

Macro Meets Micro

Scientific specialists in the world of the very small and the very large met in Philadelphia last week to discuss what they have in common and how they might use each other's discoveries.

It was quickly obvious that the one thing both groups share is a penchant for bold hypothesis based on scanty evidence. In probing into areas where human observation is dramatically limited, both astrophysicists and particle physicists are unable to follow a cut-and-dried process of careful deduction from all the facts, since most of the facts are unobservable. They have to make educated guesses and fill in the blanks as they can.

Some of the evidence collected by one group of physicists could be used by the other in filling observational blanks, the members of the colloquium concluded. However, they have first to know each other better; this was the purpose of the meeting.

Typical of the general opinion was the advice of theoretical physicist Dr. Murray Gell-Mann, of the California Institute of Technology, who said that astrophysicists should use the discoveries of particle physics of the past 30 years when they hypothesize about the origin of the universe.

Dr. Gell-Mann specified the question of antimatter as one which has not been studied carefully enough. Astrophysicists have hypothesized that there exist galaxies of antimatter which would explode if they came in contact with material worlds, but they haven't used the actual experience which particle physicists have had with the creation and annihilation of antimatter particles.

The large number of transient particles which have been discovered in the last few years should also be taken into account when theories of star formation and the early history of the universe are developed, according to Dr. Gell-Mann. These transient particles, called hyperons, are more likely to occur when material is highly condensed. Such condensation took place in one stage of the creation of the universe, according to some current cosmological theories.

Another speaker at the colloquium, which was sponsored by Temple University and the National Aeronautics and Space Administration, was Dr. Robert H. Dicke of Princeton. Dr. Dicke created a sensation at a meeting of the American Physical Society a week earlier by reporting work which cast in doubt part of Einstein's general

relativity theory. (SN: 2/11; p. 144).

In Philadelphia, Dr. Dicke defended his experimental technique, which involved measuring the shape of the sun and calculating its effect on the orbit of Mercury, but he declined to state flatly that Einstein had been proven wrong. He said that recent radar measurements of other planets might change the values he had used in his calculations.

Dr. Gell-Mann suggested that the question of the sun's shape could be settled directly if NASA would send a probe into orbit around the sun. Dr. Dicke, who has agitated for such a project in the past, agreed.



Dr. Murray Gell-Mann

Liveliest discussion of the day-long conference took place over the question of entropy, which is a physicist's measure of how much the universe has run down. Commenting on the compression-expansion theory of the formation of the universe which had been presented by Dr. E. L. Schücking of the University of Texas, Dr. Gell-Mann suggested that the concept of ever-increasing entropy might not apply universally. Dr. Schücking disagreed, claiming that his model implied no such thing. He was seconded by Dr. E. P. Wigner, Nobel Prize-winning nuclear physicist from Princeton, who jocularly termed Dr. Gell-Mann's idea "heresy." Dr. Gell-Mann replied that one reason he doubted the entropy theory was that it was featured in beginning physics texts, which, he said, are always wrong.

Foundation, Yes and No

A proposed foundation for the social sciences is almost—but not quite—receiving endorsement by the Administration.

The question is not whether expanded research in the social sciences is urgently needed. Administration spokesmen agree that much is clear. As Secretary of Labor Willard Wirtz pointed out to the Senate Subcommittee on Government Research last week, "present social science research falls so far short of its potential and of the imperative necessity for its infinitely larger development that there are scarcely forms adequate for expression—or comprehension."

The public is about as sophisticated in its thinking toward the social sciences now as it was toward the physical sciences years ago when "people insisted that everyone could see the sun 'comes up' in the morning and 'goes down' at night," said Secretary Wirtz.

In addition, the Defense Department pours some \$10 million into social science research overseas—10 times as much as the State Department. Advocates would like to remove the social sciences from the umbrella of "intellectual colonialism" or "academic spying" the defense link stimulates.

Some form of civilian government support of research is clearly in the wind. The ticklish question is whether to deepen the commitment of the National Science Foundation in this area—as the Administration seems to wish—or set up a separate foundation—as Senator Fred R. Harris (D-Okla.) and 18 other Senators have proposed.

Historically, the NSF has been oriented almost exclusively toward the hard sciences devoting 90 percent of its budget to these disciplines. But the Foundation argues it has lately begun to move more heavily in the social sciences and that a new foundation would disrupt the growing unity of all the sciences and cause research to overlap.

But, short of directly endorsing Senator Harris's proposal, Administration witnesses did question whether the Foundation can change enough to bring imagination into social science research.

A separate foundation would be more responsive to the "normative" or "humanistic" elements of social science than could a foundation strongly oriented toward the more precise sciences, said Thomas L. Hughes, director of the State Departments Bureau of Intelligence and Research.