REPORTS OF OBSERVATORIES, 1949-1950

Allegheny Observatory, University of Pittsburgh, Pittsburgh, Pa.

Thaw Refractor. The thirty-sixth year of the use of this telescope was one of average weather conditions. Observations were made on 166 nights, including 147 evenings, 110 mornings, and 91 nights of both evening and morning observations. The number of plates taken was 2196. Plates of major planets and satellites numbered 34. Ten plates were of minor planets. The rest of the plates were for the parallax, double star, and proper motion programs. Observers were Burns, Wagman, Daniel, Rachuba, Winterhalter, and John Schwartz from Oct. 1.

Astrometry. Forty-one parallaxes were completed and 50 published. Miss Lauterbach measured 73 plates of 85 Peg, 103 plates of 70 Oph and 79 plates of ζ Sge in two coordinates. A preliminary mass ratio for 85 Peg showed the brighter component to be slightly more massive than the fainter. Parallaxes for 85 Peg and 70 Oph are in good agreement with the accepted values.

Spectrographic Laboratory. In cooperation with Westinghouse Research Laboratories Burns is repeating determinations of wave lengths in the copper II spectrum between 9000Å and 2000Å at the request of Professor A. G. Shenstone of Princeton University. The hollow cathode tube is being used in place of the arc at reduced pressure used in previous work on this spectrum. Cadmium and mercury with neon and argon wave lengths are necessary to cover the desired range. A paper, "Interference Measurements in the First Spectra of Neon and Mercury," by Keivin Burns, Kenneth B. Adams (Westinghouse Research Laboratories), and Jean Longwell, has been published in *Journal of the Optical Society of America* 40, 339, June 1950. These measurements will assist in establishing secondary standards of wave lengths shorter and longer than any now accepted in the spectra of the rare gases.

Observations of mercury 198 and mercury 202 for the determination of variation in wave length of lines from isotope to isotope are pretty well along. Three stable isotopes, copper 63, cadmium 114 and mercury 199, received from the Atomic Energy Commission, will be used for comparison with the natural elements as a test for secondary

standard wave lengths, isotope shifts, and technique of isotope analysis.

Instruction and Visitors. Burns had a student in each of two summer graduate courses. In an undergraduate course at the University Wagman had 33 students the first semester and 18 the second. Daniel entertained 2600 visitors on 152 nights in the Public Evening Service. There were 324 daytime visitors.

N. E. Wagman, *Director*

Dearborn Observatory. Northwestern University, Evanston, Ill.

This report covers the period September 1, 1947 to June 1, 1950.

Personnel. Dr. O. J. Lee retired on September 1, 1947, after eighteen years of service to the university, and was appointed Professor Emeritus. He was succeeded as Professor of Astronomy and Director of the Dearborn Observatory by Dr. K. Aa. Strand, who was also appointed a Research Associate of the Yerkes Observatory.

Dr. W. S. Krogdahl was promoted to Assistant Professor on June 1, 1948. Dr. (Mrs.) Helen Steel Lillibridge served as a Research Associate from March 1, 1948 to May 1, 1949. Mr. H. Rymer was appointed a Technician on November 1, 1947. Mr. Douglas Duke was appointed a part-time Research Assistant November 1, 1947.

The following persons served as graduate assistants for the periods indicated: Mr. J. Sewell (October 48-April 49); Mr. R. Spong (January 49-); Mr. D. Austin (April-June 49); Mr. C. Gasteyer (July 49-); Mr. J. Schopp (June-August 1949); Mr. T. Littlejohn (October 49-).

Mr. John Sternig has continued to lecture on clear Friday nights when the observatory is open to the public. Approximately 2000 persons attend these lectures each year.

Equipment. The 18 $\frac{3}{4}$ -inch refractor was thoroughly overhauled in 1947 and a new camera attachment and a series of 4 objective gratings were completed in June, 1948. This equipment was built in the machine shop of the Physics Department of the University. A new double-slide camera and a plate carriage providing automatic timing of exposures and automatic shifts between the exposures is now under construction. The building of this equipment has

been made possible through a grant from the Research Corporation. The two larger measuring machines have been overhauled and modified for the main research program.

