☆ STAR DUST

Volume XXVIII January 1972 Number 5

COSMOLOGICAL IMPLICATIONS OF He/H

DAVID S. LECKRONE

David S. Leckrone of the Laboratory for Optical Astronomy, Goddard Space Flight Center, NASA, will speak to NCA about the distribution and importance of helium in the universe at the January 8th meeting.

The abundance ratio of helium to hydrogen in stars and in the interstellar medium is a parameter of great current interest primarily because of its cosmological implications. A knowledge of the He/H ratio that prevailed in the primordial material from which our galaxy formed should allow one to choose among various cosmological models: steady-state cosmologies predict He/H = 0, while the big-bang cosmologies can allow values of He/H ≤ 0.09, by number of atoms.

Two approaches are commonly adopted in attempts to estimate the primordial He/H ratio:

1. One can estimate He/H values for the relatively young spiral-arm type stars and nebulae and then invoke the theory of stellar evolution to relate these to the He/H ratio of the matter from which the galaxy formed.
2. One can indirectly estimate He/H values for some of the oldest stars in the galaxy, those belonging to globular clusters, and assume that these values are comparable to the primordial He/H ratio.

Although these two approaches seem to give consistent results in some cases, some puzzling questions remain to be answered. Ultimately, these may be answered by observations of the most distant quasars with a large orbiting telescope.

JANUARY CALENDAR

Thursday, January 6, 20 -- Neighborhood Astronomy on the observing deck of the new Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW, 8:30 PM. Information: Rene Lamadrid, 585-5569.

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

Saturday, January 8 -- Dinner with the speaker, Dr. David Leckrone, at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. 6:15 PM. No reservations needed.

Saturday, January 8 -- NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW., 8:15 PM. David Leckrone will speak on "Helium in the Universe".

CALENDAR cont'd. on p.18

CALENDAR - cont'd.

Saturday, January 22 -- The Apollo flights -- Photographic coverage of the launches and the lunar expeditions, a slide presentation by Associated Press photographer Dick Horwitz, 8:15 PM, in room 2062, Department of Commerce, 14th and E Streets, NW.

There will be a short trustees' meeting immediately after the January monthly meeting. Trustees and officers please be present.

The February meeting will be on February 5 at 8:15 PM.

NCA DECEMBER LECTURE

In a memorable talk and using few notes, Dr. S. Fred Singer of the Department of Environmental Science, University of Virginia, discussed the origins of the earth-moon system.

Isaac Newton knew qualitatively that earth tides are caused by the moon's gravitational pull, but the first great strides in quantitizing the effects were made by the physicist Darwin, who showed how rapidly tidal friction dissipates the energy of the earth's rotation. That the earth's rotation was faster thousands of years ago is shown by ancient solar eclipse observations and by growth layers on old coral. Apparently, the length of an earth year has decreased by 35 days over 360,000,000 years. The earth is transferring angular momentum to the moon such that the distance between the two is increasing by 1 inch per year.

Our speaker discussed the pros and cons of the three major theories of lunar creation: (1) The moon derives from the earth; the latest version of this concept is defended by our September speaker, John O'Keefe, according to Dr. Singer. (2) The moon was assembled in earth orbit from primordial material. (3) The moon was in existence in solar orbit and was captured by the earth; our speaker favors this theory and presented convincing evidence for it.

Singer noted that researchers favoring each of the above theories have invoked Apollo lunar landing data in support of their views. He concluded by outlining the profound effect lunar capture probably had on the interior and atmosphere of the primordial earth in forming our present atmosphere.

REQUEST FOR EDUCATION INFORMATION

The president would appreciate being informed by members as to the dates and locations of the county-wide senior and junior high school science fairs in their counties. He would also like information on any special education programs being planned for this spring by area high schools.

NEW CHEVY CHASE COMMUNITY CENTER DEDICATED

On Sunday evening, December 19, the new Chevy Chase, DC Community Center Building at Connecticut Avenue and McKinley Street, NW was formally opened to the public. The beautiful building features a large auditorium, woodworking shop, and darkroom among its many facilities; NCA, led by Hoy Walls, played a major role in the planning of the observation deck on the roof of the Center. The Society will host regular observing sessions on the deck, led by Rene Lamadrid; Jerry Schnall plans to conduct weekly telescope-making classes in the building. Among the forty-odd member organizations at the dedication ceremonies, National Capital Astronomers was represented by Jerry Schnall, Mabel Sterns. Grace Spitz, Bill Winkler, and Rene Lamadrid.

MARS AFTER 1971 OPPOSITION

These two drawings of Mars (south at top) were made by Larry Torrance from observations with a 10-inch f/5.7 Newtonian. He used a magenta filter and 240X to enhance surface features.

Left: August 23, 0323 UT. C.M. 330.8°

Right: September 4, 0257 UT. C.M. 216.9°

NCA GROWS

The National Capital Astronomers welcomes the following new members:

Regular

Robert H. Phillips
5100 8th Road, S. Apt. 114
Arlington, Va. 22204

Albert P. Vreeland
13133 Larchdale Road, Apt. 7
Laurel, Maryland 20810

Junior

Jeanne Anne Cavagnaro
5503 Fontana Place
Springfield, Virginia 22151

PICTURES OF THE MONTH -- MORE FROM MARINER 9

On page 20 are two computer-processed photographs taken by Mariner 9, now in orbit around Mars. Astronomical south is toward the top of the page in these Eastern Hemisphere views.

Left: December 4, orbit number 30. Oblique view of the Ascraeus Lacus crater complex in Tharsis. The largest crater is 21km in diameter. The white rings south of the complex are atmospheric, part of the dying dust storm.

Right: November 27. Nix Olympica and its "eroded" crater complex (64km in diameter), are shown. This feature is similar in appearance to calderas--volcanic collapse depressions on earth.

Dick Horwitz supplied these NASA-Jet Propulsion Laboratory photos.

Published eleven times yearly by NATIONAL CAPITAL ASTRONOMERS, INC., a non-profit, public-service organization for the promotion of interest and education in astronomy and the related sciences. President, William Winkler, 106 Rockville Pike, Apt. 1033, Rockville, Md. 20852 (762- 35); Vice president, John Eisele; Treasurer-membership Charles Shephard (354-6367). Staff Chart production. William Winkler and Robert McCracken. Deadline fifteenth of each month.