

Commentary

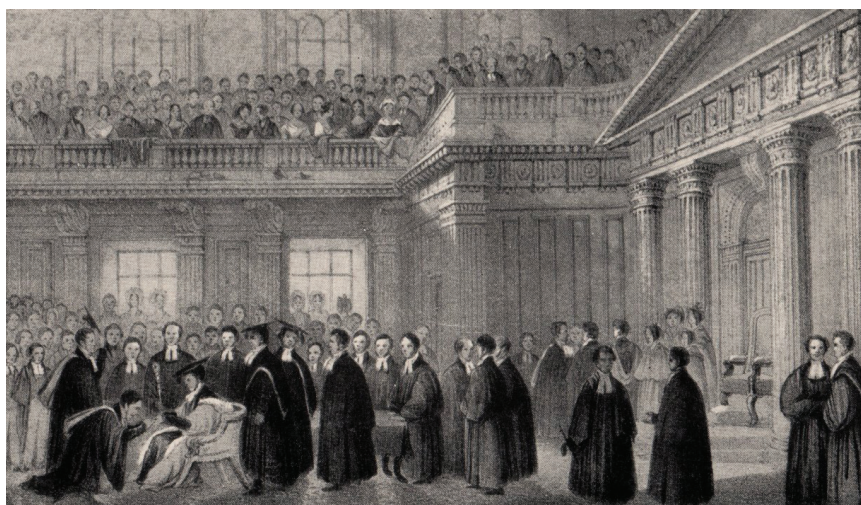
Elitism in physics: What happens when the profession's cultural scaffolding comes down?

Distinguished by its difficulty, versatility, subtlety, and even profundity, modern physics stands among humanity's great technical and intellectual achievements. This success has been enabled by continuous cultural entrepreneurship, giving rise to methods, mentalities, and institutions that have together fostered both astonishing individual accomplishments and an expansive and powerful cooperative enterprise.

Thanks to the work of historians and social scientists, we have a serviceable understanding of the cultural work underlying the physical sciences. In particular, it is possible to trace a constant tension between the work of building up what physicists are capable of and building out the number of people who can wield those capabilities. For centuries, that story has been dominated by elites inventing new ways to replicate and propagate themselves.

Andrew Warwick's 2003 history of Cambridge University's mathematical tripos in the 19th century, *Masters of Theory: Cambridge and the Rise of Mathematical Physics*, is an extraordinary investigation of one of the first places where a physics elite was systematically trained. He details how private coaches, not lecturers, oversaw small groups who worked together to apply emerging analytical tools to a wide array of physical problems. Innovating new practices of pen-and-paper calculation and enthusiastically participating in the emerging world of university sport, they created a culture of intellectual manliness that could prepare students in mind and body to survive, and progressively intensify, the rigors of their work.

Although the coaching system stressed group learning, it also entrenched the idea that only the most capable were fit to be physicists. Its culture borrowed heavily from that of the Victorian British elite, and intended as a course of general education, the tripos fueled the



ADMISSION OF THE SENIOR WRANGLER IN 1842, by Richard Bankes Harraden (1842, public domain). The senior wrangler was the highest-ranking student on Cambridge University's mathematical tripos exam.

British elite in return. Only the top “wranglers”—as identified on the publicly posted, rank-ordered results of the grueling, multiday tripos exam—actually went into the still very small enterprise of science.

Until well into the 20th century, the US boasted few elite theorists; instead, its physicists focused mainly on more pedestrian experimental work. World War II and the Cold War changed that culture as demands for scientific “manpower” spurred physics departments to develop pedagogical methods capable of vastly expanding the ranks of those who could apply cutting-edge mathematical and technological approaches. As the historian David Kaiser has shown, employers in industry appealed for talent by downplaying the elite nature of physics while advertising its professional comforts—“suburbanizing” it, as Kaiser puts it. That, of course, took for granted that, even as the discipline expanded, its demographics would still reflect not only its prior generations of elites but also the similarly white, male

world of mid-20th-century American professionalism.¹

Meanwhile, as the numbers of academic physicists also ballooned, a reconfigured culture of elitism took root in universities and was broadcast to the public with the flourishing of popular science. Caltech's Richard Feynman was one of the great cultural entrepreneurs of that era, constantly presenting himself as a curiosity-driven free spirit unlocking the secrets of the universe and his social surroundings alike. After building up that image for decades, he ultimately broadcast it to the world through his best-selling 1985 collection of anecdotes, *“Surely You're Joking, Mr. Feynman!”: Adventures of a Curious Character*.

