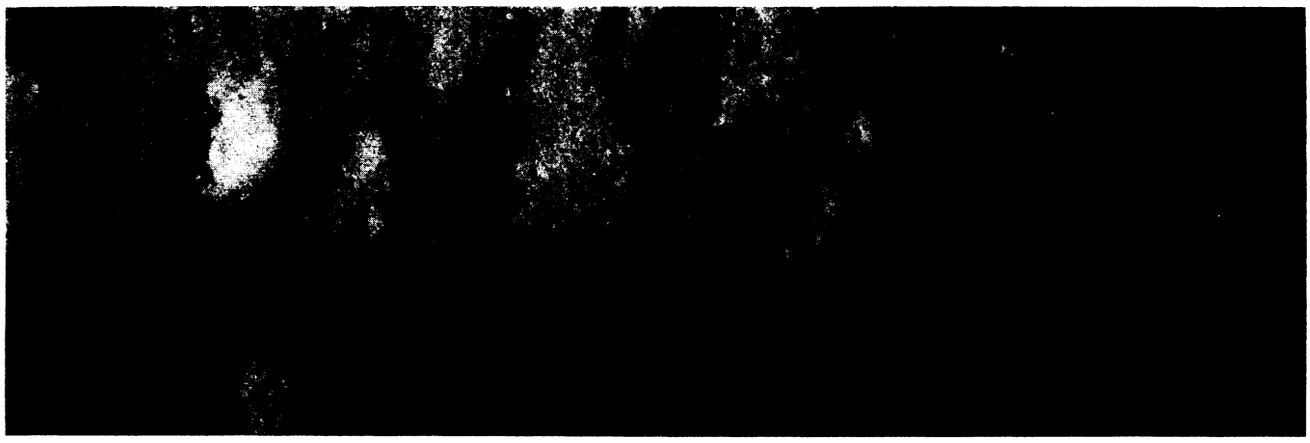

NASA

RANGER MOSAIC—The last five photographs taken from Ranger 7 by the partial-scan camera are shown here superimposed on the final picture taken by the F-a camera (see SNL 86:97, Aug. 15, 1964, front cover). These five, four of which overlap each other, show the increasing detail obtained as Ranger approached the lunar surface. The smallest scan picture, shown separated and to the upper left of the four others, covers about 163 feet of lunar surface on its long side. At original size and with high magnification, the tiny photograph gives lunar details with a resolution of about ten inches.

PHYSICS

Computer Probes Atom

A computer used with a wire spark chamber to study the structure of atoms can record the action of atomic particles and "picture" them on a TV-like screen.

See Front Cover

➤ A POWERFUL COMPUTER is now linked directly with probes of the atom's interior at the University of Chicago.

In the new system, streams of nuclear particles resulting from atomic bombardment in a cyclotron are directed through a wire spark chamber consisting of two sheets of very fine, closely spaced wires. Passage of particles causes a spark to leap between the charged wires.

Information on the particles is then sent through a 12-foot cable to a "core memory," where information is stored for the computer.

The computer, MANIAC III, then sends forth a current to "read" the core memory, just as a tape recorder reads the passage of magnetic information on tape. The computer analyzes the data received and prints a record of the location of each spark on a magnetic tape. It may also send an electrical impulse to a TV-like screen to give the experimenter a direct view of events that occurred a ten-thousandth of a second earlier.

Work on developing an atomic particle detector that could be linked directly to a computer is underway at many laboratories around the world. Such a communications link makes quickly available information that sometimes took days, weeks or even months to obtain through photographic records.

At the European Organization for Nuclear Research, CERN, a 20-ton spark chamber array was used to "see" the paths and interactions of charged particles in a neutrino experiment.

In the CERN spark chamber, shown on this week's front cover, the cosmic ray particles entered from top right and caused interaction at a point about half way through the system. Double track on the lower left is the trail of sparks between successive plates of the chamber, left by the two resulting charged particles.

The University of Chicago system was developed by Richard H. Miller, director of the Institute for Computer Research, with co-workers Michael J. Neumann, Jurgen Bounin and Herrick Sherrard.

Actually, a scientist "sees" a beam of invisible atomic particles only in the same way you "see" a football game on television. In both cases, many electron tubes come between the event and the viewer. Nevertheless, the pattern of electrons hitting the screen tells what is happening.

• Science News Letter, 86:167 Sept. 12, 1964

TECHNOLOGY

Laser Drills Metals, Makes Microscopic Holes

➤ A LASER is now being used to drill holes invisible to the naked eye in metal as hard as tungsten, report scientists at the Radio Corporation of America's aero-space systems division, Burlington, Mass.

Concentrated light from a ruby laser can go through the metal in a millionth of a second and can drill wire holes as small as one ten-thousandth of an inch in diameter. This new laser application could lead to very compact and fast microenergy memory units for computers.

• Science News Letter, 86:167 Sept. 12, 1964

ASTRONOMY

Odd-Ball Quasars May Be Closer Than They Seem

➤ THE ODD-BALL heavenly objects called quasars may be much closer to the earth's own Milky Way galaxy than astronomers have thought.

Quasars, a contraction of "quasi-stellar," are so named because they are much larger than stars but much smaller than galaxies, which contain billions of individual stars like the sun. They have been regarded as the brightest and most distant objects known.

However, they may not be so distant after all. Dr. James Terrell of the Los Alamos Scientific Laboratory, Los Alamos, N. Mex., believes quasars could be within two billion billion miles of earth, a relatively short distance astronomically speaking. This would place them between the Milky Way galaxy and the Andromeda Nebula, which is ten billion billion miles away.

Dr. Terrell's suggestion is based on variations in the light sent out by quasars, which can change in as short a time as one day. The fluctuating light output shows that these objects probably are about the size of the solar system.

If quasars are within two billion billion miles of earth, they are traveling at extremely high speeds. Their tremendous velocity could have been acquired when part of the Milky Way galaxy collapsed due to gravitational attraction, Dr. Terrell suggests.

The red shifts observed for these objects could be the result of their high speeds, he reports in Science, 145:918, 1964.

• Science News Letter, 86:167 Sept. 12, 1964