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How to Use This Book



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Being a woman in physics is like living in a parallel universe from our male colleagues. Women in physics navigate unique challenges that men rarely have to consider.

- Looking around your physics class, and being the only woman there.
- Being asked about children during a job interview.
- Having comments about your personality in your performance evaluation.
- Having your physics expertise discredited or ignored.

We know the problem is the culture in physics, not the women. Physics departments and workplaces need to change, but institutional change takes time. Sometimes a lot of time. We want to empower women in the here and now. So in this handbook, our focus is on *actions*, and what women can do right now to improve their circumstances and thrive in physics.

This handbook is not meant to be read in any particular order. You are welcome to turn to whatever chapter is of most interest to you.

Our guidance is based on a combination of research findings and personal experiences of the authors and reviewers, all but one of whom are women in physics, with the exception of one male reviewer, who used to be Chair of the Project Juno equality award assessment panel at the UK Institute of Physics. Throughout the book, we include quotes from women in physics who shared their successes and stories with us. We hope our guidance can prepare and inform women to tackle challenges they encounter, while providing validation that no woman is alone in these experiences!

The advice in this handbook can be used by any woman in physics, or anyone mentoring women in physics. We purposely keep these definitions vague. If you think you could benefit from this book, then this book is for you!

Where possible, we wrote advice that would be applicable to multiple career sectors, whether you're in academia or industry, and included topics that would be of interest to various career stages, whether you're a student, a recent graduate, or someone in

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the midst of your career. While this book was written with physics in mind, much of this advice is applicable to women working and teaching in other STEM (Science, Technology, Engineering, and Mathematics) fields.

Why did we write a handbook specifically for women in physics? Physics is unique in that it has some of the lowest representation of women in the physical sciences, and this has been the case for decades. In the US, women are 25% of undergraduate physics bachelor's degree earners (Mulvey & Nicholson, 2025). In the UK, the numbers are similar, and women are 24% of university physics students (Institute of Physics, 2022). New Zealand, Ireland, and Canada show the same pattern (Ministry of Education, 2024; Kavanagh et al., 2023; Canadian Association of Physicists, 2023). Compare that to biology, with over 60% female graduates in the field (National Center for Education Statistics, 2022), and you can imagine how different the culture of each field must be!

This underrepresentation continues all the way through physics careers. Women hold 21% of physics PhDs and physics faculty positions in the US (Mulvey & Nicolson, 2025; Porter, Oman, & Tyler, 2024). In the UK, only 14% of professors are women (Institute of Physics, 2023).

One thing is certainly clear: there is no biological explanation for physics being harder for women. If there were, we wouldn't see countries such as Iran, where over half of all physics degrees (even PhDs!) go to women (Zad, Mosivand, & Kimiagar, 2023). There is nothing innate in men or women that makes men better or women worse at physics.

This means the answer lies in culture. And the research on women in STEM fields supports this. And it's not just the culture of physics itself; it is our national cultures as well that make it harder for women to enter and succeed at physics.

When a field becomes male-dominated, women experience that field differently, and these differences start early. From childhood, girls and boys are raised with different expectations about their knowledge and skill in science and math. Parents, teachers, toys, games, and media all bear part of the blame. Our society sends a

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message to kids (and parents) that science is a boy's thing. Girls absorb that message from a very young age: girls show less interest in science than boys starting in primary school (Alexander, Johnson, & Kelley, 2012).

There are theories out there that shed light on how to encourage women in physics. The first is science identity. We know that having an identity as a scientist can be crucial for women who want to be in physics (Carlone & Johnson, 2007). Things that build a sense of identity include having others (peers as well as parents and teachers) think of you as a scientist, and having others tell you that you are succeeding in physics.

The second is a sense of belonging. Feeling like you belong in physics can help women stay in the field (Lewis et al., 2016). Belonging is feeling like you can be your authentic self when you walk into a physics space, feeling that you are listened to and respected in those spaces, and feeling that you can succeed by putting in effort.

We wrote this handbook to tell you that you *are* a scientist and you *do* belong in physics. Physics is awesome, and even more awesome with you in it! Whatever challenges you face along the way, there is always something you can do to improve your situation. We hope the stories from other women and the research provided in this handbook give you the tools and encouragement to continue your physics journey!

My recommendation to girls or young adults who are considering a career in scientific research: If your dream is to be a scientist, go for it! Advancing knowledge is one of the most rewarding pursuits you can have. Yes, science is a journey full of challenges and tough days, but every obstacle you overcome brings you closer to a reward like no other. Don't let anyone tell you that STEM isn't for women. We can lead groundbreaking projects, make revolutionary contributions, and hold influential decision-making roles. So, if you're a girl or a woman with a passion for STEM, be bold, step into the research community with confidence, and never hesitate to ask for help unashamedly. I promise you; it's going to be an incredible journey!

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