

cay half lives of the nobelium daughters. The group was able to make thousands of the new atoms. The Dubna experimenters had only a few dozen events believed to be fissions of ^{260}No , with an activity of 0.3 sec.

The Berkeley group consisted of Giorso, Matti Nurmia, James Harris, Kari and Pirkko Eskola.

CERN-Serpukhov Collaboration Yields Data on Particle Yields

Results from the first collaboration between Soviet and CERN experimenters at the Serpukhov 76-GeV synchrotron were reported in *Phys. Letters* 29B, 48 (1969). Never before have Western and Soviet scientists collaborated on the same instrument with both groups supplying part of the apparatus.

The measurements give particle yields at the newly attainable Serpukhov energies and will be useful in predicting intensities of secondary particle beams. The measurements also helped to test detectors at high energy.

No new structure was found from long-lived particles with mass up to 2.2 GeV to a level of 10^{-6} times the pion fluxes at 40 and 50 GeV/c. Anti-deuteron production was smaller than 10^{-7} times the pion production.

Indiana U. Builds 200-MeV Sector-Focused Cyclotron

Indiana University is building a 200-MeV open-sector (sector-focused) cyclotron, which will be the largest of its type in the US. The largest open-sector cyclotron in the world will be in Zurich, where a 540-MeV device will be used as a meson factory. The Indiana machine can accelerate other ions to an energy of $240 Q^2/M$ (in MeV), where Q is the charge of the ion and M is mass in a.m.u.

In its initial configuration the facility will have three stages: a dc stage with output energy up to 600 keV, a small cyclotron stage with median-plane injection and an energy gain of about 30, and a final cyclotron stage with an energy gain of 10 (for heavy ions) to 14 (maximal-energy protons).

The small cyclotron, now being constructed at a temporary location, is a 1/3 (linear dimension) model of many aspects of the final stage. The cyclotron stages will have a wide energy

range and will accept a large range of charge-to-mass ratio.

Similar to spiral-ridge cyclotrons, which achieve focusing with spirals, open-sector cyclotrons achieve focusing with magnetic hills and valleys. In the Indiana design, four pie-shaped C magnets are arranged in a ring. The hills and valleys correspond to high field and zero field. Maximal orbit diameter is 6.6 meters. Because the machine has no central region, central-region problems are eliminated. Sector-focused cyclotrons, unlike fm cyclotrons, are cw and give much higher intensity and beam quality than the fm devices.

The building to house the Indiana facility is in final design stages and is expected to be finished in fall, 1970. Then the final cyclotron stage can be assembled. Total cost of the installation is expected to be \$9.6 million.

Redefinition of Temperature, Volt and Gravity Standards

Last fall the International Committee of Weights and Measures met in Sèvres, France, and announced changes in their definitions of the practical temperature scale, the interna-

tional volt and the basic reference for the acceleration due to gravity.

Most of the fixed points on the International Practical Temperature Scale have been assigned new values, and the new scale extends down to 13.8 K, instead of the 90.18-K limit of the 1948 scale. Differences between the 1948 and 1968 scales range from 0.022 kelvins at 173 K to 9 kelvins at 4200 K. Reprints containing details of the new scale are available from the National Bureau of Standards.

The standard volt of the International Bureau of Weights and Measures has been reduced by 11 parts per million, to bring this "practical" volt closer to the volt as defined from the basic mass, length and time units. In the US the change means that the standard volt of the NBS will be reduced by 8.4 parts per million, because the US and international units have drifted apart since the last calibration.

The acceleration due to gravity at Potsdam, taken as the point of departure of the so-called "Potsdam System" of gravity measurements, has been reassessed as 9.81260 m/sec^2 , which represents a decrease of 15 parts per million.

IN BRIEF

A preliminary search for quarks at the Serpukhov 76-GeV synchrotron shows that if the quark has a 5-GeV mass, then its production cross section is less than 10^{-36} or 10^{-37} cm^2 , according to project leader Lansberg.

Very strong evidence for water on Mars has been obtained with spectra from the 82-inch McDonald Observatory telescope, and new observations have begun with the new 107-inch McDonald telescope. Observers were Ronald Schorn and C. B. Farmer (Jet Propulsion Laboratory) and Stephen Little (University of Texas).

The earth sporadically emits low-frequency (below 10 MHz) radio signals, according to observations with the first Radio Astronomy Explorer satellite. Robert Stone (speaking at the spring meeting of the US national committee of the International Union of Radio Science) said that signals from both Earth and Jupiter are sharply beamed, quite intense and occur sporadically.

Infrared observations reported in the

March issue of *Astrophys. J. Letters* by several groups suggest that interstellar grains may be made of silicates, according to Neville J. Woolf and E. P. Ney of the University of Minnesota.

No evidence for an undiscovered chamber in the Pyramid of Chephren, Giza, Egypt, has been found by Luis Alvarez and his collaborators. An array of spark chambers inside the chamber looked for an anomalous variation in cosmic-ray flux. Because the large lower zones on the pyramid's four sides have not yet been scanned, a missing chamber may yet be found.

A huge cloud chamber ($105 \times 105 \times 38 \text{ cm}$) surrounded by a magnet 5.5 meters in diameter will look for cosmic rays at the University of Chicago's High Altitude Cosmic Ray Observatory on Sacramento Peak, New Mexico. The chamber is filled with water vapor, alcohol and argon, and has already recorded 5000-GeV cosmic rays in Chicago tests. It will be used to investigate cosmic-ray secondaries. □