cosmologically significant conclusions. The radio data's autocorrelation—the quantity that should eventually reveal the BAO peak at 480 Mly—was so noisy that it wasn't statistically different from zero. But Chang notes, "The situation has improved since late 2009, since digital TVs no longer occupy the 700-MHz frequency range." With 300 more observing hours at the GBT, she and her colleagues are now mapping a larger area of sky—about 50 square degrees—which they'll use as a test for even larger surveys aimed at BAO measurement. And they hope to get funding to build a dedicated intensity-mapping telescope that's as big as the GBT. Peterson, Bandura, and others have already built a prototype.

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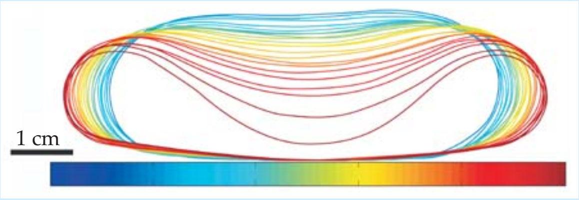
Cami and his colleagues suggest that the planetary nebula may have ejected its hydrogen envelope a few thousand years ago and that a recent thermal pulse prompted the ejection of the pure carbon dust they're now observing. (J. Cami et al., *Science*, in press, doi:10.1126/science.1192035.) —JNAM

Rolling ribbons get the bends. For thousands of years, children have delighted in hoop rolling. Certainly, most of them have not considered that the rings are subject to gravitational and inertial forces; in any case, the hoops are stiff enough that they maintain their circular form despite those forces. But what happens to a rolling hoop that's not so stiff? John Bush of the MIT mathematics department, along with visiting student Pascal Raux and colleagues, has answered that question in a recent study of more general systems—rolling bands that may be wider than they are high. Bush and company's work was both experimental and theoretical. In their experimental investigations they took pictures of a vinyl polysiloxane loop placed on the inner surface of a rotating drum. The figure shows how the form of a representative loop changes as the drum speed is increased; blue corresponds to low speeds; red, high. In their theoretical work, the investigators confirmed the intuitive idea that the rolling band deforms as the inertial or gravitational force overwhelms the internal stiffness force. Indeed, if either gravity or inertial effects



are strong enough, the top of the band can make contact with the bottom; new forces then come into play and the team's analysis is no longer valid. Rolling droplets, tumbling blood cells, and carbon nanotubes deformed by van der Waals forces, the authors note, all display similar shapes to the rolling ribbons; the dynamics of those varied systems may be elucidated by the relatively simple ribbon study. (P. S. Raux et al., *Phys. Rev. Lett.* **105**, 044301, 2010.) —SKB

Bali's beating gong. At the heart of the Balinese percussive orchestra known as a gamelan is the large gong called the *gong ageng wadon*. It features a large, protruding dome or boss in the middle; when the boss is struck with a padded mallet, the gong produces a pronounced acoustic beating or *ombak* (meaning "wave"), as can be heard in the online version of this item. Using acoustical and vibrometric analyses, David Krueger and his colleagues at Brigham Young University have studied the sources of the ombak. Although some beating was found to come from asymmetric vibration modes with closely spaced frequencies, those appear to contribute mostly to the gong's timbre. The more significant contribution arises from the gong's nonlinear structural response. Its two dominant vibration modes, both axially symmetric, have nearly a 2:1 frequency ratio. That relationship gives the gong its perceived pitch, but the ratio isn't exact. So when the gong is struck, causing displacements large enough to produce overtones, the fundamental generates harmonics and interacts with the second axisymmetric mode to yield sum and difference frequencies. The resulting sound spectrum features strong peaks of similar amplitudes that are spaced only a few hertz apart and give rise to the distinctive sound of ombak. (D. W. Krueger, K. L. Gee, J. Grimshaw, *J. Acoust. Soc. Am.* **128**, EL8, 2010.) —RJF

Directly imaged exoplanet challenges formation models. Two years ago, astronomers in Canada directly imaged what seemed to be a gas giant planet in a very distant orbit—more than 300 times the Earth–Sun distance of one astronomical unit (AU)—around a star much like our Sun. (For comparison, Jupiter's orbit is 5.2 AU, Neptune's is 30 AU.) Such a scenario poses difficulties for all the major planet-formation models in current use: core accretion, gravitational instability, and fragmentation of a pre-stellar core. The main difficulty is that either much larger objects, like another star, or much smaller ones are expected at such a great distance. Now, with further observations in hand from the Gemini North telescope and its adaptive optics, University of Toronto astronomers Ray Jayawardhana, Marten van Kerkwijk, and David Lafrenière (now at the University of Montreal) have confirmed the puzzle: The planet, with about eight times the mass of Jupiter, is moving through space gravitationally bound to the parent star, known by its nickname 1RXS 1609. Besides astrometric observations, the direct imaging (shown here) along with spectroscopic and photometric data allowed the researchers to further characterize the planet and confirm that no other large planets are farther out in the system. A mere toddler at only 5 million years old, 1RXS 1609 is about 500 light-years away. Hundreds of other exoplanets have been discovered in recent years, but this one is expected to keep theorists busy for some time. (D. Lafrenière, R. Jayawardhana, M. H. van Kerkwijk, *Astrophys. J.* **719**, 497, 2010.) —SGB