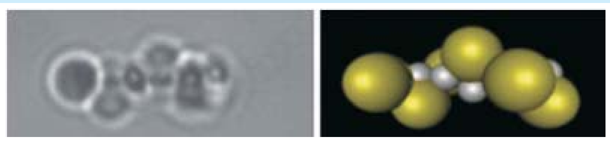
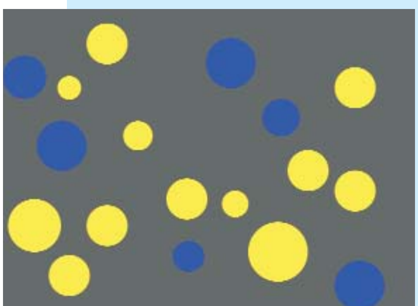
having combed through 10^{14} proton–antiproton collisions accumulated at Fermilab's Tevatron collider over the past four years, the collaboration that runs the collider's D0 detector complex has reported finding 18 events in which the expected decay of an Ω_b^- to an Ω^- plus a charmonium meson is clearly discerned. The discovery was difficult not only because so very few collisions produce an Ω_b^-, but also because the newly discovered baryon is so short-lived that it moves only about a millimeter before decaying. The 6.1-GeV mass extracted from the observed events is reassuringly close to that predicted by the number-crunching lattice-gauge calculations to which QCD theorists have to resort. (V. Abasov et al., D0 collaboration, http://arxiv.org/abs/0808.4142.) —BMS

Mimicking nature's chirality with magnetic colloids. Symmetry abounds in nature, but the beauty of proteins and other biological polymers lies in their asymmetry. Chirality, or handedness, of DNA and other biopolymers plays a critical role in their biochemical pathways: The binding properties of a left-handed DNA double helix differ significantly from those of the right-handed counterpart. Mimicking nature has not proven easy for scientists attempting to model, study, and engineer asymmetric polymers. Colloids—nanometer- to micron-sized particles—have emerged as molecular building-block candidates (see PHYSICS TODAY, June 2006, page 15). Left alone, however, they spontaneously clump together or form ordered crystals. A key to making helical structures is steric hindrance, in which the size of the building blocks—atoms, molecules, or colloids—constricts the resulting bond angles. A team of scientists from the Paris Institute of Technology in France and New York University have discovered that binary silica microspheres, joined into dumbbell shapes and with an iron-oxide ring around the joining bond, align and extend into long asymmetric polymer chains in the presence of a magnetic field. The researchers showed that steric repulsion causes either left- or right-handed helices to form when the particles have different diameters. The figure shows an optical microscope image (left) of such a helical structure and its corresponding schematic (right). (D. Zerrouki et al., *Nature* **455**, 380, 2008.) —JNAM



Instinctive and learned math abilities are correlated. When young schoolchildren master the addition tables, the knowledge they obtain relies on symbolic numerical representation. But humans, and even some animals, also have an instinctive nonsymbolic "approximate number system" (ANS) that we use to represent a quantity of items without counting. Justin Halberda of the Johns Hopkins University and colleagues at JHU and the Kennedy Krieger Institute have now established that a person's ability in applying the instinctive ANS goes hand in hand with learned symbolic numerical ability as measured by standardized exams. In their ANS test, Halberda and colleagues showed 14-year-olds a series of figures such as the one reproduced here. After viewing an image for 0.2 second, each subject attempted to identify which color dot—yellow or blue—was more numerous. To quantify a subject's ANS acuity, the researchers determined the minimum percent difference that could be reliably discriminated in the number of dots. The ANS ability displayed by the children at age 14 was significantly correlated with the results of standardized math exams they had taken each year from kindergarten through sixth grade. A correlation, though, does not establish a causal connection. Some evidence supports the argument that ANS ability plays a causal role in symbolic math achievements, but other evidence suggests that conventional math training increases ANS acuity. Or perhaps some third factor is the joint cause of instinctive and learned mathematical aptitude. (J. Halberda et al., *Nature* **455**, 665, 2008.) —SKB



Structure of strongly nonlinear crystal unraveled. The recently elucidated crystal structure of a promising class of inorganic polymer salts reveals why these materials generate strong second-harmonic generation (SHG) responses to optical stimulation. In general, asymmetric inorganic polymer thin films with highly polarizable bonds exhibit strong nonlinear optical behavior, and are used in some tunable, coherent IR lasers to probe the electronic or structural properties of molecules or surfaces. A team from Northwestern University and Argonne National Laboratory used Argonne's Advanced Photon Source to study the quaternary salts formed from the zirconium selenophosphate ($ZrPSe_6^-$) polyanion and its complementary metal cation (K^+, Rb^+, or Cs^+)—this class of salt tends to crystallize as microneedles (see figure 1). The crystal structure (see schematic in figure 2) revealed a distortion in the molecular backbone from its ideal geometry, which contributes to the salt's high polarity. The second harmonic—a beam generated in the crystal and emitted at half the wavelength and twice the frequency of incident light—for the sample with the largest cation, Cs^+, had an intensity 15 times that produced by a typical commercial nonlinear optical material. Even the smallest cation, K^+, mixed with Cs^+, produced about double the SHG response of the commercial benchmark material. The new salts exhibit strong photoluminescence in solution; they are also optically transparent from the mid- to the near-IR region, which gives them potential for use in a range of applications, from broadband communication to medical devices. (S. Banerjee et al., *J. Amer. Chem. Soc.* **130**, 12270, 2008.) —JNAM

Figure 1

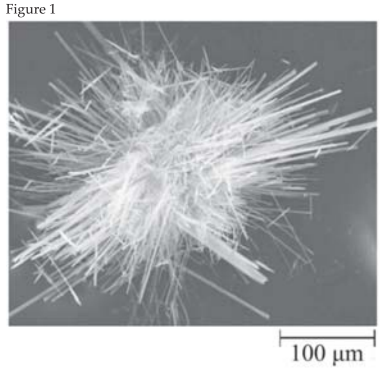


Figure 2