☆ STAR DUST

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FEDERAL CITY COLLEGE DEVELOPS COSMIC-RAY DETECTORS

DR. CRANNELL

The Laboratory for High-Energy Astrophysics at Goddard Space Flight Center is flying balloon-borne detectors to study the charge composition and energy spectra of high-energy cosmic rays. As part of an international collaboration, the group is preparing to launch a 2270-Kg ionization spectrometer aboard HEAO-A, the first of a series of heavy scientific satellites. With a variety of charge, energy, and direction sensors, the experiment will measure the spectra and look for anisotropies in the arrival directions of high-energy cosmic ray particles.

Dr. Carol Jo Crannell is a member of the staff of Federal City College, working with a NASA grant which encourages students and faculty to collaborate in research programs with Goddard Space Flight Center. She has been working on detector development for the balloon flights and the satellite programs. In 1967, she received her Ph. D. from Stanford University, where she conducted experimental studies of the behavior of high-energy electromagnetic cascade showers.

NOVEMBER CALENDAR

Friday, November 3, 10, 17, 24, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, November 4, 6:15 PM — Dinner with the speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. No reservations needed.

Saturday, November 4, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Carol Jo Crannell will speak on cosmic-ray detector research at Federal City College.

Monday, November 6, 13, 20, 27, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Wednesday, November 8 — "The Asteroids," Myron Lecar, Smithsonian Astrophysical Observatory.*

Wednesday, November 15 — "Perspectives," Fred L. Whipple, Director, Smithsonian Astrophysical Observatory.*

Saturday, December 2 — December meeting of NCA and dinner with the speaker.

*National Air and Space Museum-Smithsonian Astrophysical Observatory lecture, Museum of History and Technology Auditorium, 12th — 14th Streets on Constitution Avenue, NW. 7:30 PM.

NCA OCTOBER LECTURE

General relativity in modern cosmology was the theme of Dr. Ronald Adler's October 7 talk to National Capital Astronomers. Outlining Einstein's new physics, the American University physicist noted that general relativity principles are easier to grasp than those of the earlier special theory. The former took the mystery out of Newton's equivalency principle, showed that, on the scale of a rocket or the earth, gravitational effects are independent of frame of reference, and that gravity is an effect of the curvature of space. Riemann geometry is required for the mathematics of gravity in differing coordinate systems. Geodesics helps explain the forcelike effects of space curvature.

Among the tests of the theory of general relativity, the very-long-baseline interferometry of radio astronomy plays a major role. VLBI also helps us study unstable white dwarfs. Newtonian concepts of gravity call for those more massive than 10 suns to collapse gravitationally into radiation-trapping black holes. General relativity, however, calls for them to emit potentially detectable gravity waves.

If quasi-stellar objects are in fact running on non-fusion energy, two sources, as yet poorly theorized, are possible:

1. Collisions between matter and antimatter.
2. The potential energy of the forces maintaining the collapsed white dwarf surfaces given by red-shift considerations and the surface given by general relativity of a black hole.

The audience attending Dr. Adler's talk was perhaps the largest at an NCA meeting in years. An extensive question period followed.

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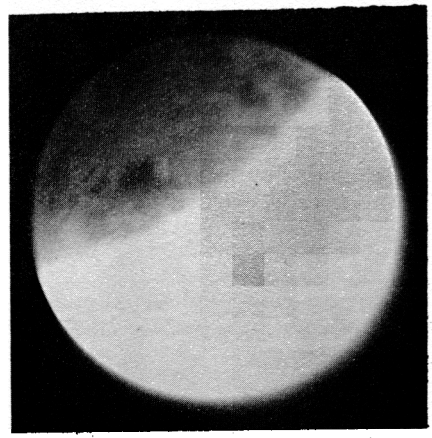
SEPTEMBER 23 DISCUSSION GROUP

Fifteen members shared their summer's experiences at the July total solar eclipse in Quebec and at Stellafane, Springfield, Vermont, in August. Among the highlights of this session were Morton Schiff's color photos of the inner corona and Darrel Freund, Jr.'s color photos of the prominences during total eclipse; Bill Winkler's movie of the clouded-out NCA expedition to Cap Chat; and Darrel's and Walter Farrar, Jr.'s beautiful slides and detailed commentary on the 1972 edition of the telescope-makers' convention on Breezy Hill. Stellafane had two nights of clear weather and spectacular aurora this year.

