# physical sciences

NUCLEAR PHYSICS

## Lifetime of neptunium

The lifetime of the nucleus of neptunium is only $10^{-17}$ seconds. Until recently that was 1,000 times too short to be measured directly by any technique in use. A new technique developed by Drs. W. M. Gibson of Bell Telephone Laboratories and K. O. Nielson of Aarhus University in Denmark has enabled the lifetime of the neptunium nucleus to be directly measured.

In the experiment, neptunium nuclei are formed by bombarding a single crystal of uranium oxide with protons. Because of the impact the neptunium will recoil.

Neptunium nuclei disintegrate very quickly by nuclear fission. Some of them disintegrate before they have had a chance to recoil, others after they have recoiled some distance.

When the nuclei disintegrate, fission fragments fly in all directions. In the experiments a plastic sheet is placed about a foot from the uranium oxide crystal to record the fission fragments. If a neptunium nucleus disintegrates before it recoils some of its fission fragments will be blocked by the other atoms in the row in which it stands and those fragments will not reach the plastic sheet. Fission fragments from the nucleus that has recoiled some distance will not undergo any blocking and all of them should reach the protecting sheet. The experimenters can calculate the average recoil distance by comparing detector patterns that show partial blocking with those that do not show it. From this they can calculate the recoil time.

X-RAY ASTRONOMY

## Galactic background

X-ray observations show that there is a diffuse background of X-rays coming from all directions in the sky. If observers look near the plane of the Milky Way galaxy, the brightness of this background is greater than elsewhere. The increase in brightness is taken by some as an indication that some source within the galaxy is adding to the diffuse X-rays that come from outside.

Dr. N. C. Wickramasinghe of the Institute of Theoretical Astronomy at Cambridge, England, argues that this need not be so. He points out that astronomers see a diffuse background of light in the Milky Way galaxy and they attribute this diffuse light to starlight scattered by interstellar dust. Dr. Wickramasinghe argues that the interstellar dust similarly can scatter diffuse X-rays coming into the galaxy from outside and produce the increase in brightness in the galactic plane. In the July 18 NATURE he presents a mathematical derivation to show that the dust is capable of scattering the X-rays as he suggests.

OBSERVATORIES

## Mauna Kea opened

The new Mauna Kea Observatory of the University of Hawaii has been completed and dedication ceremonies have been held. Standing at an altitude of 13,780 feet on the island of Hawaii, the new observatory is the highest in the world. Its major instrument is an 88-inch reflecting telescope that cost $3 million to build. The observatory was financed by the State of Hawaii for the university with assistance from the National Aeronautics and Space Administration and the National Science Foundation. At least 25 percent of the observing time will be devoted to problems of interest to NASA.

At this altitude seeing conditions are excellent, and one of the purposes of the new large telescope is to gain detailed views of the planets and their satellites. The telescope was designed by Charles W. Jones Engineering Co. and Rochlin & Baran & Associates of Los Angeles.

PULSARS

## Optical search fruitless

Since the discovery of pulsars in 1968 several dozen have been identified, but only one, NP 0532 of the Crab nebula, has a pulsing optical counterpart. Two of the men who discovered the optical counterpart of NP 0532, Drs. W. J. Cocke and F. J. Disney of the Steward Observatory of the University of Arizona in Tucson, have made a search for optical counterparts of the pulsars CP 0328 and CP 0950.

They chose CP 0328 because it has one of the narrowest radio pulses on record, and a similarly narrow optical pulse, if one existed, would be easiest to detect with their equipment. They chose CP 0950 because its radio signal is subject to very little dispersion by charged particles in interstellar space, and this circumstance argues that CP 0950 is very near the solar system. If that is true, then a very faint optical counterpart would be easier to observe than if the pulsar were very distant.

No positive evidence of an optical counterpart was found for either pulsar, Drs. Cocke and Disney report in ASTROPHYSICAL JOURNAL LETTERS for June, and they conclude that if those pulsars have optical counterparts, the counterpart of CP 0328 must be fainter than magnitude 25.5 and that of CP 0950 must be fainter than magnitude 24.5.

MOLECULAR ASTRONOMY

## No formic acid

Among the substances found in interstellar space hydrogen, carbon and oxygen are particularly abundant, and astronomers studying the chemistry of interstellar space are searching the interstellar dust clouds particularly for compounds of those elements. One such is formic acid ($H_2{}^{12}C^{16}O_2$). Drs. M. Cato, T. Cato, P. Landgren and A. Sume of the Onsala Space Observatory of the Chalmers University of Technology in Sweden have made a search for formic acid and report in ASTROPHYSICAL JOURNAL LETTERS for June that they have been unable to find it in any of the directions they have looked.

They used the 84-foot antenna of the Onsala Space Observatory to search in the directions of the radio sources W3, W51, NGC 2024, DR 21 and Sgr B2. They were looking for absorption of radio waves by formic acid at a frequency of 1638.806 megahertz. Formaldehyde, a compound related to formic acid, has been seen in all of the sources examined by the Onsala group. Therefore, they hoped that formic acid might show up in these clouds, but in none of these cases did they find any.