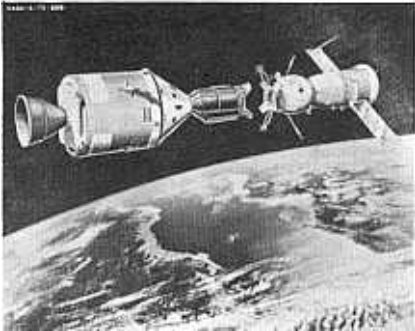




## ANNUAL NCA FILM NIGHT IS MAY 4



*Artist's concept of the American and Soviet Apollo-Soyuz spacecraft in orbit. The craft will dock in 1975.*



*Soviet Cosmonauts Rudavishnikov and Leonov examine the docking module at Johnson Space Center. NASA photos*

Three films recently produced by NASA showing how astronomical knowledge is applied to enable us to advance further in astronomy will be shown at the May election meeting of National Capital Astronomers.

*Apollo-Soyuz* outlines the plans problems and prospects for the historic summer 1975 flight in which American and Soviet astronauts will link their spacecraft in orbit.

*Apollo 17* summarizes the final lunar landing in the Apollo series and the first in which a professional geologist was a crew member.

*ERTS-1* shows what we are learning about the topography of the Earth using the Earth Resources Technology Satellite, and how this information is being used to raise the world standard of living.

In addition to the NASA films, Vice-President Leidecker will show the spectacular film, *Powers of Ten*, a dynamic illustration of the enormous range of size between the observable limits of the universe from the micro- to the macrocosmos.

### MAY CALENDAR

Friday, May 3, 10, 17, 24, 31, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, May 4, 8:15 PM — NCA annual business meeting and election at the Department of Commerce Auditorium, 14th and E Streets, NW. Four astronomical films will be shown. **PLEASE BE PRESENT SO THAT THERE IS A QUORUM.**

Monday, May 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.

Saturday, May 11, 9:00 PM — Exploring the Sky, presented jointly by NCA and the National Park Service. Glover Road south of Military Road, NW, near the Rock Creek Nature Center. Information: Bob McCracken, 229-8321.

Please note that there will be no speaker's dinner in May.

## 1974 NCA ELECTION

As announced in April *Star Dust*, members will elect officers for the fiscal year beginning July 1, 1974, at the May 4 meeting. The nominating committee presented the following slate:

President	Dr. Henning Leidecker
Vice President	Wolfgang Schubert
Secretary	Estelle Finkle
Treasurer	Lawrence Torrance
Trustee	Dr. John Eisele
Sergeant at Arms	Paul Burnett

The trustees have agreed that the election will be the only business that will precede the films. Members shall register as they arrive and shall receive a single ballot form. Nominations may also be made at the meeting.

## APRIL LECTURE

Dr. Robert S. Harrington of the U. S. Naval Observatory, Washington, D. C., spoke on the photographic double-star program using the 26-inch Clark refractor of the Observatory, at the April 6 meeting of NCA.

The total masses of physical double stars are determined from Newton's extension of Kepler's third (harmonic) law. The mass ratio, yielding the individual masses, is then determined from Newton's second law. Observational requirements are, for total mass, the mean separation and period of revolution; for mass ratio, the distance of each from their common center of revolution.

Visual observers of double stars can measure separations of 0.1 second of arc, compared to 2.5 seconds resolution with the required 5-second to 1-minute photographic exposures. However, photographic measurements are 1 to 2 orders of magnitude more accurate.

Besides mass determinations, photographic observations are made to determine the number of companions having physical association in a system, and to detect unseen companions of stars from orbit perturbations.

The current photographic double-star techniques were developed by Einar Hertzsprung in the 1920's. His student, K. a. Strand, now Scientific Director of the Naval Observatory, founded the U. S. program in this work and developed the modern multiple-exposure technique.

Here in Washington, double stars of magnitude 9 and brighter are photographed. The two principal programs involve obtaining 10 to 12 plates each year for stars in one class, and 3 to 4 plates in a year every ten years for stars of another class. An automatic camera on the 26-inch refractor takes about 60 photographs of a star system on each 3.25 x 4.25-inch plate. No hand guiding is needed. The 5000-5800Å region of the spectrum is used with this visually-corrected objective, defined by Kodak 2G emulsion and a GG 14 filter.

For double stars differing greatly in magnitude, coarse wire objective gratings are used to obtain second-order images of the primary star for comparison with the secondary. By means of these gratings star companions with a difference of up to 6 magnitudes can be measured.

