



SINGER OFFERS EARLY EARTH-MOON HISTORY



S. FRED SINGER

On December 18, Dr. S. Fred Singer of the University of Virginia, Charlottesville, will speak to the National Capital Astronomers on the early history of the earth-moon system.

The main theories concerning the origin of the moon include fission from the earth, formation near the earth, and capture by the earth's gravitational field aided by tidal friction. The orbital characteristics and chemical properties of the moon provide clues that support the capture theory, although not unambiguously. Our ideas on the origin of the moon are very much influenced by our ideas concerning the development of the solar system and the formation of its planets.

S. Fred Singer is a professor in the Department of Environmental Sciences and at the Brooks Museum, University of Virginia. He holds a Ph.D. in Physics from Princeton University where he was an instructor. Dr. Singer's extremely varied career has included computer design for the U. S. Navy; service as scientific liaison officer to the U. S. Embassy, London; professor of physics at the University of Maryland; professor of atmospheric science at the University of Miami; and as Director of the Weather Bureau's National Weather Satellite Center from 1962 to 1964.

Our speaker is a fellow of the Royal Astronomical Society, the American Physical Society, Institute of Aeronautics and Astronautics, and the American Geophysical Union. His professional interests include earth satellite applications, orbits of space vehicles, the origin of meteorites and lunar surface studies.

DECEMBER CALENDAR

Saturday, December 11 -- NCA Juniors star party at the Jerry Hudsons' home, Knoxville, Maryland. Rides will be available at the Chevy Chase Library. Call Jean Radoane, 434-0443, for information.

Thursday, December 16, 8:30 PM.-- Observing session on the rooftop deck of the new Chevy Chase Community Center, 5601 Connecticut Avenue, NW, conducted by Rene Lamadrid. Call him at 585-5569 for information.

Friday, December 17, 7:30 PM -- Last telescope-making class of this year conducted by Jerry Schnall in the basement of McKinley Hall, American University. Call him at 362-8872 for information.

Saturday, December 18, 6:15 PM -- Dinner with our December Speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. Reservations not required.

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CALENDAR - continued

Saturday, December 18, 8:15 PM -- Monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. S. Fred Singer will speak on earth-moon system origin.

The January monthly meeting will be held on January 8th at 8:15 PM.

A short Trustees' meeting will be held after the January meeting. Trustees and officers please be present. Members wishing to attend are cordially invited.

NCA NOVEMBER LECTURE

Robert Kreplin of the U. S. Naval Research Laboratory reported on his studies of solar X-rays by means of rockets and satellites at the November 15th meeting. Particularly notable is the increasing importance of X-ray variability relative to far ultraviolet variability (such as Lyman- α) in understanding coronaphysics and the effects of solar emissions on earth's ionosphere. Mr. Kreplin has developed many of the X-ray devices flown by the Navy, and he showed details of some of them.

A highlight of the talk was a time-lapse movie of solar chromosphere events, produced by Lockheed Observatory. It showed in a rather startling manner how a solar flare eruption can initiate sudden rapid changes in the chromosphere and prominences hundreds of thousands of miles distant.

NCA thanks John Legowik for providing the 16-mm projector.

NOTES ON CURRENT RESEARCH

Hjellming and Wade of National Radio Astronomy Observatory, Greenbank, West Virginia, report that both 3.7- and 11.1-cm radio emission from a direction within 3sec of the star Antares is variable, and associated with Antares' companion star, a class B supergiant. (*Astrophysical Journal Letters*, September 15, 1971)

Kuchowicz at the University of Warsaw suggests that a careful search for elements heavier than uranium would be fruitful in spectra of peculiar class A stars (A_p). Strong evidence for the presence of uranium and promethium in these stars now exists. It may even be possible to detect elements of atomic number 114 in A_p atmospheres. (*Nature*, August 20, 1971)

IMPORTANT EQUATIONS IN ASTROPHYSICS -- VII

The extent to which we can see through the atmosphere of a star is determined by its *opacity* at the wavelength we are using. Major processes which determine opacity are interactions between free electrons, between free and atom-bound electrons, and Thompson electron scattering. The problem of opacity calculation from theory is among the most complex and important in astrophysics. For the sun, approximate opacity at a given frequency, K_ν , is given by

$$K_\nu = 4 \times 10^{25} \frac{\bar{g}}{t} Z(1+X) \frac{\rho}{T^{3.5}}$$

where $\frac{\bar{g}}{t} = 0.3$, Z is the mass fraction of heavy elements, X , the mass fraction for hydrogen, ρ is density, and T is temperature. Thompson scattering is ignored.

SPECIAL RATE ON ASTRONOMY BOOK

Volume 9 of the *Annual Review of Astronomy and Astrophysics* was published in August. Its 393 pages are a detailed, readable account of current research progress and problems in our science. If at least 10 NCA members so wish, we can get copies for \$8.50 each, a 15% discount. Please indicate your desire for a copy, in writing, either at the December meeting or by letter to the president. See September *Sky and Telescope*, page 162, for the contents of this highly regarded volume.

PICTURES OF THE MONTH

Dick Horowitz obtained two excellent photographs from NASA (Jet Propulsion Laboratory) showing some of the first pictures taken by Mars probe Mariner 9.

Page 15 -- Nov. 14, 1971 photo of the huge Martian dust storm and its effects. A row of three large mountain crater features is seen near center, with a fourth one hundreds of miles distant. These are surface features producing hydrodynamic wake effects in the overlying dusty atmosphere.

Page 16 -- (Left) Mariner 7 photo of the south polar cap area of Mars, August 1969. (Right) Mariner 9 photo of the same area Nov. 14, 1971. Due to season differences, the south polar cap has much more ice (presumably CO₂) in the Mariner 7 view. The great dust storm makes the Mariner 9 view much less distinct, although this probe is capable of much better definition from its orbit than Mariner 7 was during its fly-by. The change in the 1969 quasilinear features to bright, curved appendages in 1971 is unexplained.



★ **S T A R D U S Y**
W A S H I N G T O N D U S Y

Published eleven times yearly by NATIONAL CAPITAL ASTRONOMERS, INC., a not-for-profit, public-service organization for the promotion of interest and education in astronomy and the related sciences. President, William Winkler, 1001 Rockville Pkwy., Apt. 20852, Rockville, Md. 20852 (762-5135); Vice president, John Eisele, Treasurer-membership, Charles Shepard (354-5387), Star Dust production, William Winkler and Robert McCracken. Deadline: fifteenth of each month.

