

# The Month at Caltech

## *Jupiter's radiation belt*

Radio astronomers at Caltech's Radio Observatory in Owens Valley have discovered the existence of a Van Allen radiation belt on the planet Jupiter. The belt is about 200,000 miles above the surface of the planet. Jupiter is about 85,000 miles in diameter.

The belt was detected from the unexpectedly high radio emission at a wavelength of 10 centimeters (3.9 inches), first noticed by scientists at the Naval Research Laboratory in Washington, D.C., two years ago. Their findings were confirmed last year at other short wavelengths both at Caltech and at the National Radio Observatory. The Van Allen type belt

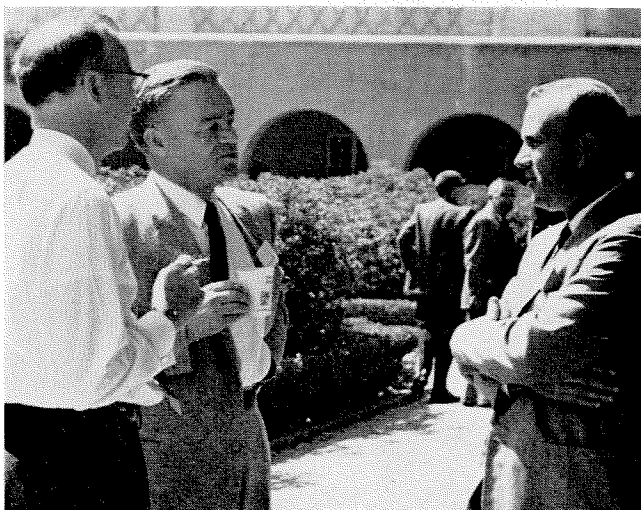
was suggested as a possible origin. The Caltech radio astronomers have now established almost conclusively that the belt exists.

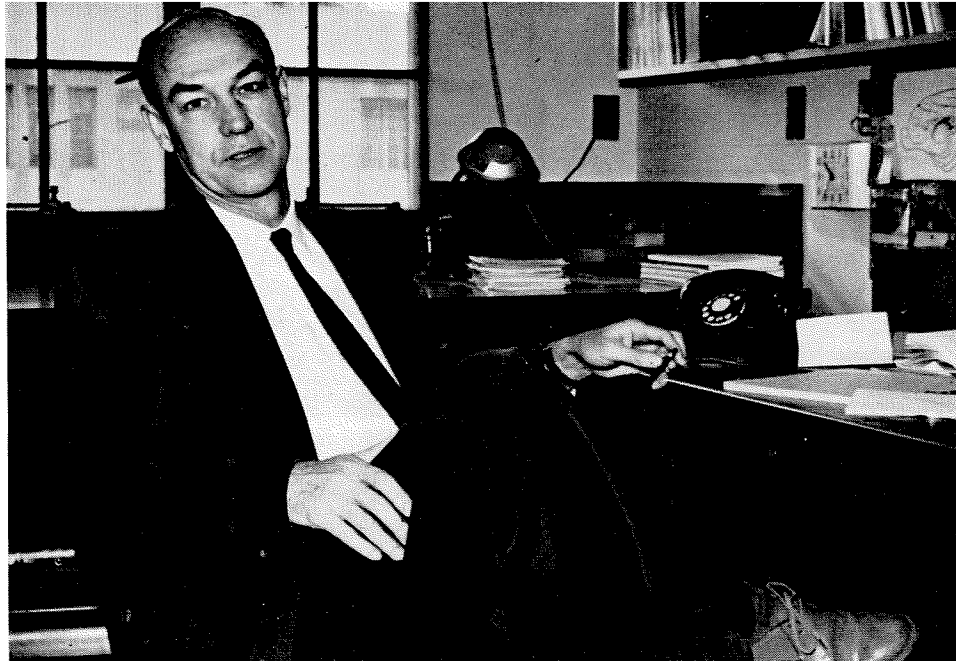
The finding is due to the fact that high speed electrons trapped in Jupiter's magnetic field emit radio waves as they spin back and forth along the lines of magnetic force in a synchrotron mechanism. In trying to prove the existence of a belt, radio astronomers try to detect linear polarization of the radio emission and its region. Like light waves, radio waves may be polarized. In one experiment, this type of polarization has been detected, which indicates the presence of a magnetic field on Jupiter with its axis almost parallel to the planet's rotation axis — as in the earth's mag-