In this precise work, plate-scale variation with temperature and with differential refraction is significant.

The program, as shown by its record, is productive: from 1958 to 1963, 488 orbital positions were measured on 2,307 plates; 1963 to 1967, 610 positions, 3,286 plates; 1967 to 1972, 292 positions, 2,693 plates.

Recently, more time on the 26-inch refractor has been devoted to visual doubles and planetary astronomy.

## DR. WINIFRED CAMERON TO BE MERAL BANQUET SPEAKER

The 1974 convention of the Middle East Region of the Astronomical League will feature NASA's Dr. Winifred Cameron as the banquet speaker. The convention will be hosted by NCA at the Ramada Inn, intersection of state route 234 and Interstate 66, Manassas, Virginia, on Saturday, May 18, 1974.

Morning and afternoon paper sessions, a flea market for telescope parts, an astrophotography contest, and contributed exhibits are planned. At the 7:00 PM banquet, Dr. Winifred Cameron will speak on Lunar Transient Phenomena, Observational Methods, and Results.

Weather permitting, an observing session will be held Friday night at the nearby site of Hopewell Observatory (under construction). This event was originally planned to be held at the Manassas Battlefield Park. Meet at the motel in time for a caravan departure by 8:00 PM.

Please send proposals for papers and exhibit space to Bill Winkler, 1001 Rockville Pike, Rockville, Maryland 20852.

Please send checks made payable to Middle East Region Convention to Larry Torrance, Treasurer, 1224 Adams Road, Waldorf, Maryland 20601. Registration is \$2.00, or \$3.00 per family; banquet tickets including tax and tip are \$5.95 per person, and must be purchased before May 15.

## STELLAR EVOLUTION IS SMITHSONIAN SUBJECT

The April 3 Guggenheim Lecture in Astronomy at the Smithsonian Institution was delivered by Pierre DeMarque of Yale University. This was the fifth lecture in the current series cosponsored by the Air and Space Museum.

Early studies of the life history of stars emphasized origin and similarities between the Sun and other stars. Now we emphasize their fate and differences. Great impetus to knowledge of stellar evolution was given by development of atomic physics and quantum theory in the 1920's, and nuclear physics in the late 1930's. Ernst Öpik first put forth a comprehensive theory on the evolution of giant stars based on these developments.

Dr. DeMarque summarized current knowledge of the relation between stellar masses and their evolutionary physics as follows:

- < 0.1 solar mass -- Black dwarf, no hydrogen burning.
- 0.1 - 0.6 -- Burns hydrogen but not helium; will become a white dwarf.
- 0.5 - 3.5 -- Burns hydrogen, then helium and carbon; will become a white dwarf.
- 3.5 - 10 -- Burns carbon explosively, then becomes a supernova.
- 10 - 20 -- Following carbon burning, collapses to a neutron star.
- 20 - 60 -- Carbon, silicon, oxygen, and iron ultimately burned. Collapses to a black hole.

The term, "burns" as used here refers loosely to nuclear processes and has nothing to do with combustion.

Dr. Harrington concluded by remarking on the difficulties of doing observational astronomy in Washington. In 1972, only 70 nights totaling 395 hours were suitable for the photographic program; in 1973 only 57 nights totaling 342 hours were useful.

Seeing quality is the most severe atmospheric restriction except for clouds; stars are photographed only within one-half hour of the meridian. Because the stars observed are relatively bright, light pollution does not represent a serious problem. The effects of the new sodium-vapor lighting are increased, however, by the circumstance that the 26-inch telescope works best in the yellow region of the spectrum.

## EXCERPTS FROM THE IAU CIRCULARS

1. March 20 — M. Lovas, Konkoly Observatory, Budapest, discovered a 15th-magnitude supernova in NGC 3916 in Leo.

2. March 21 — The same observer discovered a 14th-magnitude supernova in NGC 4038-39 in Corvus.

3. March 21 — The same observer also discovered a 14th-magnitude comet in Virgo. Comet Lovas (1974c) has a perihelion distance of 2.9 AU, and will reach perihelion in July 1975.

4. March 30 — G. E. D. Alcock reported that Comet Bradfield showed a 3° gas tail and a 1.5° dust tail in the northeast, a nebulous cloud to the south, and a double antitail pointing west of south.

This listing courtesy Bob Bolster.

## NCA WELCOMES NEW MEMBERS

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