

THE MEETINGS IN MEXICO

By S. A. Korff



The science building of the University of Mexico. Joint meeting of the Mexican Physical Society and the American Physical Society was held last summer in building in the foreground. (Photo by Rollie McKenna)

MEXICO was the scene of three meetings during late August and early September 1955. The first of these was the joint meeting in Mexico City of the American Physical Society and the Sociedad Mexicana de Fisica. The second was the international cosmic-ray conference, the Congreso de Radiacion Cosmica, held at Guanajuato. The third, immediately following this and in the same place, was the meeting of the cosmic-ray component of CSAGI, the Comité Special pour l'Année Geophysique International.

It is obviously impossible to summarize all the important papers or to mention all the names of the participants. For such summaries, the reader may refer to the original programs. We can here only touch on a few of the highlights, and these must inevitably be those selected by the author as seeming interesting and important to him. Everyone who attended will carry away his own impressions, doubtless quite different; and for those who did not attend, this is how the meetings looked through one set of eyes.

THE meeting in Mexico City took place at the University. Those who attended the last meeting will recall many changes, some rather startling. Mexico City itself has grown. Today well over a million people live there. Traffic has increased, and today the jams of automobiles are reminiscent of familiar scenes in New York, Chicago, and San Francisco. The Government has put vast sums into the University. What five years ago was a "desert" of lava and stones is today the University City. Many fine new buildings and auditoria are available, and the meeting did not lack for first-rate space facilities. The social aspects of the meeting have been nicely covered by Mrs. Brode. We shall therefore next mention a few technical matters.

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The meeting ran for three days, from Monday through Wednesday, August 29-31. As usual with a meeting in which the printed program carries 112 contributed papers and 42 invited papers, it was necessary to run several simultaneous sessions. The division into sections followed the usual Physical Society procedure, there being for example sessions devoted to radioactive nuclei, to theoretical physics, and to fluid dynamics. The invited papers likewise were divided into sections according to the topic, and a number of these were drawn up with special reference to this particular meeting. A number of topics of special interest to our Mexican colleagues were discussed, and they in turn gave several papers about their problems. At least two of the American authors gave their papers in Spanish out of compliment to our Mexican hosts, and several of the Mexican contributors gave theirs in English.

The final event was the joint banquet of the two societies, held at the Club Hipico in the city's north-western suburbs. The location was superb, the food excellent, and the after-dinner speeches both short and interesting.

THE Cosmic-Ray Conference was held at Guanajuato, an old city some 250 miles a trifle north of west from Mexico City. The town is roughly half way from Mexico City to Guadalajara, on the high plateau of Central Mexico, and at about a 6000-foot altitude. It is built in a valley near old time silver mines which were rich producers during the colonial epoch. The streets are very narrow, only a few being wide enough for automobiles. At Guanajuato the Government has built a fine new building to house the provincial University. It was here, again in an academic atmosphere, that the conference was held. The subject of cosmic rays normally is schizophrenic, with one group of investigators interested in it as a means of production of high-energy particles, and another group investi-

gating geophysical and astrophysical aspects. The conference had been carefully built around the topic of cosmic rays, their geophysical and astrophysical effects and correlations. This permitted the conference the logical function of completing a job started earlier, as this meeting followed one at Bagneres de Bigorre a couple of years earlier at which the main topic was new and peculiar particles and high-energy physics.

The program started out with a set of papers summarizing what was today known about the primary flux. The speakers included Peters, Gottstein, MacDonald, and Ney. Several papers discussed the Z spectrum in detail. In summary, it was agreed that the primaries are mostly, perhaps, 90 percent (by number) protons, 9 percent alphas, and the rest heavier nuclei. The exact numbers were subject to some difference of opinion, and opinion was still notably divided on the number of primaries in the Li-B-Be group. The effects of the earth's magnetic field were next discussed in a series of papers by Simpson, Brode, Morand, and others. Vallarta's group in Mexico (paper by Gall) had computed a whole set of new orbits in the low-energy ranges. It was agreed that the integral flux at 55° north geomagnetic latitude was about 300 protons per square meter per steradian per second. The conference next passed to a review of the primary energy spectrum, by this being meant the number of particles in each energy interval. At the low part of this spectrum, (papers by Neher, Singer, Winckler, Meyer, and others) interpretations are complicated by albedo considerations. Some experiments were reported in which attempts had been made to evaluate the amount of the albedo effect. It was agreed that the albedo effect is large and that the primary flux is considerably reduced when albedo particles are subtracted out, possibly reducing the flux to 200 protons per square meter per second. The high-energy part of the spectrum manifests itself through giant showers. These were discussed at some length. (Papers by Cocconi, Olbert, Cranshaw, Clark, Hazen, and Greisen.) The highest energy seriously mentioned was 10^{20} electron volts, a figure somewhat higher than had hitherto been given serious thought. However, as was also pointed out, there was as yet not more than sketchy experimental data at the highest energies, and the top two or three orders of magnitude should be accepted with some hesitation. On the other hand, the importance of these high-energy particles from the astrophysical point of view is great, for their curvature in the galactic field is of the order of the thickness of the galaxy and if such energies are indeed confirmed then directional asymmetries are to be expected.

The conference next took up time variations. The papers in this part were by Simpson, Duperier, Chasson, Trefall, Neher, Pomerantz, Sekido, Ehmer, Singer, Elliot, Korff, Forbush, Morrison, Jongen, Brunberg, Sarabhai, Sandstrom, Fenton, Farley, Daudin, Janossy, Cranshaw, Rothwell, Clark, and Williams. As a necessary preliminary it was important to review the procedure for determining meteorological corrections, to which all the newly acquired data must be subjected.