## SEMINAR DAY

*More than 1,050 alumni, wives and guests came to the Caltech campus for the 23rd Annual Alumni Seminar on May 7. Thirteen lectures and a series of special exhibits were featured on this year's program.*

*At right, alumni exchange vital statistics between Seminar talks. Below, lecturers take a coffee break — Horace Gilbert (left center), professor of business economics; Kent Clark (right), associate professor of English.*





*Roger W. Sperry,  
Hixon professor of  
psychobiology.*

netic field. In a second experiment the diameter of the source of radiation has been measured. This indicates that, in a direction parallel to the planet's equator, the radio source is between 400,000 and 500,000 miles across.

Calculations show that the radio energy from the Jupiter belt is 100 trillion times that expected from the earth's Van Allen belt. This makes Jupiter's belt even more hazardous to space travel than the earth's.

Work at the Caltech Radio Observatory is supported by the Office of Naval Research.

### *National Academy of Sciences*

Four Caltech professors were elected members of the National Academy of Sciences last month — Norman R. Davidson, professor of chemistry; Murray Gell-Mann, professor of theoretical physics; Roger W. Sperry, Hixon professor of psychobiology; and Olin C. Wilson, staff member of the Mt. Wilson and Palomar Observatories.

Election to the Academy, one of the highest scientific honors in the nation, is in recognition of outstanding achievement in scientific research, and membership is limited to 500 American citizens and 50 foreign associates. There are now 36 Caltech staff members in the Academy.

Dr. Davidson received his BS from the University of Chicago in 1937, his BSc from Oxford in 1938, and his PhD from the University of Chicago in 1941. He was a member of the staff of the uranium separation project at Columbia University during the war and later joined the plutonium project at the University of Chicago. He has been on the Caltech faculty since 1946.

Dr. Davidson's principal research interest during the past 10 years has been the study of the rates of very fast reactions. He has pioneered in the development of two new techniques in this field. In both of these techniques, a system at rest is rapidly disturbed

by a pulse of energy. The chemical reactions initiated by the disturbance can then be observed by rapid photoelectric observations. He has also been active in the study of the physical-chemical properties of the nucleic acids — the giant molecules that transmit hereditary information from generation to generation.

Dr. Gell-Mann received his BS from Yale University in 1948, and two years later (at the age of 21) received his PhD from the Massachusetts Institute of Technology. He came to Caltech as associate professor in 1955. His main field of study is nuclear physics, in particular the study of the lifetimes, decay modes and other properties of sub-atomic particles. Dr. Gell-Mann is presently on a year's leave from Caltech.



*Murray Gell-Mann, professor of theoretical physics.*

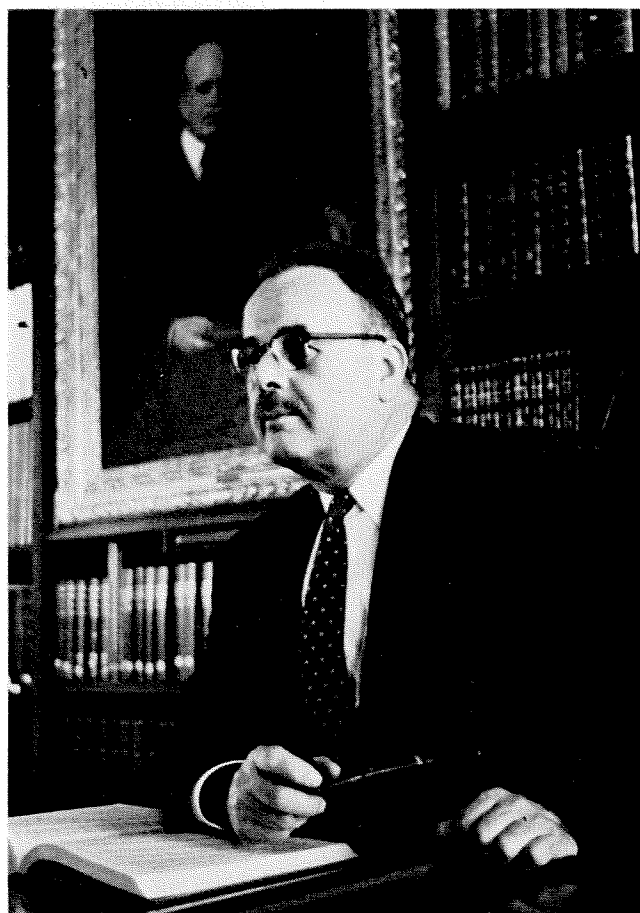
serving as visiting professor of theoretical physics at the University of Paris on a senior postdoctoral National Science Foundation Fellowship.

