# Memory cell: Charge of the light, delayed

It's hard to store a pulse of light. The clumsy techniques available today include sending a light signal along a coiled kilometer of optical fiber. A compact optical memory chip would make telecommunications networks more efficient and optical computers more feasible, information technology experts say.

German researchers report this week creating an optical-memory prototype that combines small size, speedy operation, and controllable release of signals. This sandwich of semiconductors stores light by transforming it into pairs of positive and negative charges and then stepping in like a referee at a fight to hold the opposite charges apart.

The charges accumulate as light signals to be stored dislodge electrons from atoms in a thin intermediate semiconductor layer, known as a quantum well (SN: 4/20/96, p. 247). The layer's properties enable it to confine charges.

Each photon freeing an electron from the well's crystal structure also creates an electron vacancy, known as a hole, which can behave as a mobile positive charge. Voltages applied to electrodes steer the electrons and holes into separate spots in the well and hold them for potentially useful periods of up to tens of microseconds. An earlier version used sound waves to separate the charges (SN: 5/24/97, p. 318). When the voltage is shut off, the electrons and holes combine, releasing a flash of light.

Stefan Zimmermann of the University of Munich and his colleagues there and at the Munich Technical University in Garching describe their prototype device, which stores a single pixel of light, in the Feb. 26 SCIENCE.

To improve the device's characteristics, the researchers say they are changing the materials from which it is made so that it can work at room temperature instead of the frigid 100 kelvins necessary now. They also anticipate being able to shrink it dramatically.

"We never thought it would work," says Jörg P. Kotthaus of the University of Munich. "We made it rather large to get a lot of signal out." Rather than its present 200 micrometers on a side, the circuitry to store one pixel could shrink to less than 2 μm on a side, he predicts.

Storage times of many microseconds represent a valuable step, says Claude Weisbuch of the École Polytechnique in Palaiseau, France. However, he suspects that "it will be tricky to make it work at room temperature" because more energetic electrons and holes will tend to leak past the voltage barriers. —*P. Weiss*

# Milky Way's tug robs stellar cluster

*There are hundreds of tails in the Milky Way. This is just one of them.*

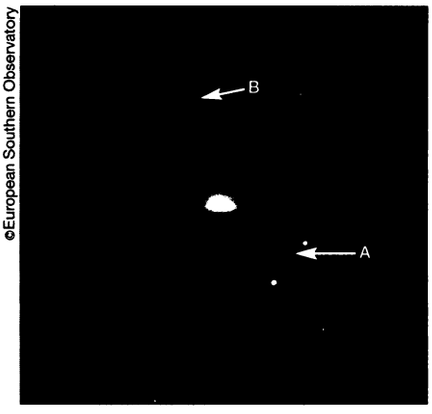
*In this drawing, the globular cluster NGC 6712 is seen at two different times—before (A) and after (B) the swarm of stars passes through the plane of our massive, pinwheel-shaped galaxy. The cluster's repeated passage may have stretched NGC 6712 like a comet's tail.*

*That scenario could explain a new observation: None of the several-hundred-thousand stars in NGC 6712 are less massive than the sun. That's a surprise, because clusters usually contain many more lightweight stars than heavyweights. The tug of the Milky Way's dense center has robbed NGC 6712 of its lightest members, says Francesco Paresce of the European Southern Observatory in Garching, Germany.*

*"NGC 6712 is the first real example of 'evaporation' of stars, allowing us to watch the process unfold in front of our eyes," he notes. Other clusters don't show the same pattern because they don't come as close to the Milky Way's center. NGC 6712 may have ventured within 1,000 light-years of the core just a few million years ago. The lightest stars are more easily detached because they tend to lie at the periphery of a cluster, says Lars Hernquist of Harvard University.*

*Like the rest of the universe, as much as 99 percent of the Milky Way's mass is thought to be made of invisible material, or dark matter. By studying the extent to which clusters, as well as tiny satellite galaxies, are distorted or torn apart by our galaxy's gravity, astronomers hope to shed light on the distribution and the amount of dark matter in the Milky Way.*

*Paresce and his collaborators made their observations with the first component of what will be a quartet of 8.2-meter telescopes, known as the Very Large Telescope, on Cerro Paranal in Chile. The team describes its findings in the March 1 ASTRONOMY AND ASTROPHYSICS.* —*R. Cowen*



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# Disability law may cover gene flaws

A recent Supreme Court ruling has fostered a fledgling legal strategy that could protect people from discrimination based on their genes. The ruling suggests that the power of the Americans with Disabilities Act (ADA) might extend to people who are genetically predisposed to disease—before they fall ill.

As researchers identify genes associated with diseases such as breast cancer, colon cancer, or Huntington's disease, the danger arises that employers or insurance companies could discriminate against people who carry genetic defects. No federal law specifically protects people from genetic discrimination. "It's about all of us, folks," said Francis S. Collins, director of the National Human Genome Research Institute in Bethesda, Md. "We're all at risk for something."

Lawyers, scientists, genetic counselors, advocates for the disabled, and congressional staffers met Feb. 19 in Washington, D.C., to brainstorm about legal protections for people who carry identified genetic risk factors. The conference, sponsored by Collins' institute and the National Action Plan on Breast Cancer of the Public Health Service, focused on last year's Supreme Court case *Bragdon v. Abbott*.

In that ruling, an HIV-positive plaintiff was found to be protected under the ADA even though she had not developed any symptoms of AIDS. The woman sued her dentist after he refused to fill her cavity. The ADA defines as disabled, and therefore protected under the act, any person who is limited in a "major life activity." The plaintiff argued that she met this criterion because, after learning that she carried the AIDS virus, she decided not to have children. The court agreed, in a 5-4 decision.

*Bragdon v. Abbott* demonstrated that the ADA can extend to people who may, sometime in the future, develop a disease. Because it rested on the plaintiff's decision not to have children, however, a strict interpretation of that ruling would not protect people whose reproductive choices are unaffected by their genetic risk factors, said Paul Miller, commissioner of the Equal Employment Opportunity Commission in Washington, D.C. "The broader question is whether the ADA protects against discrimination on the basis of diagnosed but asymptomatic genetic conditions—those that have the potential to limit major life activities," said Miller. The ADA should apply in such cases, he said.

Whether it will is an open question. The commission would vigorously support a test case, Miller said, and might use a legal strategy that does not rely on