, and G. Orfield, "Inside the double bind: A synthesis of empirical research on undergraduate and graduate women of color in science, technology, engineering, and mathematics," Harvard Educational Review, 81, 181–196 (2011).
12. T. J. Atherton, S. Ramon, S. Barthelemy, W. Deconinck, M. L. Falk, S. Garmon, E. Long, M. Plisch, E. H. Simmons, and K. Reeves, *LGBT Climate in Physics: Building an Inclusive Community* (American Physical Society, College Park, MD, 2016).
13. J. Levine and M. Essert, http://www.nsf.gov/statistics/2015/nsf15311/tables/pdf/tab7-7.pdf (2012).
14. R. Ivie, S. White, A. Garrett, and G. Anderson. *Women Among Physics and Astronomy Faculty* (American Institute of Physics, College Park, MD, 2013).
15. J. S. Seng, W. D. Lopez, M. Sperlich, L. Hamama, and C. D. R. Meldrum, "Marginalized identities, discrimination burden, and mental health: Empirical exploration of an interpersonal-level approach to modeling intersectionality," Social Science and Medicine, 75(12), 2437–2445 (2012).
16. W. B. Swann Jr., V. S. Kwan, J. T. Polzer, and L. P. Milton, "Fostering group identification and creativity in diverse groups: The role of individuation and self-verification," Personality and Social Psychology Bulletin, 29(11), 1396–1406 (2003).