

LETTERS

Guns on campus are scientists' concern

I disagree with the two letters in the June 2017 issue (page 15) whose writers opined that the issue of guns on campus is not sufficiently physics-related to merit coverage in PHYSICS TODAY (July 2016, page 26). Many physicists work on college campuses, guns are a form of technology for which scientists should take some responsibility, and today's interconnected world demands that scientists pay attention to a broad range of societal issues. I'm sure America's gun lobby would love it if scientists remained silent, but all of us need to speak up about guns on campus. Thanks for the article.

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Issues that pushed the SSC's demise

Thank you for publishing Michael Riordan's well-researched article "A bridge too far: The demise of the Superconducting Super Collider" (PHYSICS TODAY, October 2016, page 48). The complexities of the subject are on full display in the book *Tunnel Visions: The Rise and Fall of the Superconducting Super Collider*, by Riordan, Lillian Hoddeson, and Adrienne Kolb (University of Chicago Press,

2015), and in the article's focus on the political intrigue.

As a physicist at the SSC from 1990 to 1994, I can say we were quite aware of the difficulties of establishing international collaboration and funding. For example, my Japanese colleagues voiced concern about how it would look in Japan for their relatively small delegation to make a large funding request. The Japan-US relationship is politically and culturally complex, and that complexity echoes today in science—for example, in planning the Fukushima Daiichi cleanup, in which I have been a participant.

In addition to the considerations Riordan mentions from the 1993 draft letter being circulated within the Clinton administration, the general climate that year featured strident party conflicts on all fronts. Among the issues looming large were budget-balancing skirmishes and the conflict between Texas Republicans and Michigan Democrats over the closing of GM factories. Those forces converged and came to bear on Clinton's decision to withdraw support for a large project located in an opposite-party state. So a project that had been planned for decades and was in the midst of construction was canceled largely for short-term political reasons.

To lessen the vulnerability of long-term projects to the forces of short-term political struggles, I have long advocated that before new labs are constructed, a US-participating treaty organization similar to CERN should be formed. It would likely be composed of countries that border the Pacific Ocean and would support geographically diverse sites with low construction and maintenance costs. In the modern era of improvements in remote internet access and plummeting air travel costs, big projects do not need to be located in established labs in New York, Chicago, or the Bay Area. And not everyone needs to be resident—just ask those who are planning facilities such as the Thirty Meter Telescope or DUNE. So the "intellectual backwater" opinion mentioned by Riordan is perhaps not as daunting now. Incidentally, most of us even then were quite pleased and engaged with the quality, diversity, and depth of the culture in the Dallas-Fort Worth area.

A principal advantage of the CERN project model is the stability and diversification of funding afforded by the authority of a multilateral treaty structure.

Similarly, a treaty would lessen the risk that US big science faces now: that Congress would cancel a project in one of its 20 annual funding votes.

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► **Riordan replies:** Cas Milner helps to underscore what was true about the vote against the Superconducting Super Collider (SSC) in the US Congress, particularly the House of Representatives: It was not a Democrat versus Republican issue. It was instead a Rust Belt versus Sun Belt issue. Northern states like Illinois, Michigan, Ohio, and Wisconsin were reacting against southern states like Texas and Louisiana getting more than their fair share of the federal pie.

But he is incorrect—or at least inaccurate—about "Clinton's decision to withdraw support" for the project. In writing and verbally, Clinton supported the SSC, but his support was lukewarm, as we concluded in *Tunnel Visions*. By contrast, the project was a "presidential priority" for George H. W. Bush. Given the staunch SSC opposition in the House, more than lukewarm support was required for it to survive.

As far as the quality of cultural life in the Dallas-Fort Worth area, Milner is writing about the opinions of a biased sample. Based on our interviews, many physicists who decided not to go to Texas would not agree with him.

Michael Riordan
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Making a statement about parameter ranges

A formulation in "Sterile neutrinos give IceCube and other experiments the cold shoulder" (PHYSICS TODAY, October 2016, page 15) needs clarification. In discussing the results from IceCube and other experiments, Sung Chang writes that certain parameter ranges are "excluded" by the data. Although that word often appears in scientific publications reporting such results, it is misleading, even when accompanied

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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

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by the term “confidence level,” and may lead readers to incorrect conclusions.

For a given model, a frequentist analysis—the type of analysis that leads to confidence intervals—yields a range of parameter values for which the observed data satisfy predefined conditions: For a limit-setting analysis, the data are in the tail of the expected distribution. According to the frequentist construction, primarily developed by Jerzy Neyman, the experimenter is to repeat the experiment many times and glean the true parameter values from the distribution of produced intervals. No statement can be made from a single experiment about how likely the parameter values are, and to say, or even to suggest, that certain parameter values are “excluded” is logically incorrect unless there is a zero probability of producing the observed result with a particular parameter value. The correct statement is “For the parameter range [here specify the parameter range for which the data satisfy the probability requirement], the observed data satisfy [here define the criteria the data are supposed to fulfill].”

That phrasing will seem clumsy, but it is important that results be stated correctly. Implying that the frequentist analysis somehow allows a conclusion about which parameter values are probable or improbable is a logical error—one that unfortunately is pervasive, even in physics. A related error led the American Statistical Association to issue a warning last year about the use and interpretation of *p*-values in statistical hypothesis testing (see <https://www.amstat.org/asa/files/pdfs/P-ValueStatement.pdf>). I think physicists should get it right!

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Historical note on 2016 Physics Nobel

The coverage of the 2016 Nobel Prize in Physics (PHYSICS TODAY, December 2016, page 14) was enjoyable, particularly because my colleague David Thouless shared in the prize. The piece

states, correctly, that in the 1930s “Rudolf Peierls argued convincingly that in [two-dimensional] materials, the thermal motions of atoms would prevent long-range order from being established.” However, the case Peierls made in his 1935 article¹ was a variant of a 1930 argument by Felix Bloch² that thermally excited magnons would prevent the establishment of long-range order in two-dimensional Heisenberg magnets.

References

1. R. E. Peierls, *Ann. Inst. Henri Poincaré* **5**, 177 (1935).
2. F. Bloch, *Z. Phys.* **61**, 206 (1930).

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Call him Doctor Cooper

I always enjoy reading PHYSICS TODAY. However, there is a fatal mistake in “The image of scientists in *The Big Bang Theory*” by Margaret Weitekamp (January 2017, page 42). The caption for figure 1 reads “Hanging with Mr Cooper.”

No. He is Dr Cooper. He is very sensitive about it.

As the author correctly described, Sheldon, Leonard, and Raj often make fun of Howard, who doesn’t have a PhD. Sheldon is proud of his doctoral degree, and he never allows anybody to call him Mr Cooper.

This is funny for me because I also feel strange if someone calls me Mr Katori. People may call me Teppei or Dr Katori, but not Mr Katori, please.

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Correction

July 2017, page 8—Reference 1 for Charles Day’s “From the editor” should read as follows:

1. S. Watanabe et al., *Nature* **515**, 228 (2014). **17**

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