Interference Acts as Light 'Switch'

A "switch" discovered by researchers at the **University of Toronto** in Canada could lead to the creation of an optical transistor. Aephraim Steinberg, Kevin Resch and Jeff Lundeen found that a BBO crystal lased with a 20-mW Ti:sapphire beam prohibits the simultaneous transmission of two femtowatt Ti:sapphire beams but allows one beam to pass.

Resch said that one photon "turns the other off" in the crystal because of a quantum interference effect. The researchers hope the switch will enable development of an optical transistor that could allow computers to store and transfer information orders of magnitude faster by using photons instead of electrons.

IR Blind-Spot Detection Testing Extended

Autosense Ltd. of Denver and **Ford Motor Co.** of Dearborn, Mich., have agreed to expand testing of a low-cost blind-spot detection system that uses low-power IR lasers to locate vehicles in adjacent lanes. The Autosense-owned system, called SideMinder, has been under development since 1985 and could cost as little as $100 to manufacture.

The system uses seven 940-nm laser diodes with outputs of up to 700 mW for sensing boundaries up to 8 m from the vehicle in 10-cm increments. Production models are likely to use nonlasing, 880-nm emitters.

Ford will test the system on several of its platforms as well as present it to its subsidiaries and related companies. Warren Hyland, president of Autosense, said Ford's participation is expected to produce enough demand to make production of the system viable for a supplier. Autosense could not fill smaller requests for detectors from Ford subsidiary **Volvo Car Corp.** or **General Motors** in Detroit, Hyland said, because it "could not get a supplier to come to the table."

Crystal Traps Light

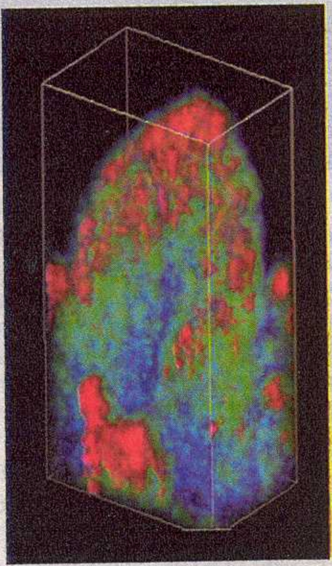
A year ago, two research teams made big news by slowing the propagation of light through a vapor trap to a virtual stop. Now a group led by Philip R. Hemmer of the **Air Force Research Laboratory** at Edwards Air Force Base, Calif., and M. Selim Shahriar of **Massachusetts Institute of Technology** in Cambridge has developed a method to capture light for tenths of a second in an yttrium-silica crystal.

Shahriar said the technique is expected to facilitate the application of light trapping because of its durability and additional slowing potential, and because the crystal can handle multiple pulses simultaneously. He predicted that one of the first uses will be quantum encryption.

Optical Tomography Moves to Developmental Biology

Faculty and students at **Harvey Mudd College** in Claremont, Calif., are using optical coherence tomography technology to capture three-dimensional movies of developing cell systems.

Conventional methodologies typically employ a scanning electron microscope, which requires that the subject be dead. The optical coherence microscope uses a near-IR superluminescent diode to emit approximately 850-nm light that can produce images from as deep within a live subject as 1 mm without causing damage.



Similar technology is used among ophthalmologists for scanning patients' retinas, and in other medical applications such as gastrointestinal endoscopy and dermatology.

Richard Haskell, a biophysicist at the college, said the researchers are the primary group using the technology for detailed study of developmental biology. So far, the microscope has been used to capture gastrulation in the very early stages of frog embryonic development. Haskell said the scientists are also beginning to image cell division growth in plant roots.

Single Atom Probes Standing Wave

A probe composed of a single calcium ion has produced one of the most precise measurements of the three-dimensional structure of a light-wave field. Researchers at **Max Planck Institut** in Garching, Germany, isolated the atom in a radio-frequency trap and surrounded it with an optical cavity containing a standing wave with a 397-nm wavelength. The ion, sensitive to radiation with the standing wave's resonant line, fluoresced, and the scientists observed it via a lens and a photomultiplier tube.

They controlled the location of the ion within the standing wave by positioning the cavity mirrors by means of piezoelectric transducers and moving the light field. The resulting measurements of the wave's modes and Hermite-Gauss functions produced spatial resolutions as high as 60 nm.