

ested in percolative structures. Many of the factors controlling the percolative expansion of networks and their possible phase transitions remain unknown and are an active area of research.

Compacted networks, a very important class of classical percolative networks, are not mentioned in the Motter and Albert article. Compacted networks are all around us, the most often overlooked example being window glass. They are self-organized by short-range connectivity rules (which can also be found in Motter and Albert's examples), but in addition they have been compacted by long-range forces, seldom if ever discussed in models. In the window glass example, valence-bond rules govern short-range connectivity, but there are also long-range van der Waals forces that cause the glass density to be usually only about 10% lower than related crystalline densities.

The behavior of many physical systems is governed by delicate balances between short- and long-range forces, so the existence of compacted networks will not come as a surprise to most readers of *PHYSICS TODAY*. What may come as a surprise is that quantitative theories of compacted networks are already being used by industry to design new specialty glasses, like extraordinarily damage-resistant Gorilla glass.¹

Self-organized percolation appears in many contexts. For instance, combined charge and rigidity percolation explains many features of high-temperature superconductors, including limits on the transition temperature.² In the biosciences, the classical compacted globular structures of protein folds are determined by the competition between hydrophobic and hydrophilic forces. A new theory explains evolutionary trends of influenza virus in terms of those forces.³ Based on ideas of self-organized criticality⁴ and derived from a bioinformatic study⁵ of self-similarities in 5526 segments from the Protein Data Bank, it successfully predicts the frequency of disease mutations and may have important applications for the use of mutation-prolific viruses to treat disease.

References

1. J. C. Mauro, *Am. Ceram. Soc. Bull.* **90**, 31 (2011).
2. J. C. Phillips, *Proc. Natl. Acad. Sci. USA* **107**, 1307 (2010).
3. J. C. Phillips, <http://arxiv.org/abs/1209.4306>.
4. P. Bak, *How Nature Works: The Science of Self-Organized Criticality*, Copernicus, New York (1996).

5. M. A. Moret, G. F. Zebende, *Phys. Rev. E* **75**, 011920 (2007).

Punit Boolchand
(boolchp@ucmail.uc.edu)
University of Cincinnati
Cincinnati, Ohio

John C. Mauro
(mauroj@corning.com)
Corning Inc
Corning, New York

J. C. Phillips
(jcphillips8@comcast.net)
Rutgers University
Piscataway, New Jersey

Competing against science fiction

David Kramer's piece (*PHYSICS TODAY*, July 2012, page 23) concerning the importance of science to the general public and the public's discomfort with science has provoked me to respond.

Science is dull and dreary to the general public and will remain so until we can achieve warp speed. James Kirk and Han Solo achieve it regularly and without ill effect. The public knows from *Star Trek* and *Star Wars* that warp speed is possible, if only we put the effort into it. Likewise, gravity is just an inconvenience to be overcome, and the public knows it can be overcome with little effort, to take us to the stars.

Let's face it, when the public is excited about such events as the space program, Moon landings, and such, it is a triumph of technology, not science. All the science education in the world will not overcome the siren call of science fiction; it's simply too exciting.

All one can hope for is that the small minority of the general public who appreciate science and scientific endeavors are those who have influence in the public media and the halls of Congress. In that regard we have been pretty damn lucky.

Moishe Garfinkle
(garfinkm@drexel.edu)
Drexel University
Philadelphia ■

Rights & Permissions

You may make single copies of articles or departments for private use or for research. Authorization does not extend to systematic or multiple reproduction, to copying for promotional purposes, to electronic storage or distribution (including on the Web), or to republication in any form. In all such cases, you must obtain specific, written permission from the American Institute of Physics.

Contact the

AIP Rights and Permissions Office, Suite 1N01
2 Huntington Quadrangle,
Melville, NY 11747-4502
Fax: 516-576-2450
Telephone: 516-576-2268
Email: rights@aip.org

Low-Noise DC Voltage Source



SIM928 ... \$1095 (U.S. List)

- **±20 V isolated voltage source**
- **Ultra-low noise output**
- **Switchable batteries for continuous operation**
- **Output floats to ±40 V**

The SIM928 Isolated Voltage Source is ideal for applications where ultra-clean DC voltage is required. Voltage can be set between ±20 VDC with millivolt resolution, and the SIM928 delivers up to ±10 mA. The output circuit is optically isolated from all earth-referenced charging circuitry. As the output battery is depleted, the freshly charged standby battery is switched in to replace it. This provides a continuously uninterrupted isolated bias voltage source.



SIM900 Mainframe loaded with a variety of SIM modules

SRS Stanford Research Systems
Phone (408) 744-9040
www.thinkSRS.com