



the Spectrum

The Buffalo Astronomical Association
c/o Buffalo Museum of Science
Humboldt Park
Buffalo, N.Y. 14211

Editor: Ernst E. Both

APRIL 1971

APRIL MEETING: Our meeting on April 9, 1971 (8:00) will feature Mr. Ralph Dakin of Bausch and Lomb, Inc., Rochester, N.Y., who will present a lecture on "Gratings in Astronomy." Mr. Dakin is well known to most of our members from his lecture on the total eclipse of the Sun in Peru (May 1968); a Fellow of the Rochester Academy of Sciences, Mr. Dakin has been for many years a guiding influence in the Astronomy Section of the Rochester Science Museum. This promises to be a very informative meeting and we are very happy to welcome back Mr. RALPH DAKIN!

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* MEASURING A MIRROR'S RADIUS OF CURVATURE * By Robert Burdick

To the mirror maker who is looking for a simple method to measure the radius of curvature of his mirror during grinding, a steel ball whose radius is accurately known and a stop watch which will measure to 1/10 second is needed. The procedure is as follows: level the mirror, face up, using the ball which will roll to the mirror's center, if level. The mirror must be solidly supported, and both ball and mirror surface should be completely clean of dust and dirt particles. The ball is brought to the edge of the mirror and released. The ball will roll to the other edge of the mirror, then back to the release point; when it reaches the release point the stop watch is started. If P = period, in seconds/cycle, and F = frequency, in cycles/second, then:

$$P = \frac{1}{F} ; \text{ this value is placed in the formula } R = r7P^2, \text{ where}$$

r = radius of ball, and R = radius of the mirror.

I have a 2-inch diameter ball, and for a 12.5 inch, $f/4$ mirror the number of oscillation cycles of the ball is 40 in $150.4 \pm .1$ seconds. This is accurate to within 0.14 inches for a 100 inch focal length. A table of seconds and mirror radii can be calculated for your particular mirror and converted into a graph. All that is needed each time the radius is measured is to look up the seconds in the graph and read off the corresponding radius.

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* B.A.A. INSTRUMENT SECTION REPORT * By Warren Steinberg

During the evening of February 26, 1971, another group of instrument makers congregated in the Roosevelt Room of the Museum of Science. The highlight of the meeting was the testing and comparison of four mirrors. Bob Burdick's four-inch mirror was a classic example of amateur precision over a commercially made mirror. Ed Lindberg, upon testing the mirror and examining Bob's graphical analysis, stated that as far as anyone could see, the errors in Bob's 4-inch were beyond recognition. Bill Gehrke brought a very nice 8-inch Cave mirror but Tom Dessert's commercially made 4-inch mirror did not measure up to the ATM standards. Wayne Johnson displayed his hard-worked-on mirror which he had accidentally broken. Such is the tragic lot of the mirror-maker! Other items of interest: Rudy Buecking's discussion of 100% color correction with Schupmann systems; Miss Gretchen Schork on the dusty observing conditions in Arizona as experienced by John Riggs; Bill Parker's talk on optical designing with computers - Bill displayed some weather satellite pictures which

confirmed the continuous cloud cover hovering over our area and especially over Kellogg Observatory. Rudy Neuhauser talked with Dave Zdrojewski about cement tools for use with the deep curves on the Maksutov corrector. And one of our members told of shooting down some transmission lines with his home-made (via The Scientific American) gas laser -- at 200 yards, that's pretty good (it is also against the law). Later on in the evening there was some discussion on the possible expansion of Newstead Observatory. Attendance: Miss Gretchen Schork, Rudy Buecking, Bob Burdick, Tom Dessert, Bill Gehrke and sons, Irv Goetz, Wayne Johnson, Ed Lindberg, Rudy Neuhauser, Bill Parker, Ron Poling, Vern Siegel, Warren Steinberg, and Dave Zdrojewski.

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* NEW YORK ASTRONOMICAL CORPORATION MEETS * By Frederick R. West

On November 13-14, 1970, the third annual meeting of the New York Astronomical Corporation was held in New York City, hosted by Goddard Spaceflight Center's Institute for Space Studies. The New York Astronomical Corporation is an organization whose purpose is to further interest and research in astronomy in New York State and to assure adequate research facilities to astronomers and astrophysicists in the state. At present there are 20 organizations which belong to this corporation; these include both public and private universities, colleges, and planetaria. There are two classes of membership: full membership, which is open to universities with PhD programs in astronomy or related physical science, and associate membership, open to all other universities, colleges, and planetaria with some program of teaching and/or research in astronomy. At present there are 7 full members and 13 associate members.

The principal project now planned by the Corporation is the site selection for a 150-inch reflector to be used by New York State astronomers at a favorable location outside the state. The telescope is to be a replica of the two Kitt Peak National Observatory 150-inch Ritchey-Chretien reflectors now under construction at Kitt Peak (Arizona) and Cerro Tololo (Chile). Construction of such a telescope would result in great saving of design and engineering costs, at present estimated to be at least \$ 20,000,000. The Corporation has not yet obtained any funding for the planned instrument. Along with the 150-inch, an instrumentation laboratory is planned within New York State, to allow more efficient use of the large telescope. Development of the telescope and laboratory will take place over a 6-year period after the initial funding. Mauna Kea (Hawaii), Kitt Peak (Arizona), and Cerro Tololo (Chile) are among the most attractive sites being considered.

