



CURRIE TO REPORT ARRAY - DETECTOR STATUS, RESULTS



DR. CURRIE

Dr. Douglas G. Currie, Professor of Physics and Astronomy at the University of Maryland, will describe his group's research on intensified charge-coupled devices (ICCD) as photon-counting array detectors (PCAD) in applications such as amplitude interferometry.

This unique class of detectors can provide a photon-counting array with a rapid scanning rate.

Currie will review the objectives and overall program of the group, primarily addressing the Amplitude Interferometry Program, which provides extremely high angular resolution even through atmospheric turbulence. He will discuss the principles and role of the PCAD in the program, including both internally and externally intensified CCD's, their design status, and performance relative to the requirements. He

will compare the various array detector systems with respect to those we may expect to see in the future and the domain in which each type of detector will excel.

Dr. Currie received his B.S. in Engineering Physics from Cornell, his Ph.D. in Theoretical Physics from the University of Rochester, and was a National Science Foundation Postdoctoral Fellow at Princeton and Maryland. He has been a member of the teaching faculty at Maryland for 14 years.

Dr. Currie's early research was in formal relativistic particle dynamics. He was a major participant in the Apollo Lunar Laser-Ranging Experiment at McDonald Observatory, and is a member of the Wide-Field Planetary Camera Team developing a CCD camera for NASA's Space Telescope. His current work on the long-term Amplitude Interferometry Program involves extensive observation at Palomar Mountain and Mount Wilson Observatories. The program has led indirectly to the development of the two-color refractometer for stellar position measurement and the use of CCD's on the transit circle.

DECEMBER CALENDAR — *The public is welcome.*

- Tuesday, December 1, 8, 15, 22, 29, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.
- Friday, December 4, 11, 18, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.
- Friday, December 4, 18, 8:00 PM — Use the NCA 14-inch telescope with Bob Bolster, 6007 Ridgeview Drive, south of Alexandria, VA, off Franconia Road between Telegraph Road and Rose Hill Drive. Call Bob at 960-9126.
- Saturday, December 5, 6:15 PM — Dinner with the speaker at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.
- Saturday, December 5, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Currie will speak.

NOVEMBER LECTURE

Dr. Thomas Corbin, U. S. Naval Observatory, addressed the November meeting of National Capital Astronomers on the status of large-scale astrometry.

The subject matter of this fundamental branch of astronomy is the coordinates of a chosen set of stars — and the coordinate system itself — and their changes with time, over the entire sky. The results are published in several series of fundamental catalogs; these locate the equinox and positions of certain stars for an observed epoch.

There are two main series of fundamental catalogs, German and American. The German FK series is based on successive corrections to older catalogs, from the 1880 FC of 600 stars to the 1963 FK-4 of 1535 stars. The FK-5 (about 1984) will contain about 4500 stars, including an extension to 2000 fainter stars to be added in a differential manner, since they cannot be directly related to the old system.

FK-4 mean errors range from 0.1 to 0.3 arcseconds in the Northern and Southern Hemispheres respectively. Typically, coordinates are really defined only for the sparsely distributed catalog stars; interpolation to other objects introduces accuracy problems.

Each program of observations of the Sun gives corrections to right ascension and declination, therefore the equinox and polar-equator corrections. Each catalog of the series therefore inherits some errors from previous editions.

It should be pointed out, however, that the German FK series remains essential. Since the FK series has been the standard for several decades, the FK-5 must not depart too abruptly from the FK-4. Hence in computing the FK-5, the FK-4 stars will be used to determine the needed corrections and the fainter stars will then be added to the system.

The American series attempts a fresh start dependent only on newer instruments and observational techniques for more accurate data. This ideal can, of course, only be approached; there are many requirements and difficulties. The American approach will attempt to incorporate the fainter stars directly in the formation of the system.

Every series of observations being infected by systematic errors, no one series or catalog should be allowed to dominate. However, the Cape series (South Africa) does dominate the FK-4 in the Southern Hemisphere data; 1970 shows serious system distortion. Recent data from Perth, Cape, and Argentina all show this same distortion. Expeditions are planned.

Differences in magnitude, techniques, and methods of data reduction can each introduce systematic errors. For example, in order to make proper reductions of transit observations, the Naval Observatory must recalibrate azimuth, level, and collimation of the transit circle every two hours! A quite separate list of circumpolar stars are observed both above and below the pole to determine the current pole.

An effort is being made to recalibrate old data. However, the early raw data were seldom preserved; only the reductions were published. More recent data have been machine-recorded.

Beyond the fundamental system, there exists an international system of reference stars. For example, the AGK-3R (reference stars to the AGK-3), set up in 1950, is based on observations from 11 observatories of each of 21,000 stars north of declination -5° . Its southern counterpart, the SRS, contains 20,500 stars south of declination $+5^{\circ}$. The northern half is complete and will be published soon. Work is in progress on the southern part of the system; the whole list is to be reobserved during the 1980's.

