

# Beauty and the biased

A recent talk at CERN about gender in physics highlighted the widespread biases that litter science. **Philip Moriarty** says we need to do more to tackle such issues head on

When *Physics World* asked 15 physicists and authors, myself included, to name their favourite science books for the magazine's 30th-anniversary issue, I knew immediately which I would choose (October pp74–78). My “must-read” pick was Sabine Hossenfelder's exceptionally important *Lost In Math: How Beauty Leads Physics Astray*, which was released earlier this year.

Hossenfelder, a physicist based at the Frankfurt Institute for Advanced Studies, is an engaging and insightful writer who is funny, self-deprecating and certainly not afraid to be provocative. I enjoyed the book immensely, being taken on a journey through modern theoretical physics in which Hossenfelder attempts to make sense of her profession.

If there is one part of the book that particularly resonated with me it is the conclusion – “Knowledge is power”. This is a powerful closing statement that deserves to be widely read by all scientists, but especially by that particularly irksome breed of physicist who believes – when all evidence points to the contrary – that they are somehow immune to the social and cognitive biases that affect every other human.

In “Knowledge is power”, Hossenfelder adeptly outlines the primary biases that all good scientists have striven to avoid ever since the English philosopher Francis Bacon identified his “idols of the tribe” – the tendency of human nature to prefer certain types of incorrect conclusions. Her pithy single-line summary at the start of the chapter captures the key issue: “In which I conclude the world would be a better place if everyone listened to me.”

Along with my colleague Omar Almaini from the University of Nottingham, I teach a final-year module entitled “The politics, perception and philosophy of physics”. I say teach, but in fact, most of the module consists of seminars that introduce a topic for students to debate, discuss and argue for the remaining time. One issue we dissect is Richard Feynman's oft-quoted definition of science as “the belief in the ignorance of experts”. Disagreeing with Feynman is never a comfortable position to adopt, but I think he does science quite a disservice



**Gender gap** Bias in science is deeply ingrained.

here. The ignorance, and sometimes even the knowledge, of experts underpins the entire scientific effort. After all, collaboration, competition and peer review are the lifeblood of what we do.

Science, in my view, would be nothing without experts. The problem, however, is that with each of these come complex social interactions and dynamics, and bias – no matter how hard we try. For this and many other reasons, *Lost In Math* is now prominently on the module reading list.

The issue of bias was brought to a head at a CERN workshop on high-energy theory and gender in September, where theoretical physicist Alessandro Strumia from the University of Pisa claimed that women with fewer citations were being hired over men with greater numbers of citations (November p11). Following the talk, Strumia faced an immediate backlash in which CERN suspended him pending an investigation, while some 4000 scientists signed a letter that called his talk “disgraceful”.

On the evidence of his slides, I found Strumia's talk to be poorly researched, ideologically driven, and an all-round embarrassingly biased tirade against women in physics. I suggest that Strumia needs to take a page – or many – out of Hossenfelder's book. When I read through Strumia's cliché-ridden and credulous arguments, almost every slide of his presentation reminded me of the wise thoughts of her final chapter.

One criticism that has been levelled at Hossenfelder's analysis is that it does not offer solutions to counter the type of biases that she argues are prevalent in the theoretical-physics community and beyond. Yet Hossenfelder does devote an appendix – admittedly rather short – to listing

some pragmatic suggestions for tackling the issues discussed in the book. These include learning about, and thus tackling, social and cognitive biases.

This is all well and good, except that there are none so blind as those who will not see. The type of bias that Strumia's presentation exemplified is deeply ingrained. In my experience, his views are hardly fringe, both within and outside the physics community. You only have to look at the social-media furore caused by the now former Google engineer James Damore, who came up with a similarly pseudoscientific “analysis” of gender differences last year in his memo, *Google's Ideological Echo Chamber*.

Just like Damore, Strumia is being held up by the usual suspects as the ever-so-courageous rational scientist speaking the truth, when, of course, he's entirely wedded to a glaringly obvious ideology and unscientifically cherry-picks his data accordingly. In a masterfully acerbic and exceptionally timely blog post published soon after the Strumia storm broke, particle physicist Jon Butterworth from University College London highlighted a number of the many fundamental flaws at the core of Strumia's over-emotional polemic.

Returning to Hossenfelder's closing chapter, she highlights that the “mother of all biases” is the “bias blind spot”, or the insistence that we certainly are not biased. “It's the reason my colleagues only laugh when I tell them biases are a problem, and why they dismiss my ‘social arguments’, believing they are not relevant to scientific discourse,” she writes. “But the existence of those biases has been confirmed in countless studies. And there is no indication whatsoever that intelligence protects against them; research studies have found no links between cognitive ability and thinking biases.”

Strumia's diatribe is the perfect example of this bias blind spot in action. His presentation is also a case study in confirmation bias. If only he had taken the time to read and absorb Hossenfelder's writing, Strumia might well have saved himself the embarrassment of attempting to pass off pseudoscientific guff as credible analysis. While the beauty of maths leads physics astray, it is ugly bias that will keep us in the dark.



**Philip Moriarty** is a physicist at the University of Nottingham, UK, e-mail [philip.moriarty@nottingham.ac.uk](mailto:philip.moriarty@nottingham.ac.uk)