

OF NOTE

PHYSICS

Light step toward quantum networks

Researchers are striving to use quantum physics to store, manipulate, and transmit data to someday create extraordinarily powerful and secure computer networks. Now, physicists in Atlanta have demonstrated the quantum version of one of the most basic network functions: reading a bit from a computer's memory so that it can be sent through a communications channel.

Dzmitry N. Matsukevich and Alex Kuzmich of the Georgia Institute of Technology describe the feat in the Oct. 22 *Science*.

Unlike conventional bit reading, the procedure manipulates quantum data bits, or qubits, which can each simulta-

neously represent a 0 and a 1. In a likely architecture for quantum networks, individual or small aggregates of atoms or ions will act as qubits for storage and calculations, whereas photons will serve as communications qubits between the atoms or ions.

In the new experiment, the researchers forced a cloud of ultracold rubidium-85 atoms into a specific quantum state. Then, they triggered those atoms to collectively emit one photon endowed with its own version of the cloud's quantum state.

"For the first time . . . we've transferred a matter qubit to a photon qubit," Kuzmich says. Next to come, he adds, is the converse operation. —P.W.

ASTRONOMY

Riddles on Titan

Two puzzles have emerged from the Cassini spacecraft's first close flyby of Saturn's hydrocarbon-shrouded moon Titan (*SN: 11/06/04, p. 291*). Radar images from the Oct. 26 passage, which recorded just 1 percent of the moon's surface, show no obvious sign of craters. That's a surprise because Titan, the solar system's second-largest moon after Jupiter's Ganymede, is likely to have been pummeled by debris roaming the outer solar system.

One explanation is that new craters have been buried under a thick layer of organic-rich material. Another possibility is that the zone of the moon's atmosphere might be obscuring craters. Either way, the Cassini team today is trying to figure out why.

Scientists used a laser measurement instrument on Cassini's ion and neutral spectrometer found a heavy carbon isotope in Titan's atmosphere. The lighter isotope is more abundant from the top of the atmosphere down. In other words, heavier ones do, this result makes sense. But carbon in Titan's atmosphere, as measured in methane, shows no such division between the lighter and heavier isotopes, notes Toby C. Owen of the University of Hawaii

in Honolulu. To reconcile the disparity, Owen conjectures that some process, perhaps the evaporation of liquid or solid hydrocarbons on the surface, could be replenishing the carbon. —R.C.

BIOMEDICINE

Heavy traffic may trigger heart attacks

People at risk of heart attacks should steer clear of traffic, a new study suggests. Researchers in Germany have found that exposure to traffic can dramatically increase a person's risk of having a heart attack soon afterward.

The researchers analyzed the medical records of 691 heart attack survivors in Augsburg, in southern Germany, during a recent 30-month period. After surveying the study volunteers about their activities up to 4 days before a heart attack, the researchers found that a person's risk of being stricken nearly tripled in the hour

after being in traffic. Lead author Annette Peters of the GSF-National Research Center for Environment and Health in Neuherberg says that she and her colleagues were "surprised by the size" of the increased risk.

Of the people in the study, 10 percent were riding in traffic within an hour of the onset of a heart attack. About 10 percent of the study volunteers reported heavy traffic exposure nearly the day before the heart attack. The researchers found that people who were traveling in traffic the day before a heart attack had a 2.8-fold increase in risk. The researchers also found that people who were riding in traffic the day before a heart attack had a 2.8-fold increase in risk. The researchers also found that people who were riding in traffic the day before a heart attack had a 2.8-fold increase in risk.

The German study appears in the Oct. 21 *New England Journal of Medicine*. In an accompanying commentary, Peter H. Stone of Brigham and Women's Hospital in Boston argues that the new data—when considered in the context of known triggers for heart attacks—provide "compelling" evidence that particulates in air pollution may trigger a heart attack. —D.P.

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