NATIONAL CAPITAL ASTRONOMY

Lunar eclipse — Bill Winkler used a 4-sec exposure at the f/15 prime focus of a 3-inch refractor for this photo, 29 minutes after maximum eclipse. Bob McCracken printed the Kodacolor negative on panchromatic paper.

NCA members saw the umbral shadow as medium-bright copper color.



Partial lunar eclipse of July 26, 1972, 0745 UT.

Local grazes — it is rare indeed that four grazing lunar occultations are observable in the immediate vicinity of Washington within less than one month. *Star Dust* has just received such a prediction from the occultation computer at the U. S. Naval Observatory, too late for the first two, unfortunately. The first passes within 1 mile of the NCA 5-inch refractor (to the position of which the computer refers all NCA predictions), at 0707 UT on October 27. The 6.5-magnitude star is ZC1036. On October 31 at 0919 UT ZC1519, also 6.5 magnitude, will graze within 2 miles of the 5-inch. These distances are both within the observational spread for such events.

At 0514 UT on November 25, 7.0-magnitude ZC1260 will graze within 15 miles north. This is a south-limb graze, so no occultation will be seen at the observatory. Less than an hour later, at 0939 UT, the slightly-brighter 6.2-magnitude ZC1262 will graze the south limb within 12 miles north.

Occultations, particularly grazes, are fascinating to observe. These will provide excellent opportunities without the usual travel, and their observation will have significant value if made accurately and reported promptly. To be useful, such reports must give the times of all events, i.e., disappearances and reappearances, to within less than one second; Latitude, longitude, and altitude of the observer's position must be known to within less than 50 feet. To be fascinating, they only need be observed. In either case, the use of high magnification (rarely desirable in astronomy), is helpful in order to 1) narrow the field, thus to eliminate most of the bright lunar surface, and 2) increase the contrast between the faint star and the background sky, by reducing the light efficiency for the latter. Stars, being point sources, are not dimmed as severely by empty magnification as are extended objects, e.g., the sky, the moon. Smooth slow-motion controls are highly desirable, and perhaps necessary in serious work. See *Star Dust*, July-August 1971 and October 1971 for further discussions of occultations in general, and NCA work in particular.

Also computed for the position of the NCA 5-inch refractor at the Naval Observatory are 13 *total* occultation events during November, and nine for

December. Members are urged to observe these, either at the 5-inch or at other locations.

Observational and reporting details and suggestions for observing and timing these occultations may be obtained from Bob McCracken, 229-8321.

EXPLORING THE SKY PROGRAM ENDS SPECTACULAR SEASON

Hundreds of guests were coming and going all evening as circulating traffic continued to jam the filled and overflowing parking lot at the closing session of "Exploring the Sky" on October 14. Following Bob McCracken's usual introductory remarks many NCA members shared their telescopes with the public in observing the moon, Jupiter, and other objects along the route of our "guided telescopic tour of the heavens."

National Park Service Rangers Bob Ford and Bill Rudolph made a heroic effort to count guests, conducted an open-sky constellation-study group, and provided a station-wagon load of free cocoa, cookies, coffee, and doughnuts, all of which were enthusiastically welcomed and promptly consumed.

In spite of the smog and the ubiquitous mercury-vapor aurora that increasingly plague the Rock Creek Park site, the jointly-produced series has continued to gain popularity through the years. We are sincerely grateful to those who have made it so: the Park Rangers, whose efforts characteristically exceed the call of duty, and the many NCA members who faithfully support the program with their telescopes. An attempt to list those of either group would but assure that some would be inadvertently omitted.

* STAR DUST

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