

## PHYSICS

# Relativity Re-explored

Progress is being made toward a better understanding of relativity after years of neglect. The "quantization" of general relativity is one approach now being studied.

► IF ALBERT EINSTEIN were alive, he would be astounded to know that 45 of the world's top physicists, mathematicians and astronomers would meet for six days in the United States to discuss his theories on gravitation, as they have recently.

Four or five years ago such a meeting would not have been possible. If held, it would have consisted of "three friends talking together," Einstein and his two close associates, Drs. Peter Bergmann of Syracuse University and Valentin Bargmann of Princeton University.

The renewed interest in gravitational theory has developed after many years of neglect due to the lack of experimental guideposts and mathematical difficulties. Both remain troublesome, but much progress has been made toward better understanding of general relativity by considering approximate solutions of the equations.

One approach now being thoroughly studied is the "quantization" of general relativity. This involves treating gravitational radiation not as being continuous but as consisting of tiny packets, much as light, which was once thought continuous radiation, is now known to consist of tiny light packets, or photons.

The scientists struggling with general relativity theory are in much the same position now as were those earlier this century when quantum mechanics was being devised to account for the tiny world of the atom.

Gist of the problem is that one set of laws seems to apply to nuclear particles such as electrons, protons, etc., while another is needed for large objects such as the earth, stars and galaxies.

So far there are only three known proofs for Einstein's general relativity. One is changes in the orbit of the planet Mercury, which observations have shown come very close to what the theory predicts. Another is the bending of light from far-away stars by the sun's gravitational field, which also comes very close to the amount predicted. The third is the displacement, or reddening, of spectral lines from certain very massive stars.

There are, on the other hand, literally thousands of proofs, with more accumulating every day, that the laws of quantum mechanics hold true for minute particles of matter.

Some day scientists may be aided in bridging this gap by using giant computers. That will not be possible, however, until they have figured out the necessary equations.

As one scientist attending the International Conference on the Role of Gravita-

tion in Physics at the University of North Carolina in Chapel Hill said: "If it were tried now, either the mathematician preparing the instructions for the computer would blow out his brains, or the machine itself would blow up."

Science News Letter, February 2, 1957

## INVENTION

## Air Traffic Control Provides Safer Flying

► SAFER FLYING for the nation's countless air travelers is the promise of an automatic air traffic control system that keeps planes on the straight and narrow at all times.

Key to the device's actions is a magnetic memory tape coupled with an electronic computer. They are designed to sit in the cockpit along with a human pilot and an automatic pilot.

This is how the system works. Before flight, a path through the skies is plotted for the pilot. He is also given specific times for being at a specific spot on his flight path. This information is fed into the memory device. The computer then checks the actual flying time and flight path while the air liner is moving and correlates it with the predetermined information given the pilot by the control tower.

If the plane is off its time or path, the computer automatically feeds signals to the autopilot and throttle control, thereby correcting the flight to maintain the plane on course and schedule.

One of the big advantages of the system, its inventor, Thomas M. Ferrill Jr. of Garden City, N. Y., says, is that the position and movement of each aircraft at any given instant can be radio controlled by a tower operator to prevent possible collision.

Science News Letter, February 2, 1957

## MINING

## Discarded Diggings Found Valuable

► DIGGINGS, thrown away as worthless by disgruntled gold miners 20 years ago, are proving to be a storehouse of valuable minerals today.

The water-deposited storehouse of strategic materials has been found in the Pacific Northwest, a report by A. J. Kauffman Jr. and K. D. Baber of the U. S. Bureau of Mines shows.

Chromite is being recovered from alluvial deposits in Oregon. Columbium-tantalite and "radioactive blacks," which are dark sands

containing columbium, tantalum, uranium, thorium and certain rare earths, are being mined in Idaho.

Other minerals present in the alluvial deposits of Oregon, Idaho, Montana and Washington in quantities sufficient for working are ilmenite, a titanium mineral; zircon, source of the new metals zirconium and hafnium; monazite, a source of the rare earth metals and of thorium; magnetite; and garnet.

Development of this new mineral storehouse, the report shows, will depend on markets and milling.

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