

the use of Maxwell's equations as a mechanism for explaining the concepts, and I much enjoyed carrying out the exercise suggested in box 2. However, it occurred to me that something is missing in connection with the final result as given in equation 2c. Although it is clearly a wave equation and therefore any constraint violations may indeed "propagate away," as the authors suggest, it is also clear that the equation will accept a constant solution or even an exponentially growing one. What remains unclear is why the "propagate away" option is the one that should take precedence in actual calculations.

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■ **Baumgarte and Shapiro reply:** A good question! The solution to the wave equation depends on the adopted boundary conditions.

Imposing "outgoing" wave boundary conditions, appropriate for most of the problems of interest for us, ensures that constraint violations do indeed propagate away. For a numerical demonstration that employs such boundary conditions for the form of Maxwell's equations in box 2, see reference 1.

## Reference

1. A. M. Knapp, E. J. Walker, T. W. Baumgarte, *Phys. Rev. D* **65**, 064031 (2002).

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## Sexism may be in the eye of the beholder

The February 2012 issue of *PHYSICS TODAY* held a certain irony for me in its juxtaposition of Robert March's review of Leon Lederman and Christopher Hill's book *Quantum Physics for Poets* (page 51) with the article by Rachel Ivie and Casey Langer Tesfaye on women in physics (page 47). I had recently read Lederman and Hill's book because I sought an up-to-date and accessible text for the quantum section of my course on modern physics for nonscience students. Like the reviewer, I also found it a well-written, lively, and contemporary account of quantum physics.

Much as I liked the book, in the end I chose not to adopt it. My reason was

the very example the reviewer touts as an instance of Lederman's engaging writing: the image of a reader peering in the window of Victoria's Secret while Lederman and Hill enlighten him—and it is clearly a him—about wave-particle duality. Read the cited passage in all its detail and it isn't hard to draw several conclusions about how the authors, perhaps subconsciously, view their readers as male; as drawn, in a slightly voyeuristic way, to Victoria's Secret; and as thinking highly of their own sexual allure.

How would a female student react to Lederman and Hill's example? Would it make her feel included among those interested in physics? Would it make her comfortable in the presence of male physicists or her fellow physics students? I think not. Had this example occurred just once, I might have let it go and adopted the book. But Victoria's Secret is mentioned every time the wave-particle duality comes up—which is frequently in this book on quantum physics.

If we're to remedy the underrepresentation of women in physics that Ivie and Tesfaye decry in their article, we'll need enough sensitivity to come up with more welcoming examples than that of a physics-interested male ogling the Victoria's Secret window display.

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■ **Lederman and Hill reply:** Perhaps Richard Wolfson would have viewed our work more favorably had he read our first book, *Symmetry and the Beautiful Universe* (Prometheus Books, 2004). There we championed the great mathematician Emmy Noether to the modern science lay audience. We told the story of all of physics through Noether's grand theorem and how it forms a keystone of our understanding of nature. We did so as much to honor one of the greatest intellectuals who ever lived as to show our readership that physics is not a men's club.

More to Mr. Wolfson's point, Victoria's Secret stores can be found in almost every shopping mall in the US. When we pass by, we see as many women as men looking at their windows. Both genders' thoughts may be expected to run to fantasy, yet here is a point of contact between such human experiences and physics. We are leveraging it to inspire the poetic reader to enter a world of altered reality—in this instance, to ponder the quantum world

with the transmission of photons through a glass window and its inherent probabilistic nature.

We hope to invite readers deeper into the magnificent world of atoms, quarks, strings, the conduction band structure of semiconductors, Schrödinger's cat, the Dirac sea, and more. We take some risk, as we are prone to do on other topics such as politics and religion, and we have received numerous complaints concerning our belief in global warming, the creeping superstition, and anti-intellectualism that we see infecting our society today.

We are inclined to disagree, however, with Mr. Wolfson's conclusion about the effect of the Victoria's Secret windows metaphor on our female readers: We have done the experiment of taking the risk, and we have not received a single complaint thus far from anyone else that our book is sexist.

**Leon Lederman**  
**Christopher Hill**  
Fermilab  
Batavia, Illinois

## Nature's manifest absurdity: A cautionary tale

Alan Chodos, in his commentary in the December 2011 issue of *PHYSICS TODAY* (page 8), summarized the OPERA experiment that supposedly found neutrinos traveling at a speed of  $c + \delta c$ , where  $c$  is the speed of light and  $\delta c \approx 7 \times 10^5$  cm/s. He also discussed some theoretical speculations and objections, but he ended his commentary with the odd comment that "if the OPERA result fails to survive, that will not prove that neutrinos don't travel faster than light." Then he presented his own ideas of tachyonic (faster-than-light) neutrinos that would support the "apparent lack of Lorentz invariance in the neutrinos' superluminal propagation" (see the article by Oleksa-Myron Bilaniuk and E. C. George Sudarshan, *PHYSICS TODAY*, May 1969, page 43).

Chodos didn't mention that regardless of neutrino properties, the most serious problem with the OPERA result is that it entails a failure of *causality*. Since the clocks in the rest frame of the experiment are synchronized by GPS in accordance with special relativity, which is accepted as valid, consider the corresponding observations with clocks synchronized in a frame of reference moving with velocity  $c - \delta c'$