feat is widely seen as a promising technical breakthrough: In a field that has long relied on passive observation, one can now give a sonoluminescing bubble laser nudges to find out what it's made of.

Ashley G. Smart

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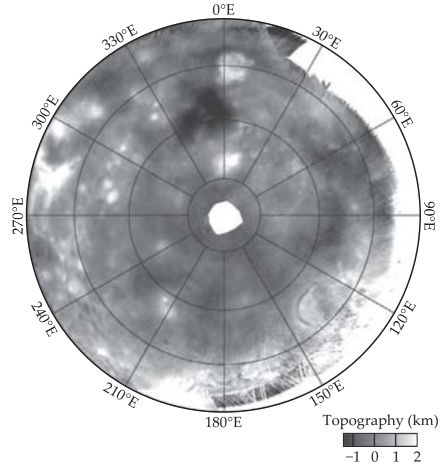
physics update

These items, with supplementary material, first appeared at http://www.physicstoday.org.

How rumors spread. The events of the Arab Spring and other uprisings and protests over the past year have dramatically demonstrated the ability of social media to widely disseminate information and trigger collective action. Analyzing complex interaction networks, Hernán Makse and colleagues showed in 2010 that the people most influential in the spreading of an idea—or an infectious disease, for that matter—are not those who know the most other people, but rather those at a well-defined core of the network. Now, Javier Borge-Holthoefer and Yamir Moreno of Spain's University of Zaragoza have analyzed rumor-spreading models, which may be more appropriate for describing social contagion. In such models, a person may be an *ignorant*, unaware of some piece of information; a *spreader*, aware and willing to transmit it; or a *stifler*, knowledgeable but uninterested in sharing further. An ignorant contacted by a spreader can become another spreader, while a spreader who tries to share with others already knowledgeable—stiflers or other spreaders—may stop spreading and become a stifler. When the duo simulated their rumor models on real-world network structures—an email contact network, cross-references within the US political blogosphere, the routing structure of the internet, and Twitter—the behavior they found differed markedly from that of disease models. For starters, the researchers found no influential spreaders. But they did find that nodes at a network's core can behave as firewalls, critical stiflers that know all the circulating information but prevent it from spreading system-wide. (J. Borge-Holthoefer, Y. Moreno, *Phys. Rev. E* **85**, 026116, 2012.) —RJF

A day on Venus just got longer. For two years in the early 1990s, the *Magellan* spacecraft bounced radar waves off the surface of Venus. Echo return times gave surface topography, and tracking the radar images yielded a planetary rotation period of 243.0185 Earth days. Our nearest-neighbor planet was visited again in 2006, this time by the European Space Agency's *Venus Express*. The new mission also created a topographic map, but did so by measuring thermal radiation emitted from the surface. Because the Venusian atmosphere is so thick with greenhouse gases, temperature fluctuations in its lower regions are minimal and temperature serves as an indicator of altitude. When Nils Mueller (German Aerospace Center) and colleagues compared their map (see the figure) with *Magellan*'s, they were surprised to see a subtle longitudinal offset. Subsequent analysis revealed that in order to align the maps, the rotation period of Venus must be 6.5 minutes longer than determined by *Magellan*—at least when averaged over the 16 years separating the *Express* and *Magellan* observations. The new result actually agrees with Earth-based radar measurements made before *Magellan*, and Mueller and colleagues note that the *Magellan* data were obtained over a



relatively short time. They suggest that *Magellan* might have measured an anomalous rotation rate. It's not implausible that Venus could be temporarily torqued; interactions with its atmosphere, the Sun, or Earth could each do the job. (N. T. Mueller et al., *Icarus* **217**, 474, 2012.) —SKB

Gravity waves and heat in Mars's atmosphere. Atmospheric gravity waves arise when mountains and other massive features cause a wind's otherwise smooth horizontal flow to oscillate vertically. On Mars, where the topography is rough and high and where wind speeds can reach 400 km/s, gravity waves carry momentum fluxes that far exceed those of their terrestrial counterparts. A new computational study demonstrates that gravity waves not only perturb the Martian atmosphere's dynamics, as one would expect, but also perturb its thermal structure. Aymeric Spiga of the Pierre and Marie Curie University in Paris and his collaborators sought to explain a puzzling observation made in 1997 by *Mars Pathfinder*. As the lander parachuted toward the Martian surface, its sensors detected pockets of air whose anomalously low temperature (around 100 K) was cold enough for carbon dioxide, the atmosphere's main constituent, to condense. Ice clouds of CO_2 were indeed detected by later missions, but at altitudes (60–80 km) at which climate models predicted the atmosphere would be too warm. Two phenomena were proposed to account for the anomaly: gravity waves and thermal tides. Spiga and his colleagues resolved kilometer-scale gravity waves by means of a circulation model whose grid spacing was 10 times finer than the hundreds-of-kilometers spacing typical of global models. The team's simulations showed that at altitudes around 80 km, fluctuations induced by gravity waves alone cause the temperature to dip below 100 K. How the dry-ice droplets nucleate in the thin Martian atmosphere remains a mystery. Solving it will require building a computational bridge across another gap in length scale: to the microphysics of cloud behavior. (A. Spiga et al., *Geophys. Res. Lett.* **39**, L02201, 2012.) —CD