after one sphere penetrates the surface of the other. So we may be seeing the interaction circle of two spheres of gas, foreshortened to an ellipse that appears as two point sources with less intense connecting lines.

These, and many other such explanations, are considered by Shapiro to be somewhat contrived, and they have been put forward merely to avoid the obvious conclusion—that 3C 279 is not nearly as far away as its red-shift suggests.

Distant quasars? Meanwhile James E. Gunn at the Hale Observatories has found a quasar that appears to be unequivocally at the cosmological distance suggested by a red-shift of 0.32. He describes[2] two quasars whose images in the telescope are superimposed on the images of small, compact clusters of galaxies, and which appear to have the same red-shift as galaxies in the relevant cluster.

The most convincing case is made out for quasar PKS (for "Parkes") 2251 + 11, a quasar in Pegasus with a red-shift of 0.323. Gunn measured the red-shift of a galaxy in the cluster associated (in the telescope field) with this quasar as 0.33 ± 0.01. If quasars are actually local objects, the appearance of this one in the same line-of-sight as the cluster is just a coincidence; Gunn believes that this coincidence, together with a coincidental agreement between the two red-shifts, is too much to swallow.

Another observation points to a physical relationship between this quasar and the cluster; the intensity of the Balmer lines in one of the galaxies shows most of its hydrogen to be ionized. An obvious candidate for the source of ionizing radiation is the quasar, supposing of course that it is part of the galaxy cluster.

One way of rationalizing these two new and opposing observations is to postulate that the class of objects we have been calling "quasars" involves two very different kinds of phenomena. One kind, exemplified by 3C 279, is a comparatively local set of objects with anomalously high red-shifts, while the other kind, including PKS 2251 + 11, are very distant objects with the red-shifts to be expected from their recession velocity. Shapiro points out, however, that this is not an "explanation" of the observations; it merely begs the question. No other evidence points to any such difference between quasars. —JTS

References

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Latest work on the A_2 meson sees no split

Interest ran high at the special session on the A_2 meson, held at the Washington APS meeting. Many of those who crowded into the room hoped that a new experiment designed to duplicate the original CERN experiment would at last settle the question of whether or not the A_2 is split, that is, does it exist as two identical particles differing only in mass by 3%?

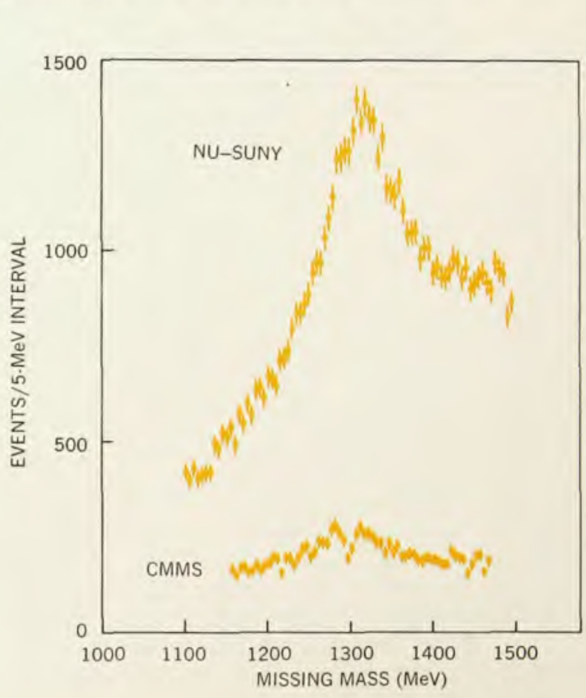
Bernard Gottschalk, reporting on the new experiment performed by a collaboration between Northeastern University and the State University of New York at Stony Brook, said that his group finds no split in the A_2. He noted that their experiment is almost an exact duplicate of the original CERN experiments performed by the missing-mass spectrometer group there. The collaboration members are David Bowen, David Earles, William Faissler, David Garelick, Marvin Gettner, Michael Glaubman, Bernard Gottschalk, G. Lutz, J. Moromisato, Edward Shibata, Y. W. Tang and Eberhard von Goeler (Northeastern), H. R. Blieden, Guido Finocchiaro, Janos Kirz and R. Thun (Stony Brook).

The CERN missing-mass spectrometer group used the reaction $\pi^- + p \rightarrow A_2^- + p$, measuring the momentum and angle of the recoil proton to obtain the mass of the A_2. They also required that some number of charged particles be detected from the decay of the A_2. One experiment was done with 6-GeV pions and another with 7-GeV pions. For the 7-GeV measurements the estimated resolution was 16 ± 3 MeV. For the two experiments the missing-mass group had about 2000 A_2 mesons.

To determine the A_2 mass resolution accurately, the Northeastern–Stony Brook experimenters studied elastic events, detecting the recoil proton and the scattered pion. They found that at 7 GeV they had a resolution of 21 ± 1 MeV and at 5 GeV a resolution of 16 ± 1 MeV. At 7 GeV they measured 15 000 events. To see if there was a difference between A_2^- and A_2^+, the experimenters did measurements with 5-GeV negative pions (25 000 A_2's) and 5-GeV positive pions (20 000 A_2's). In none of the three experiments did the group find any structure in the A_2. The experimenters find that the A_2 shape is adequately described by the usual simple Breit–Wigner fit and cannot be fit by a dipole mass formula.

Other recently performed measurements were described by S. J. Lindenbaum who discussed a Brookhaven experiment and by P. Weilhammer who told of a collaboration between CERN and the Max Planck Institute in Munich (*physics today*, April, page 18). Both of these experiments looked only at those A_2 mesons that subsequently decayed into K^0 and K^-, a mode that occurs about 10% of the time; the energy range was higher, too—20 GeV at Brookhaven and 17 GeV at CERN. Both of these experiments directly confirmed that the K^0K^- mode of the A_2 had spin 2, positive space parity and negative G parity, which are the quantum numbers associated with the A_2. Neither experiment found any split in the A_2.

The puzzle still remains, though. Why did the CERN missing-mass group and other experimenters see a split and the recent experiments see none? —GBL



Mass spectra of A_2^- meson found at an incident energy of 7 GeV by the CERN Missing-Mass Spectrometer (CMMS) and Northeastern–Stony Brook (NU–SUNY) groups. Data have not been corrected for detection efficiency or number of incident pions, which accounts for difference in shape and size of peaks. Note dip in CMMS at 1300 MeV.