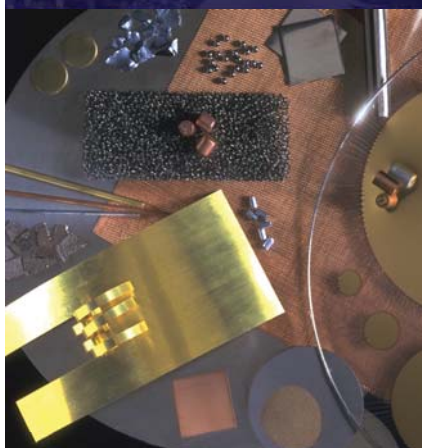


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consistent with a superluminal neutrino speed.⁷

On the other hand, if the OPERA result fails to survive, that will not prove that neutrinos don't travel faster than light. The idea of tachyonic neutrinos has been around for a long time, and work on tachyons more generally is even older.⁸ Over the past 25 years or so there have been hints—ranging from the measurement of the electron neutrino mass at the endpoint of beta decay to the measurement of the muon neutrino mass in pion decay—of tachyonic behavior, and both the MINOS and MiniBoone experiments have reported neutrino and antineutrino oscillations that could indicate violations of *CPT* symmetry. Because *CPT* symmetry follows from Lorentz invariance and other mild assumptions, those results might provide additional evidence supporting the apparent lack of Lorentz invariance in the neutrinos' superluminal propagation.

Neutrinos are mysterious, and they are very hard to study experimentally. To say that we don't understand everything about them is a vast understatement. They may or may not be tachyonic, but even the smart money can bet that the further elucidation of their properties will reveal new and surprising results that, one hopes, will lead to deeper insights into the subatomic world.

Letters

Desert solar hubs not new but risky

An item by Toni Feder titled "Scientists help make deserts into solar-energy hubs" (PHYSICS TODAY, July 2011, page 21) refers to upcoming implementations of concentrated solar power (CSP) technology as pilot projects. However, nearly 100 years ago, Philadelphia scientist Frank Shuman applied the CSP concept to a system he built in Meadi, Egypt. He used reflective troughs to power a steam engine that operated a pump to bring irrigation water to the desert. Along with his pilot project, "by 1914, Shuman was talking of building 20 000 square miles of collector in the Sahara"¹ for producing energy from the Sun. Although CSP components have improved since then, old photographs of Shuman's facility in Egypt look remarkably like the one on the July 2011 cover of PHYSICS TODAY.

Since there are conflicting views on the job-creating potential of renewable energy, scientists promoting solar-energy hubs in the desert might want to review the findings of reference 2,

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3. G. Amelino-Camelia et al., <http://arxiv.org/abs/1110.0521>; R. Ehrlich, <http://arxiv.org/abs/1110.0736>.
4. See, for example, J. Knobloch, <http://arxiv.org/abs/1110.0595>; D. V. Naumov, V. A. Naumov, <http://arxiv.org/abs/1110.0989>; A. Mecozzi, M. Bellini, <http://arxiv.org/abs/1110.1253>; D. V. Ahluwalia, S. P. Horvath, D. Schrit, <http://arxiv.org/abs/1110.1162>.
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Alan Chodos

(chodos@aps.org)

American Physical Society
College Park, Maryland

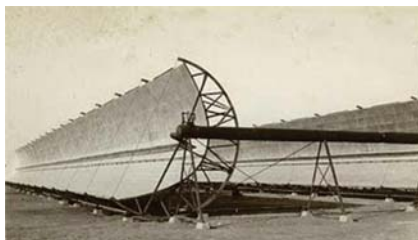
which makes the following claim:

Europe's current policy and strategy for supporting the so-called "green jobs" or renewable energy dates back to 1997, and has become one of the principal justifications for U.S. "green jobs" proposals. Yet an examination of Europe's experience reveals these policies to be terribly economically counterproductive.

But then review the follow-up report by Eric Lantz and Suzanne Tegen, which claims that the methodology used by Gabriel Calzada Álvarez and colleagues "does not reflect an employment impact analysis."³

Attention should also be paid to the termination of large CSP projects. For example, a proposed 290-megawatt CSP plant for Arizona Public Service was terminated in 2009 because Lockheed Martin Corp "decided not to go forward with the project due to the size and the final risk profile of the EPC [engineering, procurement, and construction] contract, among other factors."⁴

Are water supplies in the desert ade-



Frank Shuman's solar collector, built in 1908 in Meadi, Egypt. (Courtesy of Tacony Historical Society.)

quate for the operation of CSP? Can the deserts provide—locally or through importation—the water resources needed to sustain CSP plants without denying desert inhabitants the water they need for survival? To reduce water usage for CSP, we could use dry-cooling instead of wet-cooling towers, but even with dry cooling, will the water resources be sufficient for the total steam cycle and for cleaning mirrors?

Gerhard Knies's hopes for CSP in deserts, like Shuman's a century ago, are admirable. But Knies's prophecy that "the transfer from fossil fuel to renewable energy will become the biggest business of the future" is reminiscent of other grossly inaccurate energy-related predictions. For example, Lewis Strauss claimed more than 50 years ago that atomic power was the answer to energy problems and that it would make "electricity too cheap to meter."⁷⁵ History shows that such claims should be made with considerable caution.

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3. E. Lantz, S. Tegen, *NREL Response to the Report Study of the Effects on Employment of Public Aid to Renewable Energy Sources from King Juan Carlos University (Spain)*, white

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4. Reuters, 1 October 2009, <http://www.reuters.com/article/2009/10/01/utilities-operations-aps-solar-idusn0128639320091001>.
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Andrew Ochadlick Jr
(andrewochadlick@comcast.net)
Science Dimensions
New Hope, Pennsylvania

Controlling chemical reactions in the quantum regime

Debbie Jin and Jun Ye, in "Polar molecules in the quantum regime" (PHYSICS TODAY, May 2011, page 27), provide an enlightening overview of their recent work on cold molecular gases; they note a significant opportunity to study and manipulate chemical reactions in a regime in which quantum effects are important. In the case of their potassium-rubidium system, they regard the observed reaction



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