

on 705 bubble-chamber events that showed the negative pions coming off, on the average, with more energy. And a Duke University group, with 565 events, found essentially no asymmetry.

The matter of matter-antimatter asymmetry is still up in the air, with feverish activity going on at many laboratories.

The table shows the latest scorecard in the π^+ vs. π^- game.

Shift in the Lamb shift

The Lamb shift in the first excited state of hydrogen is higher than the value found by Willis E. Lamb Jr. and his colleagues in 1953, according to a remeasurement by Richard T. Robiscoe and Barry L. Cosens of Yale University [*Phys. Rev. Letters* 17, 69 (1966)]. The new measurement disagrees even more with current theoretical predictions.

In their 1953 experiments, Lamb, Sol Triebwasser and Edward S. Dayhoff made an indirect measurement of the $P_{3/2}$ - $P_{1/2}$ separation by determining the $P_{1/2}$ - $S_{1/2}$ separation and the $S_{1/2}$ and $P_{3/2}$ separation. Their result for the $P_{1/2}$ - $S_{1/2}$ separation was 1057.77 ± 0.10 MHz. Robiscoe and Cosens, determining the $P_{1/2}$ - $S_{1/2}$ separation by a level-crossing technique, find it to be 1058.05 ± 0.10 ; this is 0.28 ± 0.14 MHz higher than Lamb's value. Lamb, who is also at Yale, together with Marvin Leventhal, Kenneth Lea and S. Kaufman, has also been busy remeasuring the shift. They are redetermining both hydrogen separations, and some separations for singly ionized helium, as well.

Robiscoe and Cosens remark that their higher value implies that α , the fine-structure constant, is higher than the value of $1/137.0388$ currently accepted (if there is no change in the $S_{1/2}$ - $P_{3/2}$ separation determined by Lamb). Vernon Hughes has measured α from the fine structure of the muonium atom, in which a muon and a proton mate, instead of an electron and a proton. His value agreed well with Lamb's. At present the most reliable determinations are from the fine structure.

In principle, the fine-structure constant could best be found from hyperfine structure. However, the theory

of hyperfine structure is in poor shape. The problem is that theorists are not sure how to correct for proton structure. Sidney Drell recently suggested that the present correction for proton structure might be too large. At any rate, Norman Ramsey and Daniel Kleppner did determine α from hyperfine structure, using a hydrogen maser, and found it differed from the fine-structure value by 38 parts in 10^6 .

Over the past twenty years the discrepancy between measurement and prediction of the Lamb shift has worsened. The latest theoretical value, calculated by Maximiliano Soto of Columbia University is 1057.50 ± 0.11 MHz— $0.55 \pm .14$ MHz lower than Robiscoe and Cosens found. The experimenters remark that the "discrepancy may pose some fundamental questions in quantum electrodynamics."

Neutrino spiral—which way?

An experiment to observe the helicity of the neutrino has been proposed by S. G. Ryzhanov in an article in *JETP Letters* (Vol. 3, No. 2, 1 June 1966, page 299 in English, page 457 in Russian). Ryzhanov's suggestion describes a way in which a gedanken-experiment proposed by Jerrold Zacharias, namely observing the rotation of a macrobody covered with material undergoing beta decay, can be realized.

Helicity, the property expressing the neutrino's spin in relation to its direction of motion is important in processes involving (non)conservation of parity. According to theory the sense of spin of neutrinos emitted in beta decay should be the same as the sense of spin for the associated electrons. Ryzhanov proposes to get the neutrino helicity by measuring changes in the rotation of macroscopic droplets induced by the spins of beta electrons entering the droplets.