Research. The main research program of the Observatory consists of photography of double stars with separations larger than 4". The high quality of the optics of the Dearborn refractor makes it especially suited for this program. Additional plates of double stars with separations between 2" and 4" were obtained by Mr. Strand with the Yerkes and the Sproul refractors. Since the program was started in June 1947, 260 plates have been taken with approximately 60 exposures on each. Mr. Rymer and Mr. Gasteyer were the main observers. Together with the plates taken at the Yerkes and the Sproul Observatories the accumulated measures now total 250,000 settings.

Mr. Strand has completed an analysis of the Procyon system from plates taken at the Yerkes and McCormick Observatories. High dispersion plates of Procyon taken at the Mt. Wilson Observatory were measured by Mrs. Lillibridge.

Dr. Krogdahl has devoted much of his time to the preparation of his manuscript for a textbook on Astronomy, scheduled to be published by the Macmillan Company. Dr. (Mrs.) Margaret Krogdahl is continuing her theoretical investigations of line broadening in stellar atmospheres. Some of these results have recently been published in the *Astrophysical Journal*. Dr. Strand continued to be in charge of the astrometric program with the 40-inch Yerkes refractor and staff members of both observatories participated in the measurements and reduction of the accumulated material.

K. Aa. Strand, *Director*.

Flower and Cook Observatories. University of Pennsylvania, Upper Darby and Wynnewood, Pa.

During the year ending 1950 June 30, at Flower Observatory, S. G. Barton continued his work on double stars, while C. P. Olivier and three student assistants, W. Marsteller, M. E. Nason and J. S. Stevenson, worked on photometry and variable stars. R. H. Wilson of Temple University, working under a Naval Research grant, used most effectively the interferometer for the measurement of close double stars, during the summer of 1949. He will continue this work, under a new grant, during the summer of 1950. All the above work was done

using the 18-inch refractor. At Cook Observatory, Wm. Blitzstein used the pulse-counting photoelectric photometer, attached to the 15-inch horizontal telescope, with much success on eclipsing variables. Direction of the American Meteor Society was continued by Olivier, and both Barton and he did the usual amount of undergraduate and graduate teaching during the regular session.

A new site of 31 acres about 13 miles west of Flower Observatory has been acquired, and plans are being made to eventually move all the equipment of both observatories to this place. The area on which the buildings will be erected is surrounded by woods on the north and east, the ground is high and wholly unobstructed to south and west, and only by the tress on the other two sides. It faces upon an excellent road. We hope that preliminary construction can begin during the coming year.

Publications. We have practically all data, much in final shape for publication, for Vol. VII, Part 2, *Astronomical Series*. This should appear by the end of the year. Reprint No. 77 is here but undistributed; Reprint No. 61 has actually appeared in the *Monthly Notices*, but the reprints themselves have not arrived. Numbers 78, 79 and 80 will be based upon articles already accepted by journals: we hope to distribute them before the end of the year.

Staff. With sincere regret the resignation of Dr. S. G. Barton is announced. His work, particularly on double stars and also phases of the history of astronomy, has been carried on here for over 30 years. It has been the basis of numerous valuable papers which have appeared both in our *Publications* and *Reprints*. Besides undergraduate teaching, he has also been responsible for the larger part of our graduate courses during the past 21 years. Dr. F. B. Wood, now at Steward Observatory, University of Arizona, has been appointed as associate professor, his duties to begin with the coming session. As at first he will be occupied largely with cooperating in the planning for the new observatory, and personally superintending most of the actual construction and installation, he has been given the additional title of Executive Director. We expect Dr. I. M. Levitt and Dr. Wm. Blitzstein to remain as part-time astronomers at Cook Observatory, and to have at least two graduate student assistants at Flower Observatory, next session. There are besides plans for enlarging the permanent staff in the future.

