

## PHYSICS

# Theory for Cosmic Rays

► A NEW THEORY for the origin of cosmic rays was reported to the American Physical Society meeting in New York by the late Dr. W. F. G. Swann, emeritus director of Bartol Research Foundation, Swarthmore, Pa., only three days before he died of cerebral hemorrhage on Jan. 29.

Essentially, his idea was that a very small portion of a mass of gas shot out from the sun or another star steals energy from the rest of the gas and stores it as magnetic energy. This gives a very small percentage of the total particles in the gas mass energies sufficiently high to rank as cosmic ray particles.

The entire process takes only a few seconds or minutes, and applies even more to stars more active than the sun, Dr. Swann had told SCIENCE SERVICE. The stolen energy hoarded by the gas mass is acquired from the magnetic field of the star, such as found with spots on the sun.

Dr. Swann had likened this process to distributing a large amount of money among a large number of persons: no one individual would receive very much. If, however, a small group of persons formed a big company that controlled large amounts of money, then later decided to dissolve the group, each member of the group would have a large amount of money.

The magnetic field is the bank from which a small part of the gas mass steals

the energy needed to give its particles the high cosmic ray energy. The energy of the magnetic field comes originally from the agency responsible for the ejection of the gas from the star. Work must be done in shooting the gas out of the star because the influence of the star's magnetic field is such as to oppose the motion of the gas mass. This work comes from the kinetic energy, or energy of motion, of the large amounts of matter in the star.

Dr. Swann had studied the hypothetical case of a ring of gas having a radius of about 6,000 miles, one half again as big as that of earth, and a radius of cross section of 600 miles, the ring containing about 40,000 particles per square inch. He calculated the energy the ring steals and stores in the form of a magnetic field, if such a ring is shot out from a star where the magnetic field is a thousand gauss.

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# Continuous Ruby Maser

► THE FIRST ruby optical maser to operate continuously was described to the American Physical Society meeting in New York.

The tiny device, only one inch long, is trumpet-shaped. It can concentrate the light from a mercury vapor lamp into a tiny

When the ring has subsequently expanded to infinity, that energy, if equally divided among the individual particles, is sufficient to provide about a thousand billion electron volts for each. Such energy is the amount associated with cosmic rays.

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## OPHTHALMOLOGY

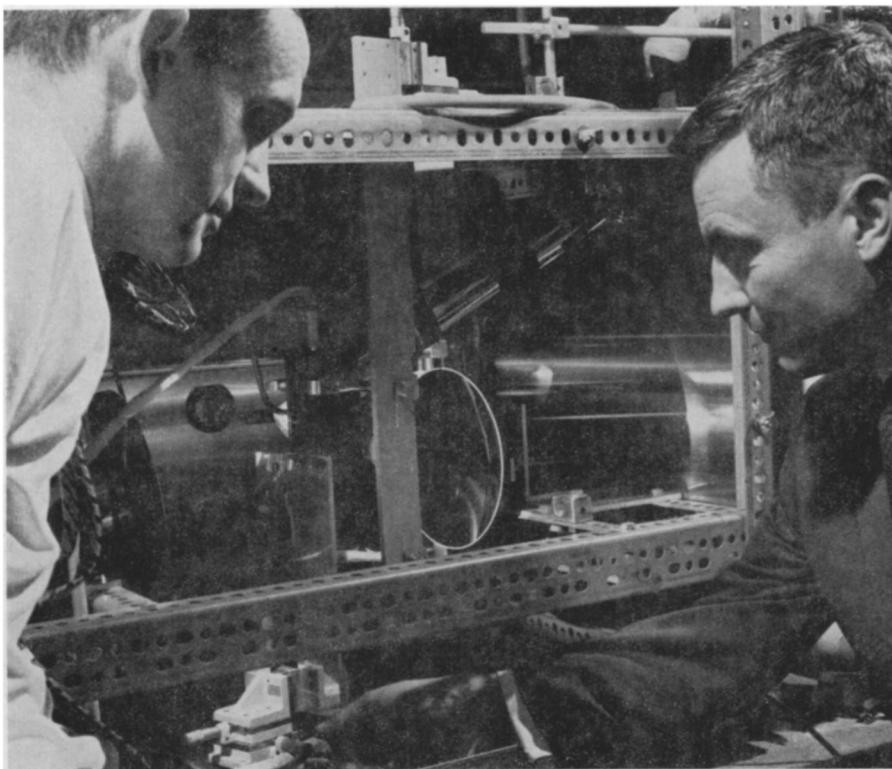
## No Age Limit Set for Wearing Contact Lenses

► EIGHTY-YEAR-OLDS can wear contact lenses as well as persons in their 30's.

After cataract operations, for example, a contact lens may be used on the operated eye and worn with conventional glasses.

"The patients' age seems to have very little bearing on their ability to use a contact lens satisfactorily," Dr. Julian N. Dow of the Good Samaritan Hospital, Beverly Hills, Calif., said at the Los Angeles sectional meeting of the American College of Surgeons.

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**EXAMINING MASER**—Drs. Donald F. Nelson and Willard S. Boyle, who developed the continuously operating ruby maser, examine the apparatus which pumps light to one end of a trumpet-shaped crystal. Pumping intensity is increased five times with this arrangement.

spot of visible red light that is not only many times more intense than it was originally but also is of a single, extremely pure color.

By concentrating light several million times more than a flashlight does, optical masers are predicted that will map the moon, serve as radar, be used for communications in space as well as on earth, act as a surgeon's scalpel, and, possibly, even serve as that seeming impossibility of warfare, a death ray.

The trumpet-shaped crystal that is the heart of the continuously operating optical maser is made of two parts. The conical portion where the mercury light is gathered and focused is of sapphire. The other end, where maser action takes place, is of ruby. The crystal is grown as one unit, then cut into the desired trumpet shape, Drs. Donald F. Nelson and Willard S. Boyle of Bell Telephone Laboratories, Murray Hill, N. J., reported.

Other optical masers have operated continuously, the first one using helium and neon gas. Bell Telephone scientists also reported at the meeting that they had made a continuously operating maser using calcium fluoride and trivalent uranium atoms. Maser have also been made with neodymium.

The ruby maser, however, has the advantage not only of being more readily available and easier to handle but of being more efficient. It also gives off a light that is visible, whereas most other masers emit infrared light.

The trumpet-shaped ruby maser is cooled to 345 degrees below zero Fahrenheit and at that temperature it emits light of 6,934 angstroms. Ruby masers also operate at room temperature, emitting a light of 6,943 angstroms.

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