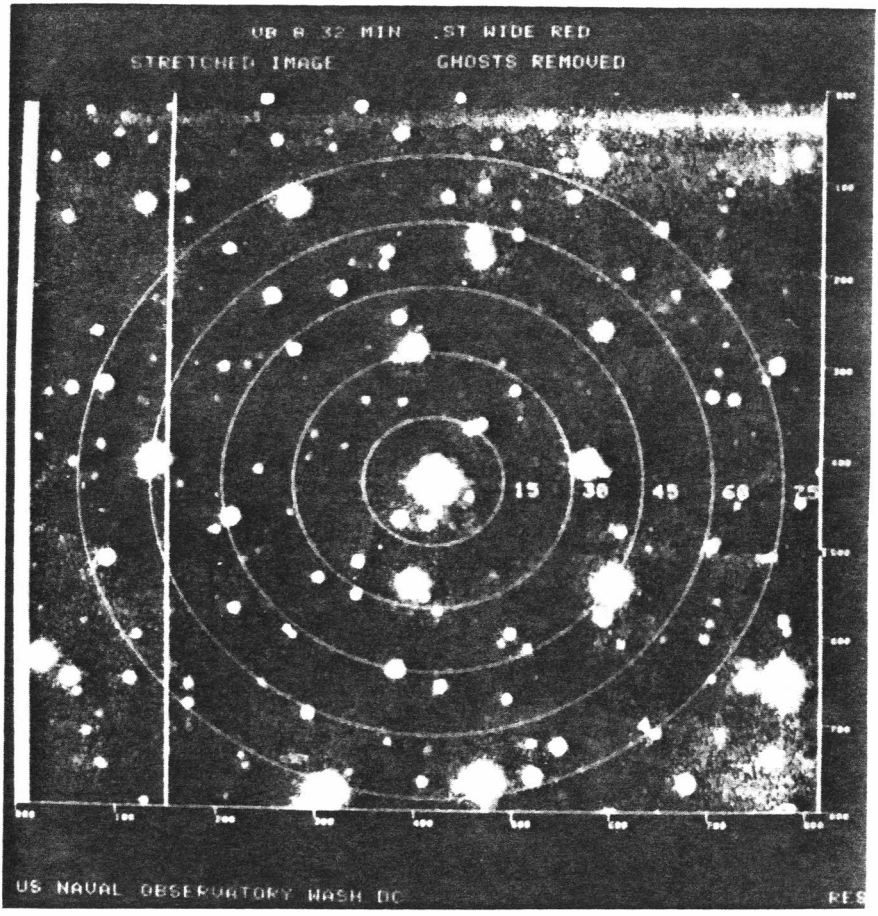
☆ STAR DUST

Volume XXXX Summer 1984 Number 11



U.S. NAVAL OBSERVATORY SEEKS FAINT STAR CANDIDATES FOR SPACE TELESCOPE STANDARDS -- Page 42.

AUGUST CALENDAR — *The public is welcome.*

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

Tuesday, August 6, 13, 20, 27, 7:30 pm -- Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, August 17, 24, 31, 9:00 pm -- NCA 14-inch telescope open nights with Bob Bolster, 6007 Ridgeview Drive, south of Alexandria off Franconia Road between Telegraph Road and Rose Hill Drive. Call Bob at

Saturday, August 18, 9:00 pm -- ***Exploring the Sky,*** presented jointly by National Capital Astronomers and the National Park Service. Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy. Information: John Lohman, 820-4194.

FAINT STARS SOUGHT FOR SPACE TELESCOPE STANDARDS

Certain stars suspected of having low-mass (planetary?) companions are to be examined by the Space Telescope. From a current feasibility study, this 32-minute wide-band red CCD exposure is one of a series made on 2 June 1984 with the U. S. Naval Observatory (Flagstaff) 61-inch astrometric telescope. Centered on candidate VB 8 (17th vis mag), the field was surveyed for faint reference stars. The circles mark 15-arcsecond intervals.

No photometrically calibrated standard stars were available within the field; overlapping magnitudes were relayed from a 4-minute exposure. Stars were measured by a photometry program which fits one-dimensional Gaussian distributions to marginal sums. VB 8 was tentatively set at 14.7 magnitude in the wide red. The resulting photometry of 85 sample stars includes most of the objects within 1 arcminute of VB 8.

The faintest star for which a centroid was obtained (above and .3 inch right of center at 31 sec) was thus measured at magnitude 24.81, but the standard deviation for this liminal object is about .5 magnitude. This exceeds by more than 600 times the photographic limit of the 61-inch telescope, and about 15 times that of the 200-inch at Palomar! Of course, the CCD can also extend the photographic limit of the 200-inch telescope — and of the Space Telescope.

Further digital processing of the image (and others of the series) disclosed several extremely faint, close companions which in the original exposures are completely engulfed in the glare of the primary stars, as in this photograph.

This work assures that a system of faint reference stars useful to the Space Telescope Program can be established in the near future.

Star Dust thanks Drs. P.K. Seidelmann and R.E. Schmidt of the U.S. Naval Observatory for making this information available.

Not all of our readers are familiar with the CCD (Charge-Coupled Device), which replaces conventional photographic film in the telescope. The device consists of an array of many (in this case, 800 x 800, or 640,000) photosensitive diodes diffused into a silicon chip. Each of these stores electrons in response to photons arriving from the stars. Charges proportional to the light received are thus built up during the exposure. These charges are then read out in an orderly sequence to form an electronic representation of the image.