Observing Conditions. Night work suffered greatly during the past year from unfavorable weather. Indeed, to my recollection, it was the poorest of the past 22 years. Also the rapid growth of the suburbs of Philadelphia is making the positions of both Flower and Cook Observatories steadily worse. We have every reason to believe that the present instruments, placed at the new site, will give much better results than are now possible.

Charles P. Olivier, *Director*

Fuertes Observatory, Cornell University, Ithaca, N. Y.

Instruction. One hundred sixty-eight students registered in the department during the year. Of this number eight were graduate students taking work leading to various advanced degrees. Professor Stahr taught courses in Orbit Theory and Advanced Galactic Structure. Professor Shaw taught a year's course in Introductory Astronomy and an advanced course on the Origin of the Solar System. Open house nights in October and May were attended by crowds severely taxing the facilities.

Dr. Dean B. McLaughlin gave a general university lecture on the Mystery of Exploding Stars and a technical seminar to the Astronomy-Physics group. Other general university lectures included Dr. Farrington Daniels on Atomic and Solar Energy, and Dr. Harold Urey on the Origin of the Earth.

Research. Mrs. Vera Cooper Rubin, graduate assistant, completed an analysis of 108 external galaxies, with published radial velocities and distances, to ascertain the possibility of a differential rotation about some distant point. A modification of the theory of Oort and Lindblad, for differential effect of rotation within our galaxy, was applied to the problem. Analysis yielded the results that our galaxy has a velocity of 400 km/sec toward $G = 160^\circ$, $g = +22^\circ$, and that the universe of galaxies has a plane of rotation with pole at $G = 14^\circ$, $g = +10^\circ$, the center of rotation being in the direction $G = 104^\circ$ or 284° , $g = +5^\circ$. Final solutions contained terms for expansion, peculiar motion and rotation.

Professor Stahr continued work on the radio astronomy project sponsored by the Office of Naval Research. She prepared two supplements to the *Annotated Bibliography on Radio Astronomy*. They were distributed through the School of Electrical Engineering as *Radio Astronomy*

Report No. 4, July 1, 1949, and *Report* No. 10, Feb. 15, 1950. She is currently preparing a completely revised bibliography to appear as a report of Commission 5, International Scientific Radio Union to be presented at the 1950 Zurich meeting.

Professor Shaw developed a project for the spectrophotometry of the moon's surface sponsored jointly by the University and the Office of Naval Research. The project involves the construction of a 12-inch horizontal reflecting telescope fed by a two-mirror coelostat with electric drive. All of the optical work and much of the machine work has been completed. Light from the lunar surface will be analysed by a large quartz spectrograph to which is attached a photo-multiplier tube scanning the spectrum directly. The photo-tube assembly including power units has been completed. As an auxiliary research a dozen or more lava samples have been chemically analysed and some reflectivity curves run.

R. William Shaw, *Director*

The Observatories of the University of Michigan.

Ann Arbor, Michigan; Bloemfontein, South Africa; Lake Angelus, Pontiac, Michigan.

THE OBSERVATORY. Ann Arbor, Michigan.

PERSONNEL

Dr. Stanley P. Wyatt, Jr., was appointed Instructor in Astronomy beginning September 1, 1950. Dr. Aller was in residence as a guest investigator at the Mount Wilson Observatory during the period August, 1949, to January, 1950.

Mrs. Sally C. Lewis, Mr. Lawrence Banghart, Mr. Shu-Mu Kung, and Miss Carolyn Mooshy served as assistants under solar research contract N6onr-232-V with the Office of Naval Research. The following graduate students were also employed as part-time teaching and research assistants: Donald H. Clements, Robert W. Donselman, Norman H. Horwitz, Marilyn Mears, Robert E. Seall, Edwin B. Weston, and Kenneth M. Yoss. Mrs. Marian Munroe joined the Observatory office staff as typist on February 20, 1950.

INSTRUMENTAL

The dome for the Curtis Schmidt-type telescope was delivered to the Portage Lake Observatory and erected late in the summer of 1949. The telescope mounting was received from the Warner and Swasey Company on December 12,