Dr. Sperry received his BA in 1935 and his MA in 1937 from Oberlin College, and his PhD from the University of Chicago in 1941. He came to Caltech in 1954 as Hixon professor of psychobiology. He has been outstandingly successful in applying a combination of surgical, anatomical, and neurological techniques to the solution of some of the basic problems of the neural mechanisms of animal behavior and their coordination.

Dr. Wilson, a graduate of the University of California in Berkeley, received his PhD from Caltech in 1934. He has been a member of the Mt. Wilson and Palomar staff since 1931. Dr. Wilson has developed spectroscopic techniques that have enabled him to study the internal motions of the planetary nebulae and – in collaboration with Dr. Guido Munch, Caltech professor of astronomy – to map the motions of the gases over a large part of the brighter areas of the Orion Nebula. Dr. Wilson's observations of more than 250 stars has enabled him to construct a color-magnitude diagram for late-type stars near the sun. He has developed a method for determining the absolute brightness of stars from the width of the H and K emission lines in late-type stars. This method is powerful enough to get determinations of the luminosities and therefore the distances of these stars.

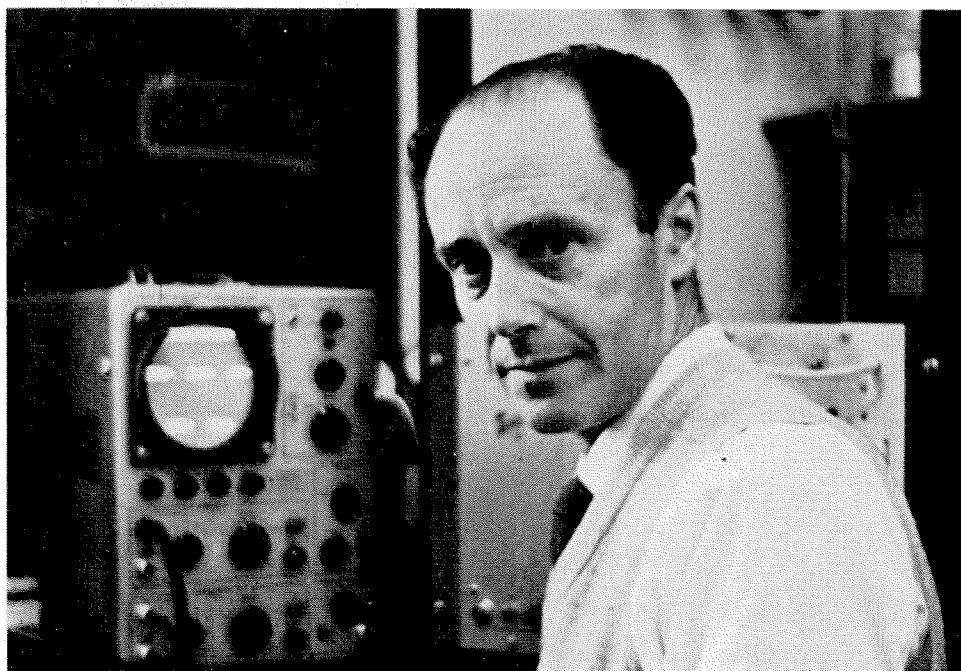
### *Guggenheim Fellowships*

Three Caltech professors have been selected to receive 1960 Guggenheim Fellowship Awards – Richard M. Badger, professor of chemistry; William A. Baum, staff member of the Mount Wilson and Palomar Observatories; and Paco A. Lagerstrom professor of aeronautics.



