★ STAR DUST

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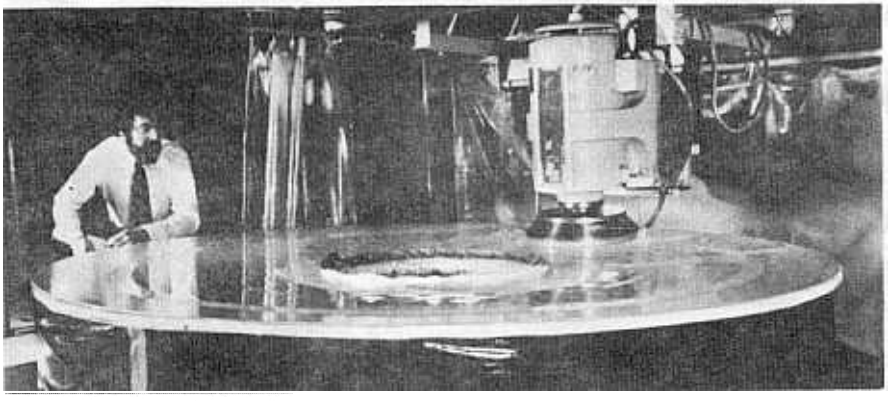
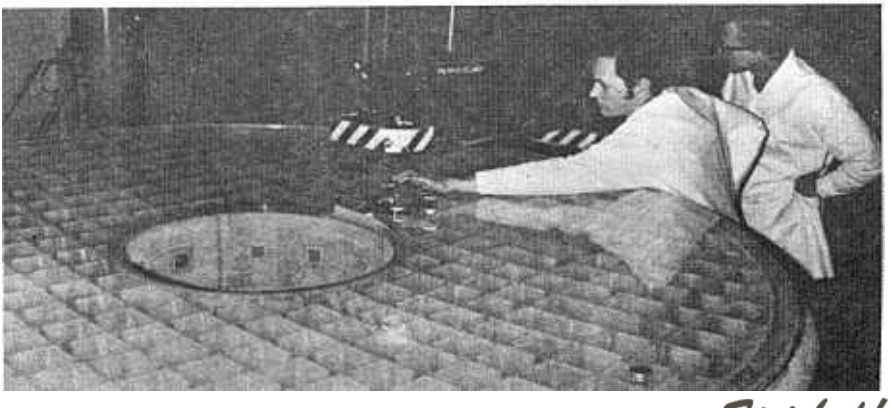


After Two Years



. . Finished!

The 2.4-meter primary mirror of NASA's Space Telescope is shown here undergoing final inspection (lower) after two years of grinding, polishing, and figuring. These NASA photos were made at the Danbury, Connecticut plant of Perkin-Elmer, the prime contractor for the telescope. Corning Glass Works, Canton, New York, cast the blank.

About 300 pounds of glass was removed in the process, leaving only about 1650 pounds for the extremely light finished mirror. The lightweight cellular backing structure is clearly visible through the thin mirror surface, shown here before metallization.

The complete unmanned observatory, weighing about 10 tons, is scheduled to be launched in early 1985 by the Space Shuttle. It will be controlled and operated from a special center to be established on the Johns Hopkins grounds in Baltimore.

SUMMER CALENDAR — *The public is welcome.*

Saturday, August 1, 7:00 PM — NCA picnic at Manassas National Battlefield Park. See page 43.

Tuesday, August 4, 11, 18, 25, 7:30 PM — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, August 7, 14, 21, 28, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Friday, July 31, 9:30 PM, August 7, 21, 28, September 4, 9:00 PM — Use the NCA 14-inch telescope with Bob Bolster, 6007 Ridgeview Drive, south of Alexandria off Franconia Road between Telegraph Road and Rose Hill Drive. Call Bob at 960-9126.

Saturday, August 8, 9:00 PM — *Exploring the Sky*, presented jointly by NCA and the National Park Service. Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy. Information: Bob McCracken. 229-8321.

JUNE LECTURE

Dr. Maurice M. Shapiro, Chief Scientist of the Laboratory for Cosmic-Ray Physics, U. S. Naval Research Laboratory, addressed the June meeting of National Capital Astronomers on high-energy neutrinos generated within pulsars and quasars. These particles are providing the basis of a newly emerging astronomy which uniquely promises to probe to depths of the sources inaccessible by other means.

It is estimated that the universe contains about one or two atoms per cubic meter — and a thousand million neutrinos per cubic meter. They interact so weakly with matter, however, that only about one in a thousand million passing through the Earth is stopped by it. A number of high-energy nuclear reactions generate short-lived mesons and muons which decay into high-energy neutrinos. The great penetration power of neutrinos allows their escape from the cores of their sources carrying previously unavailable information about the extremely high-energy neuclei which produce them.

Dr. Shapiro described the proposed DUMAND (Deep Underwater Muon And Neutrino Detector) project, now under design by an international consortium of scientists at the Hawaii Center. The 0.2-cubic-kilometer array of thousands of detectors will be under 5 kilometers of water near Hawaii, thus well shielded from undesired radiation. The water also serves as the detection medium.