His method would use a gyroscope developed by the Orlando Division of Martin-Marietta. The instrument consists of a vacuum chamber in which microscopically charged droplets of diameter 2.5 to 250 microns are suspended in an electric field in such a way that they occupy an equilibrium position. Any change in their equilibrium position is registered opti-

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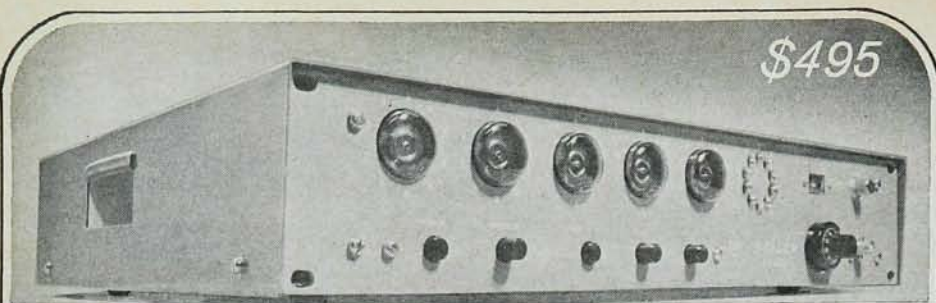
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cally with the result that the gyroscope forms an accelerometer measuring changes of equilibrium position in terms of all three directions of the angular-acceleration vector. Ryzhanov would coat the droplets with radioactive cobalt and measure the change in their rotations produced by absorption of electrons emitted by the coating. He presents a derivation to show that the effect would be large enough for measurement.

Chinese restaurant system

Referees for high-energy theoretical papers are now selected by the Chinese restaurant system. The editors of *Physical Review Letters* select one referee from Group A and one from Group B. The groups were established when one theorist complained that a paper sent to the wrong referee would be automatically rejected. It is still not clear which group any particular theorist belongs to. Perhaps the criterion is simply that first suggested by Richard Feynman: high-energy physicists fall into two categories—either they group or they disperse.

Reactor landmark

The X-10 reactor at Oak Ridge National Laboratory was designated a Registered National Landmark in ceremonies held on 13 Sept. Such status is conferred by the National Park Service on historic sites, objects and buildings as part of a program for their preservation that began in 1935.

The X-10 reactor, which was originally called the "Clinton pile," went into operation on 4 Nov. 1943. Its construction had started on 2 Feb. 1943, two months after Enrico Fermi had demonstrated the world's first successful controlled nuclear chain reaction in his laboratory at the University of Chicago.

X-10's first task was the production of plutonium-239 in gram quantities for use in the nuclear weapons program then under way. After World War II, the reactor became a prime source of commercial radioisotopes, which it continued to supply until the late 1950's. X-10 was retired from service in November 1963. □

SCIENCE RESEARCH COUNCIL THE RUTHERFORD LABORATORY RESEARCH PHYSICISTS

There are vacancies in the Bubble Chamber Research Group of the High Energy Physics Division for post-doctoral physicists with experience of the application of the bubble chamber technique to elementary particle physics research. The group is presently engaged in analyzing photographs from bubble chambers exposed to beams from the C.E.R.N. proton synchrotron and in exposure and analysis of pictures taken in an 80 cm. bubble chamber exposed to beams from the Nimrod 7 GeV proton accelerator. The bulk of the work over the next few years will arise from use of the 150 cm. British National Hydrogen Bubble Chamber in collaboration with university groups to study interactions of K and π mesons from Nimrod with hydrogen and deuterium. This second chamber has operated at C.E.R.N. with great success and is undergoing a programme of improvements before it begins data collection again early in 1967. The Bubble Chamber Research Group contains a Measurements Section with four conventional measuring machines and eight scanning and rough digitising machines, the latter providing output for a flying spot digitiser. The forthcoming installation of an I.B.M. 360/75 computer will ensure a high rate of measurement and analysis.

These appointments will be made for fixed terms of from three to five years, will carry benefits under the F.S.S.U., and will attract salaries in one of the following ranges, according to age and experience:

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or £2,410 to £3,325

Candidates should apply in writing to Mr. G. N. Pickles, The Rutherford Laboratory, Chilton, Didcot, Berks., quoting the Reference A92.