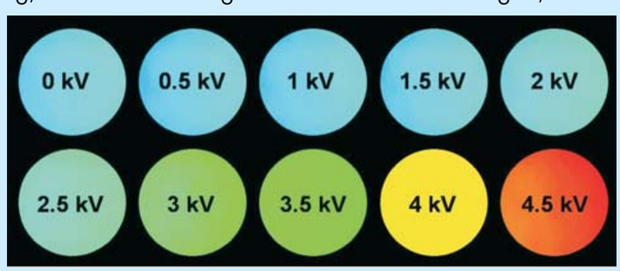
mutations make the protein so floppy that it melts at body temperature and flubs its tumor-suppressing role. The finding gives the researchers hope that drugs could bind and buttress p53's structure to restore its stability and health-preserving function. (A. C. Joerger, H. C. Ang, A. R. Fersht, *Proc. Natl. Acad. Sci. USA* **103**, 15056, 2006.) —CD

A tiny electrically pumped laser has been created by bonding a wafer of III–V compounds on a silicon substrate. Because the minimum of silicon's conduction band doesn't line up with the maximum of its valence band, holes and electrons can't recombine efficiently to make photons. As a result, silicon is a poor photonic material. But if its photonic shortcomings could be circumvented, silicon-based computers could tap directly into the torrents of data that flow through fiber-optic cables. To reach that goal, a silicon laser is essential. Ideally, the laser should work at room temperature, be electrically pumped, and be manufactured using lithography, epitaxy, and other techniques from the industrial repertoire. Mario Paniccia and his collaborators at Intel Corp's research labs in Santa Clara, California, have now built a prototype that meets those requirements. Working with John Bowers of the University of California, Santa Barbara, the Intel researchers have assembled an optically active AlGaInAs heterostructure on top of an etched silicon waveguide. Ordinarily, bonding III–V compounds to silicon creates performance-sapping defects. To avoid that outcome, Bowers devised a novel low-temperature (300 °C) wafer-bonding technique. At 13%, the prototype's efficiency is modest, but Paniccia foresees improvements. As the figure shows, the researchers can already make more than 30 lasers on a single 8-mm-wide chip. (A. W. Fang et al., *Opt. Express* **14**, 9203, 2006.) —CD

Room-temperature spin Hall effect. In the regular Hall effect, electrons that move longitudinally under the force of an applied electric field through a sample will, if exposed to a vertically oriented magnetic field, be deflected slightly to one side. Two years ago, physicists showed that a kind of Hall effect in a vertical electric field could produce a net pileup of spins at the edge of the sample, even though no pileup of electric charges would occur (see PHYSICS TODAY, February 2005, page 17). Physicists at the University of California, Santa Barbara, with collaborators from the Pennsylvania State University, now have used a sample of zinc selenide—a nonmagnetic II–VI semiconductor—to demonstrate both electrically induced spin polarization and the segregation of electrons based on spin. Using a diagnostic technique called Kerr rotation spectroscopy, the researchers showed that spins of opposite sign congregated on opposites sides of the sample, that the effect persists all the way up to room temperature, and that no internal magnetic fields arose in the process. All this despite the fact that ZnSe should not be efficient at electrically polarizing spins. Group leader David Awschalom says that the evidence for a strong spin Hall effect in ZnSe will add to the interesting controversy swirling around interpretations of the spin Hall effect. In another recent experiment, Awschalom and colleagues showed that spins needn't just pile up in a semiconductor; they can be led off as a polarized current into a wire made of the same material. (V. Sih et al., *Phys. Rev. Lett.* **97**, 096605, 2006; N. P. Stern et al., *Phys. Rev. Lett.* **97**, 126603, 2006.) —PFS

Ellipsoidal universe. A new theoretical assessment of data taken by the *Wilkinson Microwave Anisotropy Probe* suggests that the observable universe is not spherically symmetric, but more like an ellipsoid. The *WMAP* data have helped nail down some cosmological parameters such as the age of the universe since the Big Bang (13.7 billion years), the time when the first atoms formed (380 000 years after the Big Bang), and the fractions of all available energy vested in the form of ordinary matter, dark matter, and dark energy (roughly 5%, 25%, and 70%, respectively). One remaining oddity about the *WMAP* results, however, involves the way in which different portions of the sky contribute to the overall map of cosmic microwaves: Samples of the sky smaller than tens of degrees across seem to be contributing radiation at expected levels; only the largest possible scale, on the order of the entire sky, seems to be underrepresented. That largest scale is measured in the radiation's quadrupole moment. Now Leonardo Campanelli of the University of Ferrara and his colleagues Paolo Cea and Luigi Tedesco at the University of Bari (all in Italy) have taken a closer look at the so-called quadrupole anomaly. They found that if the surface of last scattering—the shell from which the cosmic microwaves come toward Earth—is slightly ellipsoidal rather than spherical, then the *WMAP* quadrupole is just what it should be. The cosmologists say that a nanogauss magnetic field pervading the cosmos could bring about the required 0.01 eccentricity. An ellipsoidal universe would nicely parallel Johannes Kepler's discovery that the planetary orbits are ellipses and not circles. (L. Campanelli, P. Cea, L. Tedesco, *Phys. Rev. Lett.* **97**, 131302, 2006.) —PFS

Artificial-muscle diffraction grating. Manuel Aschwanden and Andreas Stemmer of ETH Zürich in Switzerland molded a soft, electroactive polymer into a shape resembling a microscopic pleated window shade and bonded it onto a prestretched elastic polymer. The result is an artificial muscle that contracts when a voltage is applied. With no voltage, the grating's lines are spaced 1 μm apart. But when a voltage is applied to the ETH device, the line spacing can change by up to a whopping 32%—compared with less than 1% for tunable gratings made of hard materials. When white light strikes a diffraction grating, different wavelengths fan out at different angles; a small



aperture placed within the fan can isolate any of the colors. Changed line spacing means changed angles, and a different color sweeps across the aperture. With different voltages, the test device isolated different wavelengths over a range of 139 nm starting at 446 nm, as shown in the figure. The researchers envision replacing the fixed red, green, and blue light-emitting elements in each pixel of a display screen with two or more tunable diffraction gratings, which would make available the full range of colors that the human eye can perceive. Tunable diffraction gratings are routinely used in fiber-optic telecommunications and video projectors. The new technology could exploit newly developed white LED lights. (M. Aschwanden, A. Stemmer, *Opt. Lett.* **31**, 2610, 2006.) —DC