The DUMAND Consortium (of which Dr. Shapiro is a member) of physicists, astronomers, oceanographers, marine biologists, and engineers have for the past 6 or 7 years been developing this effective and comparatively economical system.

Upon the unlikely but occasional interaction of a neutrino with the water, a quantum is emitted in the visual spectrum, and is detected photoelectrically. The detectors are arrayed to give directionality and energy estimates. The output pulses will be computer processed and interpreted.

When a neutrino interacts with matter, muons are produced. DUMAND is expected to detect more of these muons than neutrinos directly.

Much needs to be learned about the neutrinos and muons themselves, as well as their occurrence in the universe. Apparently the many types can interconvert; this may explain the fact that the present (lower-energy solar) neutrino detector using chlorinated hydrocarbons in an old mine in the Black Hills detects fewer than expected of the solar neutrinos it is sensitive to.

Expected discrete sources include incipient pulsars and active galaxies. During the first few months of the formation of a pulsar, conversions of nuclei

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following asteroidal and grazing lunar occultations. For further information, Dr. Dunham, 585-0989.

Date	UT Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
LUNAR:						
08-19-81	10:13	Ladysmith, VA	7.8	84	12N	20 cm
08-24-81	06:42	St. Mary's, MD	8.2	31	9N	12 cm

ASTEROIDAL:	Star Mag	Delta Mag	Name of Asteroid	
08-12-81 09:17	8.6	3.1	(12) Julia	10 cm
08-15-81 01:37	9.0	3.0	(230) Athamantis	12 cm
08-20-81 00:21	8.8	2.6	(409) Aspasia	20 cm
08-26-81 08:27	6.4	7.0	(70) Panopaea	5 cm
08-27-81 03:38	8.8	2.6	(105) Artemis	12 cm

NCA WELCOMES NEW MEMBERS

Janet Harris
5239 Baltimore Avenue
Bethesda, MD 20816

Barbara M. Muller
5303 Mohican Road
Bethesda, MD 20816

Eugene R. O'Bryan
13307 Grenoble Drive
Rockville, MD 20853

Dr. and Mrs. Stephen M. Pribut
4600 Connecticut Ave, NW., #411
Washington, DC 20008

Fred T. Teal, Jr.
13816 Mills Avenue
Silver Spring, MD 20904

Charles M. Weber, MD
19901 Bucklodge Road
Boyds, MD 20720

NCA PICNIC AUGUST 1, 7:00 PM, AT MANASSAS BATTLEFIELD PARK

Bring your prepared picnic dinner, telescopes, and guests, and enjoy another NCA outing.

Go west on I-66 approximately 17 miles from the Beltway to Virginia Route 234 (Manassas exit). Go right (north — away from Manassas) 1.7 miles to the picnic area on the left, shortly after crossing Route 29-211. Follow the dirt road across the field to the picnic tables.

The picnic will be held regardless of weather short of rain at the time.

RENEWAL TIME AGAIN

Membership forms are being distributed for fiscal 1982 renewals. If you are renewing your membership, please enclose the notice card you received from *Sky and Telescope* with your form and your remittance. (Of course if you are a life member or award member, no payment is necessary.)

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to neutrons should produce about 10^{57} neutrinos. About 8 new pulsars per century are expected. Radio galaxies, Seyfert galaxies, and quasars are expected to produce 10^{42} to 10^{47} ergs per second in very small nuclei.

if neutrinos are discovered to have even a very small mass, the universe is more massive than now estimated. Because of the enormous number of neutrinos, they may then provide the necessary additional mass to close the universe, leading to its contraction after the present expansion phase.

Dr. Shapiro recommended the February 1981 *Scientific American* for an article on DUMAND. jbl

EXCERPTS FROM THE IAU CIRCULARS

1. May 24 — Reitsema, Hubbard, Lebofsky, and Tholen, Lunar and Planetary Laboratory, observed stellar occultations by a previously unknown satellite of Neptune. Events 8 seconds in duration indicative of a body of at least 180 km in diameter were detected with 1.5-m and 1-m reflectors located 5 km apart.

2. May 29 — Motch, European Southern Observatory, and Ilovaisky and Chevalier, Observatoire de Meudon, reported that the optical counterpart of X-ray source GX 339-4 had brightened 6 magnitudes in 2 months. Fast photometry revealed 20-s oscillations and short bursts, perhaps arising from an accretion disk in a low-mass X-ray binary system.

3. June 2 — M. Lovas, Konkoly Observatory, discovered a supernova of 15th magnitude in NGC 4874.

4. July — N. R. Evans, University of Toronto, notes that the high inclination of the binary Cepheid SU Cygni gives it a 20 percent chance of eclipsing, dimming by perhaps 10 percent. Predicted for October 22, the eclipse might last 9 days, being most readily detected by spectral changes.

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