These corrections are complicated and for mesons require complete meteorological data from radiosonde flights throughout the atmosphere, since both ionization and decay losses must be taken into account. Once corrected, the long-period recorders show some interesting fluctuations, with two quite clearly separate kinds of fluctuations. First are those which are clearly of solar origin, which show a marked 27-day recurrence tendency, and which can often be correlated with particular regions of disturbance on the sun. Second are those, usually of longer periods, which show up as world-wide changes, a percent or two in amplitude, observed by Forbush and others over the last twenty years. The existence of a diurnal effect was debated at length. If it exists it certainly is small. The amplitude is of the order of a tenth of a percent, and is hard to distinguish from other effects. In the giant showers this too has been sought. The Daudin group reports no diurnal wave as large as 0.2 percent, but perhaps a sidereal wave of 0.07 percent amplitude with its maximum at 21 hours sidereal time. This, incidentally, would place the maximum at the time when the galactic plane crosses the meridian. Other observers reported no effect within their accuracies, usually of the order of 0.1 percent. The last two days were devoted to a summary of pertinent astronomical evidence. A number of distinguished astronomers were present, including Oort, Van der Hulst, Unsöld, Chandrasekhar, and Kiepenheuer. These observers gave excellent summaries of today's knowledge of interstellar dust and gas, of the general galactic structure, of the evidence for a galactic field, and of other aspects necessary to evaluate a Fermi-type acceleration mechanism. For example, studies of the polarization of light from the Crab nebula show that the dust particles in space are not spherical, and give further support for fields of the order of one to ten microgauss and of great extent. Just such fields are required for the Fermi mechanism. Time and directional asymmetries in the highest energy particles promise to throw much new light on this problem. Injection of particles, a requirement for Fermi-type acceleration, was conceded to be possible by supernovae, by super sunspots on some of the stars recently discovered on which there appear to be great turbulence, and perhaps also by the newly found T Tauri stars. These stars, reported and studied extensively by the Mexican Observatory, appear to be an intermediate type between novae and Cepheids and promise to give us a better understanding of the mechanisms of stellar variability as well as of possible cosmic-ray injection.

FINALLY at the CSAGI meeting, which followed the day after the cosmic-ray conference closed, the standardization of measuring equipment was discussed. It was agreed that a cubical type of meson telescope was to be regarded as standard, and procedures for determining meteorological coefficients for these instruments were agreed upon. Similar standardization of data and corrections for neutron monitors, as well as

standard design features, were adopted. The meeting recognized that two divergent factors must be reconciled. On the one hand many experimenters will wish to make measurements with special instruments to throw light on some one problem. On the other hand, if observations are to be intercompared, procedures for standardizing both the instruments and the data presentation and corrections must be agreed upon. Both points of view were well represented at the meeting, and satisfactory compromises were worked out.

The CSAGI group next considered the problem of narrow-angle telescopes. It was felt that these should not be standardized, since there seemed to be a good deal of difference of opinion as to what angle should be chosen. The CSAGI agreed upon a set of standard data sheets for reporting both the cubical meson data and the neutron readings. Next considered was the problem of station distribution. Several new stations were recommended, to be so located as to supplement the world distribution and to fill in the hitherto vacant spots. These include a French station to be operated on Kergeulen Island, which is one of the subantarctic islands in the southern Indian Ocean, as well as balloon launching facilities in Bangui, in French Equatorial Africa, and rocket facilities in Colomb Bechar in Al-

geria. Next the satellite program was discussed. The meeting felt that if the satellite were to describe pole-to-pole orbits, then a counter would be able to determine the latitude effect at an altitude free from atmospheric effects, and so would give a good determination of the primary spectrum. Further, since the plane of such orbits would rotate with respect to any given longitude line, the longitude effect would also be included in the determination. For a publication program the meeting agreed that, in principle, publication of data as fast as it was accumulated was desirable, but that in order to relieve the pressure upon an individual to interrupt work in order to publish, it was agreed that a reasonable interval might ensue. Further, it was agreed that all data should be ready for publication within one year after the conclusion of the International Geophysical Year.

Finally, both the cosmic-ray meeting and the CSAGI group passed votes of thanks to the Mexican Government, to the State of Guanajuato and to its Governor. Especial thanks from all were expressed to Professor Manuel Sandoval Vallarta, who had been the chief "spark plug" in producing, organizing, and operating the most successful and enjoyable meetings of their kind which any of us had ever attended.



A view of the campus of the University of Mexico in Mexico City. (Photo by McKenna)

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By Bernice Brode

THERE were two conferences held in Mexico this late summer, 1955. The first was the *Asamblea Conjunta de la American Physical Society y de la Sociedad Mexicana de Fisica*, in Mexico City for three days in the last of August, and the second was the *Congreso Internacional de Radiacion Cosmica*, in Guanajuato and lasting about 10 days. There was a long week end in between the two meetings.

Several families had taken advantage of the air family plan to fly down the Wednesday before, including the Honorable President of the American Physical Society, Prof. Raymond T. Birge and Mrs. Birge. The

plane also carried Prof. and Mrs. William Fretter and the writer and son. We were served Mexican beer (cerveza) and tequila on the plane, and tried out our Spanish on the stewardess, both of which helped to put us in the proper frame of mind for our visit. There was much thunder and lightning after we flew over the border, which prompted our President to display his calculated statistics on the rainfall in Mexico at that time of year. He was armed with these his entire stay, while most of us were satisfied with umbrellas.

It was after midnight when we arrived at the airport of Mexico City, with its new modernistic building, far superior to the international airport we had left 7 hours before at Los Angeles. Los Angeles had better look to its laurels. Mr. Brode was there to meet us, having

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