

physical sciences

PLANETARY ASTRONOMY

New diameter for Neptune

Neptune, the second most distant planet from the sun—at 2,791 million miles—rarely passes directly in front of a star. However, it did occult the star known only as B.D. minus $17^{\circ} 4388$ on April 7, and astronomers took advantage of the event to make a new measurement of the planet's diameter.

The two existing principal figures are those of E. E. Barnard in 1899-1900 (52,900 kilometers) and of Henri Camichel in 1953 (45,000 kilometers). This year's photoelectric observations of the times of appearance and reappearance of the star were made at five observatories in Australia, New Zealand and Japan.

From them, Dr. Gordon E. Taylor of the Royal Greenwich Observatory, Herstmonceux Castle in Sussex, England, calculates in the Aug. 3 NATURE that Neptune's diameter is 50,000 kilometers.

OPTICS

Variable laser light in visible range

A tunable laser that produces visible coherent light at varying wavelengths has been developed by Stanford University scientists.

The device is called a continuous parametric oscillator. Pulsed parametric oscillators have been demonstrated at Bell Telephone Laboratories and the University of Moscow, as have continuous ones in the infrared at Bell Labs.

A vital element in the Stanford development was the use of an unusually pure lithium niobate crystal. The beam from an argon gas laser is directed at this crystal, 1.65 centimeters long, changing its intense green light into visible red light.

The wavelength of the red light can be varied by changing the temperature of the crystal, which is mounted in an open-ended oven. Temperatures of 374 to 427 degrees F. will vary the wavelength within a range of 300 angstroms. This range could be extended by using a broad-band coating on the reflecting mirrors, according to project leader Dr. Stephen E. Harris.

SOLAR ASTRONOMY

Calcium in the solar chromosphere

An important problem in solar physics is the structure and heat of the sun's chromosphere, which extends several thousand miles above the visible photosphere.

To earn his Ph.D. at Harvard University, Dr. Jeffrey L. Linsky analyzed the appearance and structure of calcium lines in the solar chromosphere, adjusting the temperature distribution of calcium, hydrogen and potassium in his computed models to agree with observations.

A general feature of the models is a minimum temperature of about 4,200 degrees Kelvin in the region corresponding to 470 to 650 kilometers above the photosphere.

Details of Dr. Linsky's calculations are contained in the Smithsonian Astrophysical Observatory's Special Report 274.

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ASTRONOMY

Photographic star atlases

The bulkiest sky atlas ever produced, 1,870 photographs of the sky from declination 90 degrees to minus 33 degrees, is now in its fourth printing. The collection, which forms a map of the heavens as big as a tennis court, costs \$2,500 a copy.

The Palomar Sky Survey was made in blue and red light with the 48-inch Schmidt telescope atop Mt. Palomar with support from the National Geographic Society. It is one of ten sky atlases available that covers large, continuous portions of the sky, and will soon be joined by an eleventh.

Harvard College Observatory is currently engaged in a new sky patrol program, for which star fields are being photographed in blue, yellow and red light by a set of three cameras.

The histories of earlier sky atlases reveal dedication and energy in both amateur and professional astronomers who compiled them. Drs. Hector C. Ingrao and Elaine Kasparian of Harvard list them as: Carte du Ciel; a previous Harvard Sky Atlas; Palisa and Wolf charts; Franklin-Adam charts, which were the first of the entire sky; Union Observatory; Barnard Atlas; Ross-Calvert Atlas; Lick Sky Atlas and the Vehrenberg Atlas.

PHYSICS

Space science meeting

On August 11 the Space Science Board of the National Academy of Sciences began a review of the part of the U. S. space program that deals with the physics of the earth in space and will advise NASA on general directions to take in the future to make "the most scientifically rewarding use of limited funds."

The study group includes 30 scientists under Chairman Herbert Friedman of the Naval Research Laboratory. It meets for two weeks at the academy's summer study center in Woods Hole, Mass.

ACCELERATOR PHYSICS

Original linear accelerator phased out

The prototype linear accelerator has now outlived its usefulness. Two eight-foot segments of the 40-foot apparatus will become a permanent exhibit at the Smithsonian Institution.

They will join other equipment, such as Columbia University's cyclotron and a Van de Graaff accelerator, as part of the Smithsonian's chronicle of early atomic and nuclear research.

The proton linear accelerator, which operated at 32 million electron volts, was built in 1947 under the supervision of Dr. Luis Alvarez at the University of California in Berkeley. In 1958, it was given to the University of Southern California in Los Angeles.

The accelerator has been phased out because it is too expensive to operate, having a duty factor—percentage of useful time—of only one percent, compared to 100 percent duty factor for today's accelerators when they are operating.