*Olin C. Wilson, staff member, Mt. Wilson and Palomar Observatories.*

The Guggenheim Foundation was established in 1925 by the late Simon Guggenheim, U.S. Senator from Colorado. The awards are designed to aid scholars to advance themselves to higher levels of accomplishment through research. The 1960 awards are the 36th annual series; this year \$1,400,000 was



*Norman R. Davidson,  
professor of chemistry.*

## The Month . . . *continued*

granted to 303 scholars and artists throughout the nation.

Dr. Badger will use part of the grant to visit a number of laboratories in Canada and the eastern part of the United States. The remainder of his grant will be used in research on the structure of molecules by infrared spectroscopy at Caltech. Dr. Badger received his BS in 1921 and his PhD in 1924 from Caltech. He has been a member of the Caltech faculty for 36 years.

Dr. Baum plans to participate in studies of the development of photoelectric image tubes for use in astronomy at the Imperial College of Science and Technology in London. Investigators there are trying to find a method of exceeding the sensitivity of the photo emulsions currently used in telescopes. A graduate of the University of Rochester, Dr. Baum received his MS in 1945 and his PhD in 1950 from Caltech. He has been on the Mt. Wilson and Palomar Observatories staff since 1950.

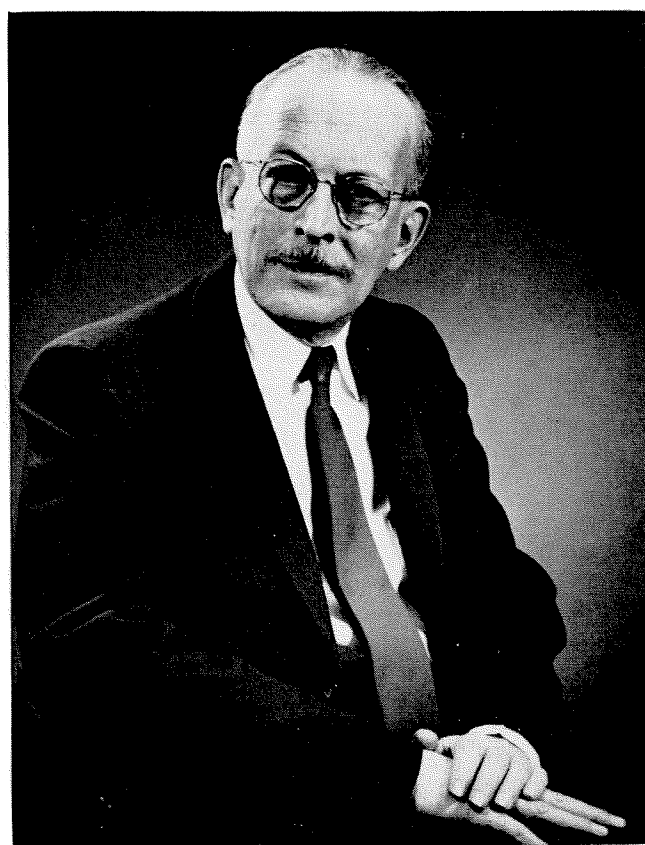
Dr. Lagerstrom will spend a year at the University of Paris as a visiting professor. He will give a course in mathematical fluid dynamics and will also conduct research in this field with advanced students. Dr. Lagerstrom is a graduate of the University of Stockholm. He received his PhD from Princeton University in 1942, and has been at Caltech since 1946.



*William A. Baum, staff member, Mt. Wilson and Palomar Observatories.*



*Paco A. Lagerstrom, professor of aeronautics.*



*Richard M. Badger, professor of chemistry.*