The two main parts of the meeting took place on each day of the two-day meeting. The first day was spent in the presentation of technical papers and research reports from some of the members and associate members. One of the most interesting was that of Dr. P. Thaddeus of Goddard, dealing with interstellar molecules. Especially interesting is the possibility that maser action in formaldehyde, one of the molecules identified in interstellar matter, can allow microwave observations of emission lines from interstellar formaldehyde to provide a check on the temperature of the background radiation of the universe. Also, Dr. A. G. W. Cameron of Goddard and Yeshiva University's Belfer Graduate School of Science presented a paper on the latest results on pulsars which are now agreed to be neutron stars in rapid rotation (periods: 0.03 to 3.5 seconds), of extremely high density (10^{11} to 10^{15} gram/cm³) and with a surrounding magnetosphere in which charged particles move at nearly the velocity of light in an extremely strong magnetic field (10^8 to 10^{12} gauss).

Other reports and short papers were presented the first day. One dealt with research in astronomy and astrophysics at Columbia University, where work is being done on narrow-band photometry, white dwarf magnetic fields, X-ray astronomy, and quasars. Another covered the extensive work going on at State University's Stony Brook campus, including stellar atmospheres, infrared astronomy, star clusters, planetary studies, and lunar geology. At City University of New York, Dr. George Stroke has been observing the Sun as a star spectroscopically; to do this properly he has to destroy the spatial resolution which we can see across the Sun's disk. A heliostat on the roof of a building and a Czerny-Turner monochromator are used in this work. Several projects in galactic structure are under way at the City College of New York.

At Cornell University, which operates the 1000-foot aperture radio telescope at Arecibo (Puerto Rico), there is a great diversity in research activity. Along with work in infrared astronomy and technology, the lunar law of reflection, ice particles in the atmosphere of Venus, stellar structure, and interstellar matter are being studied. Dr. Frank Drake gave a paper on pulsar observations with the Arecibo radio telescope with an interpretation of the sudden change in the period between successive pulses that has been observed for the Crab Nebula pulsar and others as due to a change in torque on the pulsar's magnetosphere rather than to pulsation of the pulsar or the presence of a planet in the pulsar system. State University of New York at Albany - Dudley Observatory activities were described in a joint report, since their activities and personnel largely overlap. Dr. Curtis Hemenway is doing research on meteors and Dr. Kassem is doing planetary radio astronomy. Dr. Schmalberger is studying luminosity criteria in stars, especially of spectral class B, and he has obtained spectrograms at Dominion Astrophysical Observatory in Victoria (British Columbia) for this work. Also non-linear limb darkening in the atmospheres of eclipsing binaries is being studied. Dr. A. G. Davis Philip has devised a two-prism arrangement to obtain field horizontal branch star spectra. In summary, the technical papers and reports presented revealed an impressive amount of research being conducted in astronomy and astrophysics within the state. Unfortunately, reports were not available from State University's Binghamton and Syracuse campuses, Colgate University, and the University of Rochester's Mees Observatory.

The business meeting of the Corporation took place Saturday, November 14. Associate membership was voted to the State University College at Buffalo, and the author was named its institutional representative. After this discussion on site testing for the location of the 150-inch telescope took place. Dr. Y. Terzian of Cornell stated that he planned to carry out site tests at both the Mauna Kea (13,000 ft. elevation) and Haleakala (9,000 ft.) observatories during his forthcoming observing trip to Hawaii, to learn more about the decrease in water vapor in the atmosphere at the two sites and the resulting improvement in infrared atmospheric transparency with increasing elevation. Since infrared observations may be among the most important for future astronomy, a site with maximum atmospheric transparency in the infrared is needed. If the Mauna Kea site were found nearly free of water vapor, it would give it an important advantage over the other possible sites for the 150-inch. Dr. Terzian was elected chairman of the site-testing committee.

The role of astronomy in the colleges and secondary schools was discussed. The principal question was whether or not astronomy should be taught as a separate subject (aside from physics or general science) in the state's secondary schools. The astronomy Education Committee, chaired by Dr. Kenneth Franklin of the Hayden Planetarium, was assigned the task of further study of astronomy in the secondary schools. Also the possibility of starting a New York State Astronomical Corporation Bulletin was considered; the Bulletin would publish results of research done within

New York State. The Corporation representatives decided not to start publication of such a Bulletin at once. The following members of the Board of Directors were elected to serve from November 1970 to November 1972: Dr. C. Hemenway, Chairman; Dr. Y. Terzian Vice-Chairman; and Dr. A. G. Davis Philip Secretary-Treasurer.

The New York Astronomical Corporation bibliography, with the names of astronomers resident in New York State and their publications was reviewed prior to publication. Colgate University in Hamilton, New York was picked as the site of the 1971 meeting of the Corporation. Scheduled to begin sometime this year is the fund-raising drive to obtain some of the \$ 20,000,000 needed for the observatory and laboratory. An inspection team will at some future date visit each member and associate member for an evaluation of the astronomical facilities and research projects.

The author left the meeting hopeful that the New York Astronomical Corporation would have a unifying and stabilizing effect on the vigorous pace of astronomical work in the state. There is a definite need for such an organization to coordinate and support research in astronomy within this state, especially since during the last few years in the United States science funding has been quite stingy, the future prospects for adequate funding appear to be dim, and the danger exists that basic research will fall victim to poverty and disorganization.

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* SPY AND TELL * Dr. Sev Chapman will head a newly created committee to advise N.Y. State Legislature on scientific matters. Our warmest congratulations! * * * Mirror grinders: Darwin Christy=12.5-inch; Warren Steinberg = 8-inch; Bob Karytas = 4.5-inch finished, 6-inch going; Irv Goetz = 8-inch; Wayne Johnson = 8-inch (broken?); Bill Parker = 6-inch Maksutov or Schmidt; Bob Burdick = 12.5-inch Cassegrain. * * *

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