

The weak mixing angle FREE

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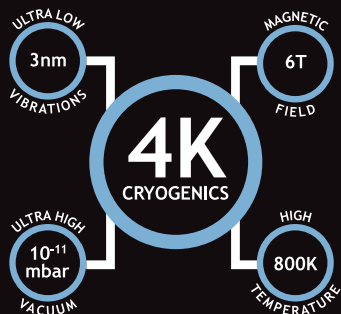
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1993. Much was made of how the cancellation was (or wasn't) the demise of US physics and how difficult it was for new PhD physicists to find proper jobs at the time. Industrial and other "hidden" physics jobs were not given much respect, and I don't recall many letters that discussed the struggles of those with bachelor's degrees in physics during that time.

A few years later, I had the privilege of being elected to the National Council for the Society of Physics Students and Sigma Pi Sigma. Under the leadership of Gary White, the director from 2001 to 2012, I participated in developing the broad outline of the Hidden Physicists program. One of our goals was to combat the prevalent misconception that the only thing a physics degree was useful for was a career in academic or government research.

That attitude is a great insult to the majority of physics degree holders, because only a relative few wind up in the business of publishing physics articles. Every year the country produces many more students with bachelor's degrees in physics than with PhDs. For example, data from the 2019–20 academic year show that 9296 students received bachelor's degrees in physics, while 1830 earned PhDs in the subject.¹ For the classes of 2019 and 2020, only about a third of physics bachelors pursued graduate degrees in physics or astronomy, and not all PhD graduates in those years ended up in "publish or perish" jobs.²

I espouse the view that completing any degree in physics alters a person's worldview and influences them for the rest of their life, whether they wind up with a PhD in physics or a PhD in medieval literature (a path one of my students followed).

Yes, it is a viewpoint akin to that of Aslan's in *The Lion, the Witch and the Wardrobe* by C. S. Lewis: "Once a king or queen in Narnia, always a king or queen." I concede that not everyone will be so inclusive. I strongly contend that someone who regularly uses their physics background is still a physicist, even if they are not publishing physics papers. That includes someone like the editor-in-chief of *PHYSICS TODAY*, who must rely on a strong background in physics to be effective. So Charles, I recognize you as a physicist, and in your role at *PHYSICS TODAY*, you were perhaps the most vis-

ible "hidden" physicist that I could imagine!

References

1. S. Nicholson, P. J. Mulvey, *Roster of Physics Departments with Enrollment and Degree Data, 2020: Results from the 2020 Survey of Enrollments and Degrees*, AIP Statistical Research Center (September 2021).
2. AIP Statistical Research Center, *Initial Employment—Physics Bachelors and PhDs: Classes of 2019 and 2020* (March 2022).

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I thoroughly enjoyed reading Konrad Kleinknecht's excellent summary of Jack Steinberger's life and physics career (*PHYSICS TODAY*, September 2021, page 59). I was unaware of several of Steinberger's achievements. In my opinion, he deserved additional Nobel Prizes for some of them, such as his calculation of the two-photon decay rate and lifetime of the neutral pion and discovery of K_L^0 leptonic decay's CP -violating charge asymmetry.

I would like to point out, however, that the Weinberg angle, θ_W , referred to in the obituary is also called the "weak mixing angle." It was invented by Sheldon Glashow in his famous 1961 paper, "Partial-symmetries of weak interactions." It is the angle that diagonalizes the 2×2 matrix of the neutral gauge bosons, giving the Z boson and the photon as the mass eigenstates in the model based on the gauge group $SU(2) \times U(1)$. With that model, Glashow proposed to unify electromagnetic and weak gauge interactions.

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Correction

April 2022, page 16—The pressure of the hydrogen isotopes in the capsule is 350 Gbar (about 350 billion atmospheres), not 350 GPa. PT