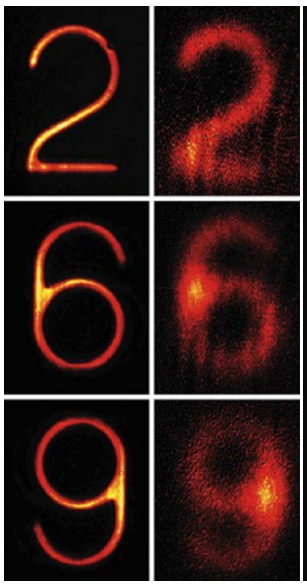
RESEARCH HIGHLIGHTS



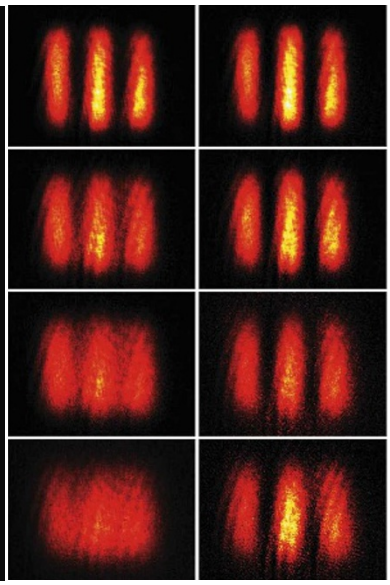
Fuzzy figures

Phys. Rev. Lett. **100,** 223601 (2008)

Capture the complex patterns of photons that make up several numerals in a vapour of rubidium atoms at 52 °C, and those images will degrade as the atoms diffuse (pictured left). But Moshe Shuker of the Technion-Israel Institute of Technology and his colleagues have found a way to store such images and then regenerate the original light beam. The numbers were created by projecting a laser beam through a stencil and exciting the atoms.

Shuker's team stored images comprising sets of three parallel lines for 2, 10, 20 or 30 microseconds (pictured far right and in descending order) using a 'phase shift' technique to counteract the effect of diffusion (shown near right). The technique involves manipulating the phase of the input image, which controls the quantum phases of the atoms. The phases of the atoms that diffuse away from an image's lines are at 180° to one another, and so cancel each other out in the restored image.

Thirty microseconds is a thousand-fold increase over the previous record for delaying an image. The work has potential applications in many fields, including quantum information processing.



M. SHUKER ET AL.

CHEMICAL NANOTECHNOLOGY

Close the gate

J. Am. Chem. Soc. doi:10.1021/ja800266p (2008)

Nanoscale synthetic channels that are opened and closed by a DNA 'switch' have been constructed by a team in China. Such channels could form part of a selective membrane for filtering and purifying water or for mimicking the changeable permeability of biological ion channels.

Yugang Wang of Peking University and his colleagues etched funnel-shaped holes, 5–44 nanometres wide at the narrowest point, into polymer membranes and lined the pores' mouths with single strands of DNA. The DNA in the pore is tightly folded in acidic conditions but unravels into loose chains at pH 8.5. This alters the diameter of the hole and therefore the flux of ions through it.

MOLECULAR BIOLOGY

Sod it

Genes Dev. **22,** 1451–1464 (2008)

Mutations in the *SOD1* gene cause motor neurons to die in amyotrophic lateral sclerosis, also known as Lou Gehrig's disease. Hidenori Ichijo of the University of Tokyo and his co-workers have pinned down why.

The key lies in the system of intracellular membranes called the endoplasmic reticulum (ER). Mutations in *SOD1* seem to affect the system that degrades worn-out pieces of ER, and a surfeit of ER containing misfolded proteins activates a genetic programme that kills the cell.

Ichijo's team found that they could mitigate motor-neuron death and extend the lifespan of *SOD1*-mutant mice by deleting a gene (*ASK1*) that turns on the cell-death programme.

ANIMAL BEHAVIOUR

Token symbolism

PLoS ONE **3,** e2414 (2008)

Apes use and understand symbols but they are not unique in this respect: capuchin monkeys (*Cebus apella*; below) can assign values to tokens that represent different items of food.

Elsa Addessi of the CNR, Italy's national research council, and her colleagues trained five monkeys to associate a particular token — such as a green chip, black plastic tube or a brass hook — with one of three specific types of food. They then gave the monkeys a series of choices, each time between different amounts of two food items or between two types of token.

The value the monkeys assigned to a token was very similar to the value they gave to the food it represented, which suggests that the animals weighed up both real and symbolic options in an equivalent manner.

E. VISALBERGHI

ASTROPHYSICS

Cosmic tiara

Astrophys. J. **680,** 295–311 (2008)

A halo of stars surrounds the Milky Way, but researchers disagree how it got there. One theory proposes that it formed from the same cloud of gas as the galaxy itself; the other says the halo is the remains of several 'dwarf galaxies' that were originally separate from but close to the Milky Way proper. A survey of about three million halo stars weighs heavily in favour of the latter hypothesis.

Eric Bell of the Max Planck Institute for Astronomy in Heidelberg, Germany, and his colleagues compared data from the Sloan Digital Sky Survey with several models. The halo's structure, they say, suggests that it is the remains of several smaller galaxies that were subsumed into the Milky Way after it formed.

ECOLOGY

Dotty diets

Nature Nanotech. doi:10.1038/nnano.2008.110 (2008)

Those who worry about nanotechnology do so partly because of its potential environmental impact. So David Holbrook and a team from the US National Institute of Standards and Technology, in Gaithersburg, Maryland, have tested whether quantum dots (tiny blobs of semiconducting material) accumulate in a simple invertebrate food web.

Over a series of experiments, they put bacteria (*Escherichia coli*), rotifers (*Brachionus calyciflorus*) and ciliates (*Tetrahymena pyriformis*) in flasks with carboxylated and biotinylated quantum dots, which may find a use in computing and solar cells.