Imagine a theater filled with people. There is but one side isle through which everyone exits in strict order: first row followed by second row, and so on. One could then stand at the door, and by counting each person's position in the line, determine which seat had been occupied by each. In an analogous way, the charge packets are moved out through an interconnecting matrix in bucket-brigade fashion by the application of a series of pulses. Each charge is measured and the result is stored at a designated address in the computer memory.

The CCD is not perfect; a small portion of each charge is left behind. This residue can then appear displaced in the image, leading to artifacts known as ghosts. Further, all of the diodes are not equally sensitive. These defects

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following grazing lunar occultations. For further information call Dave at 585-0989.

UT Date	UT Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
08-19-84	04:36	Silver Spring, MD	7.6	56	11N	12 cm
08-21-84	08:24	Germantown, MD	8.6	34	16N	15 cm
08-22-84	07:09	Olney, MD	9.2	25	14N	20 cm
08-22-84	09:15	Dunkirk, MD	9.2	24	15N	20 cm

TREASURER'S REPORT — YEAR ENDING JUNE 30, 1984

Income	
Dues - renewals	$4,360.00
Dues - new members	1,098.00
Sale Observer's Hdbks	285.00
Orders, other publications	480.24
Telescope-making class	70.00
Interest	372.81
Motel deposits received	137.25
Other income (gifts, etc.)	91.49
Total Income*	$6,894.79

Expenses	
Sky & Telescope subs	2,717.00
Observer's Handbooks	300.00
Pchs other publications	479.44
Star Dust - printing	902.41
Star Dust - postage	800.04
Speakers' dinners	203.16
Astronom League dues	222.36
Insurance - equipment	150.00
Insurance - Liability	177.00
Admin supl. & postage	435.52
Motel deposits	160.00
Total Expenses*	$6,546.93

Excess income over expenses	347.86
Balance on hand July 1, 1983	3,475.35
Balance on hand June 30, 1984	$3,823.11

*During the two years of his presidency of National Capital Astronomers, Bob McCracken has incurred a number of additional expenses, chiefly in connection with the production of ***Star Dust*** and for the NCA telephone and directory listings. For these expenses, he has donated $993.07 to NCA. Our thanks are due to Bob for his unflagging generosity with which he has devoted his time and money to the welfare of our organization. Ruth S. Freitag, Treasurer

NCA WELCOMES NEW MEMBERS

Mark Abernathy
11215 Oak eaf Drive, #2006
Silver Spring, MD 20901

John M. Brinsko
11004 Stewart Lane, #402
Silver Spring, MD 20904

Stephen F. Frazier
2802 Pepperwood Court
Vienna, VA 22180

Leith J. Holloway
PO Box 53
Hardwick, VT 05843

Marc E. Lippman Family
10310 Grand Arbor Drive
Potomac, MD 20854

Stephen Nixon
2210 Castle Rock Square, #11C
Reston, VA 22891

Jeanne V. Turoff
4007 N. Chesterbrook Road
Arlington, VA 22207

David W. Wildenhain
8557 Greenbelt Road, #203
Greenbelt, MD 20770

---

must be removed from the image data. For example, the CCD is exposed to uniform illumination, and the resulting charge differences are subtracted from the image data. This is known as a flattening exposure.

The processing thus begins by taking into account the idiosyncrasies of the CCD, followed by a number of steps using clever algorithms to extract as much information as possible from the data.

Remember that simple analogies such as the above are neither complete nor exact, and can impart only a general idea. With this caveat, however, we hope to help some to follow the increasingly frequent discussions of CCD's and their exciting contributions. rhm

EXCERPTS FROM THE IAU CIRCULARS

1. May 27 -- Carolyn and Eugene Shoemaker, Palomar Observatory, discovered a comet (1984f) of 14th magnitude in Hercules with the 46-cm Palomar Schmidt telescope.

2. May 27 -- E. and C. Shoemaker also discovered a close-approaching asteroidal object of 15th magnitude in Bootes. Orbital elements by Bardwell and Green indicate that 1984 KD is an Apollo-type object with a perihelion distance of 1.00836 au. It passes 0.03 au from the Earth in June.

3. July 8 -- Rodney R.D. Austin, New Plymouth, New Zealand, discovered a comet (1984i) of 8th magnitude in Caelum with a 15-cm refractor. Parabolic elements by Marsden indicate that Comet Austin will reach perihelion on August 12. It will move north of the equator in the evening sky by the end of July, remaining about 7th magnitude.

4. July -- K.S. Wood and J.P. Norris, Naval Research Laboratory, discovered an X-ray pulsar during analysis of HEAO data. The object, H0850-42, has a mean period of 1.779 s which varies slightly, indicating that it is in a binary system.

★ STAR DUST
WASHINGTON, D.C.

Published eleven times yearly by NATIONAL CAPITAL ASTRONOMERS, INC., a non-profit, public-service corporation promoting astronomy and related sciences through lectures, expeditions, discussion groups, tours, classes, public programs, and publications. President, Geoffrey R. Chester. *Star Dust* Deadline 15th of preceding month. Information: (301) 320-3621. Material for publication: Robert H. McCracken, Editor, 5120 Newport Avenue, Bethesda, MD 20816.

FIRST CLASS