Photographic catalogs include the AGK-2 (about 1930), containing 180,000 stars north of $-2^{\circ}5'$, the AGK-3, (about 1970), a repetition of the AGK-2 for proper motions, and the AGK-4, now being planned in Germany.

The Yale catalogs, another series from 1916 to 1956, is based on no one system.

OCCULTATION EXPEDITIONS PLANNED

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

UT		Place	Vis	Pcnt	Cusp	Min
Date	Time		Mag	Sunlit	Angle	Aper
12-04-81	03:04	Richmond, VA	8.3	43	5S	12 cm
12-16-81	11:24	Owings Mills, MD	7, 9	68	7S	10 cm
12-20-81	11:07	White Plains, MD	9.1	28	9S	12 cm
12-24-81	11:16	Thornburg, VA	6.9	3	5N	8 cm
12-31-81	00:14	Hayes, VA	7.0	18	9S	5 cm
ASTEROIDAL						
12-27-81	02:28	Carib. Sea	dM=5.9	7.7	(357) Ninina	5 cm

NOVEMBER DISCUSSION GROUP WELL ATTENDED

About 15 members interested in either improving their astrophotographic techniques at various levels or learning the basics gathered to discuss the subject on November 21. We thank our guest moderator, Fred Espenak of NASA Goddard, for his expert guidance and examples. We also thank Bob Wright for making the arrangements.

NCA WELCOMES NEW MEMBERS

Gary L. Axelson
8642 Victoria Road
Springfield, VA 22151

Louis Ward, Apt. 83-A
2815 South 9th Street
Arlington, VA 22204

K. Peter Wagner
6308 Landon Lane
Bethesda, MD 20834

system.

The sky has been astrographically photographed to magnitude 13 between 1890 and 1936, recording 2,000,000 stars. Although X-Y measurements on the plates, with plate constants, are published, they are largely ignored because they are so hard to compute. Overall there is about 10 to 15 years of work ahead.

Current work includes keypunching all these data, constructing a reference system from the IRS and photo catalogs, therefore new reductions yielding usable coordinates for the astrographic catalogs, and combining the AC with the U.S. Naval Observatory astrographic program, to determine the positions and proper motions of many stars.

examples of studies which are particularly sensitive to small catalog errors include:

Moving cluster parallaxes (for example, of the Hyades), are based on small proper motions. Systematic errors across declination zones generate huge errors.

Perturbations in the orbits of Neptune, and especially of Uranus, may imply the existence of an undiscovered planet — or systematic observational errors. When Uranus' residuals from 1837 to 1881 are reduced on a nightly basis, the rate of change of residuals with time are reduced by a factor of four. Older data are badly reduced; reduction is a major problem.

Estimates of galactic rotation are based on measurements of proper motions. Global systematic errors affect these.

Existing data suggest that the universal gravitational constant changes with time. In this study it is extremely important to remove systematic effects in proper motion.

EXCERPTS FROM THE IAU CIRCULARS

1. September — Photographs taken on September 7, 20, and 22 failed to confirm the comet reported by Stattmayer. Exposures on the 20th were made with the 1.2-m Palomar Schmidt, those of the 22nd with the Lowell 30-cm astrograph.

2. September 26 — H. Ford and R. Ciardullo, University of California, and G. Jacoby, Kitt Peak National Observatory, discovered four bright stellar hydrogen-alpha sources near the center of M31, which were not seen on 1979 red plates from the 4-m telescope nor on Einstein Observatory images. Some features characteristic of novae were seen in spectra obtained in October with the 3-m Lick telescope.

3. October 7 — G. Emerson, E. E. Barnard Observatory, Boulder, observed and photographed a 9.9-second occultation of SAO 187124 by (88) Thisbe. He used an 8-cm refractor and a 22-cm F/4 camera.

4. October 21 — S. Dunbar, California Institute of Technology, discovered a fast-moving asteroidal object (1981 UA) of 16th magnitude with the 1.2-m Schmidt telescope at Palomar.

5. November 4 — E. Helin and S. Dunbar, California Institute of Technology, discovered a fast-moving asteroidal object (1981 VA) of 16th magnitude with the 1.2-m Schmidt telescope at Palomar.

U. S. NAVAL OBSERVATORY COLLOQUIUM

Dr. Stephen Maran, NASA Goddard Space Flight Center, will speak on UV spectroscopy of extra-galactic planetary nebulae, at 3:30 PM on December 10. Coffee and tea will be served in the foyer of Building 52 at 2:40 PM.

Members are welcome. Enter the Observatory at the 34th-Street gate, where the guard will require identification and provide directions.

FOR SALE

Telescope — 12.5-inch reflector on heavy observatory mount with 3-inch diameter shafts. Eyepieces include wide-field Erfle and zoom. Best offer over \$2,000, or will sell mount and telescope separately. Sidney Kastner, 123 Northway, Greenbelt, MD 20770. H: 474-7129. O: 344-8771.

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