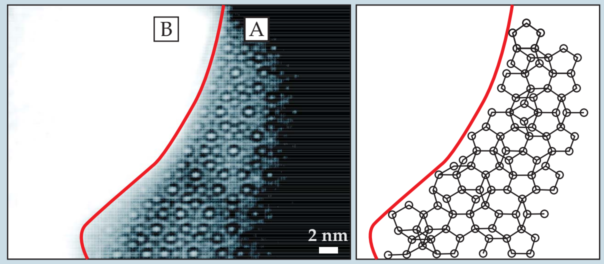
correspond to the protected surface states. Yet the bulk material is insulating, while the quantized oscillations are a hallmark of conduction electrons, a so-called Fermi liquid. Indeed, the oscillations in SmB_6 strongly resemble those seen in metallic hexaborides that incorporate lanthanum, cerium, and praseodymium instead of samarium. But as the temperature cools below 2 K, the quantum oscillations grow dramatically and deviate markedly from conventional metal behavior. The SmB_6 results rule out impurities and other easy explanations, leaving a puzzle for experimentalists and theorists to solve. (B. S. Tan et al., *Science* **349**, 287, 2015.) —RJF

Mammogram radiation risk is lower than thought. According to the World Health Organization, breast cancer kills more than 500 000 women worldwide every year, and mammography is the only breast cancer screening method that has proved to be effective in organized programs. But recommendations for mammography must weigh the benefits of an early diagnosis against the risks of x-ray radiation damage. Standard dosimetry recognizes that of the three breast tissues—skin, fatty, and fibroglandular—the last is the one truly at risk for damage from x rays. Models for simulating radiation dose in mammography routinely use a homogeneous mixture of fibroglandular and fatty tissue, covered by a layer of skin. But real breast anatomy is heterogeneous, with glandular tissue preferentially located near the breast's center. A large study at the University of California, Davis, has now accounted for that heterogeneity. PhD candidate Andrew Hernandez told a gathering at the July meeting of the American Association of Physicists in Medicine that he and his colleagues used three-dimensional imaging data of 219 women of different ages, ethnicities, and breast densities and sizes to create realistic models. Then, employing Monte Carlo simulations, they obtained the mean glandular dose (DgN)—the currently accepted metric—for both the homogeneous and the more realistic heterogeneous tissue distributions. The results for the homogeneous case agreed with earlier work of other researchers and validated the study. For the heterogeneous case, the team found that DgN values on average were about 30% lower, which strongly suggests that for the past three decades, mammography radiation dose levels, and risks, have been overestimated by about that amount. (A. M. Hernandez, J. M. Boone, J. A. Seibert, *AAPM Abstract* 27307, 2015; also *Med. Phys.* **42**, 3548, 2015.) —SGB

Quasicrystal growth observed in the lab. First spotted in 1982 by Dan Shechtman, quasicrystals have a subtle long-range order that enables them to evince rotational symmetries never seen in conventional crystals. (See PHYSICS TODAY, December 2011, page 17.) When a quasicrystal grows, it incorporates material in small bits. For decades, theorists have been working to understand how the local incorporation and long-range order can be compatible. Now a team led by the University of Tokyo's Keiichi Edagawa has imaged the quasicrystalline alloy $Al_{70.8}Ni_{19.7}Co_{9.5}$ as it adds on new material. They found that the growth process includes episodes in which the quasicrystal's 10-fold rotational symmetry threatened to become lost. But during those episodes, the quasicrystal became strained; the molecular rearrangements that relaxed the strain defused the threat. Edagawa and colleagues reached those conclusions from a geometric analysis of images such as the one here, obtained with high-resolution transmission electron microscopy (HRTEM). The A and B regions both include quasicrystal, but the material in B is invisible to HRTEM because none of its symmetry axes are aligned with the HRTEM beam. The figure to the right reproduces the locations of the atoms in the HRTEM image. Nearest neighbors are connected to show the tiling structure of the quasicrystal. As time passed, the quasicrystal in region A incorporated material from region B, occasionally in a manner incompatible with the quasicrystal's rotational symmetry. But then atoms shifted, the tiling structure subtly rearranged, and symmetry-preserving growth followed. For quasicrystals at 1183 K, that correction process typically took about 1 s. But cooling the material a mere 60 K increased the repair time by more than a factor of 10. (K. Nagao et al., *Phys. Rev. Lett.* **115**, 075501, 2015.) —SKB



Stratospheric air worsens wildfires. Outside the summer months, high atmospheric pressure can develop over the deserts that lie east of the Sierra Nevada. Pushed over the mountains by the pressure, the desert air sinks, then heats up, and blows farther westward across California's Central Valley. The Santa Ana winds, as the flow is known, exacerbate the risk and spread of fires. Now Andrew Langford of the National Oceanic and Atmospheric Administration and his collaborators have identified a phenomenon that makes the winds' fire-raising effect even worse: incursions of very dry air from the stratosphere. To make the connection, the researchers studied a wildfire that broke out 75 km west of Los Angeles on 2 May 2013. More than 2100 firefighters, supported by 177 fire engines, 11 helicopters (one of which is shown in the photo), and 8 air tankers, battled the blaze before rain extinguished it four days later. The ozone concentration in the stratosphere, too low to affect combustion, significantly exceeds that in the troposphere. By using a tool developed to predict ozone concentrations, Langford and his collaborators found a layer of stratospheric air that folded downward through the troposphere almost to the surface. As the dry air sank, it heated up and cleared the skies. The resulting ground temperature when the fire broke out was 36.7 °C; the relative humidity, 1%. Such stratospheric incursions are common above the West Coast. Although their effects cannot be mitigated, their arrival can now be predicted, thanks to the ozone's telltale presence. (A. O. Langford, R. B. Pierce, P. J. Schultz, *Geophys. Res. Lett.* **42**, 6091, 2015.) —CD