Ostensibly a populist, Feynman strongly implied that you, too, could learn about physics and the world by adopting an attitude similar to his. But the technical content of physics was relatively easy for him to master, and he habitually glossed over its difficulties, relating that his own frustration in physics derived principally from struggles to

maintain creativity, not the grinding discipline needed for skills development.

That emphasis reflected a propensity among physicists to passively identify and promote students with the “right stuff,” including in their efforts to more actively cultivate talent. At Caltech, Feynman’s famously charismatic introductory undergraduate lectures focused on ideas rather than problem-solving, and they proved by his own admission to be of dubious pedagogical value, leaving even many of the school’s brilliant students struggling.² (For a defense of the course, see the article by Matthew Sands, *PHYSICS TODAY*, April 2005, page 49.) More darkly, he was well known for the withering dismissiveness he directed at guest colloquium speakers he deemed unworthy, and he readily exploited his own star status to abnegate responsibility for departmental governance and to lighten his teaching load overall.³

Feynman was, of course, only one figure, but elitist values pervaded the profession. The anthropologist Sharon Traweek’s classic 1988 study *Beamtimes and Lifetimes: The World of High Energy Physicists* shows that the norms of cut-throat competition, including the willingness to belittle others’ work to advance one’s own, were well accepted throughout the ranks of early-career researchers. Rewarding intensely competitive behavior was understood to be a sound way for labs and universities to allocate leadership positions to individuals talented and creative enough to handle them, though it also elevated certain personality types and people from backgrounds that better prepared them for the profession’s demands.

When Traweek did her research, it was near the beginning of what is now a half century of effort to diversify the

physics profession, waged in parallel with legal and political efforts to combat discrimination in professional settings generally.⁴ Although progress has been made in the intervening years, physics still lags many professions in recruiting and retaining people from underrepresented groups, and its often-forbidding culture has contributed to the problem.⁵

But the presumption that it is actually necessary for the culture to be forbidding is eroding. Fewer giants traverse the landscape than in past eras, and elitism may be on the wane. That means not that talent has diminished but rather that it has become necessary to think harder about what talent is, how it is cultivated, how it operates communally, and how to build a culture in which it can thrive.

The culture of physics is already being reconfigured in departments and labs around the world. What those cultural changes look like on the ground should be constantly discussed in public forums, in specific detail, so that successful models can be replicated and adapted and problems diagnosed. As the scaffolding of elitism comes down, physicists have an obligation to invest in the

cultural structure beneath it, to make it as durable as possible, creating still more powerful varieties of physics while opening the profession’s doors to more people than ever before.

References

1. D. Kaiser, *Hist. Stud. Phys. Biol. Sci.* **33**, 131 (2002); *Am. Q.* **56**, 851 (2004).
2. R. P. Feynman, R. Leighton, M. Sands, *The Feynman Lectures on Physics*, vol. 1, Basic Books (2013), Feynman’s Preface.
3. J. Gleick, *Genius: The Life and Science of Richard Feynman*, Pantheon Books (1992).
4. On the backdrop for legal and political efforts to advance women in science, see M. W. Rossiter, *Women Scientists in America: Forging a New World Since 1972*, Johns Hopkins U. Press (2012).
5. On the particular lack of progress for African Americans in physics and cultural factors involved, see AIP National Task Force to Elevate African American Representation in Undergraduate Physics & Astronomy, *The Time Is Now: Systemic Changes to Increase African Americans with Bachelor’s Degrees in Physics and Astronomy*, American Institute of Physics (2020).

William Thomas

(wthomas@aip.org)

American Institute of Physics
College Park, Maryland

CONTACT PHYSICS TODAY

Letters and commentary are encouraged and should be sent by email to ptletters@aip.org (using your surname as the Subject line), or by standard mail to Letters, *PHYSICS TODAY*, American Center for Physics, One Physics

Ellipse, College Park, MD 20740-3842. Please include your name, work affiliation, mailing address, email address, and daytime phone number on your letter and attachments. You can also contact us online at <https://contact.physicstoday.org>. We reserve the right to edit submissions.



**Accuracy.
Reliability.
Confidence.**

871 SERIES LASER WAVELENGTH METER

- For pulsed and CW lasers
- Accuracy as high as ± 0.0001 nm
- Measurement rate as high as 1 kHz
- Operation available from 375 nm to 2.5 μ m

BRISTOL
INSTRUMENTS

bristol-inst.com