THE PINE MOUNTAIN OBSERVATORY OF THE UNIVERSITY OF OREGON

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The Department of Physics of the University of Oregon has been expanding its staff and facilities for a number of years. This has been aided by the award in 1965 of a National Science Foundation Development Grant. In discussions of its future, the departmental faculty felt that expansion in optical astronomy would be one of its goals and that it would be desirable to acquire a modest but modern optical observatory for the staff.

During the summers of 1963 through 1966, one of us (E.G.E.) operated an observatory with a 15-inch reflecting telescope near Sisters, Oregon, just east of the Cascade Mountains in central Oregon. This experience provided convincing evidence that the climate of the area would be excellent for photometric astronomy in the summer months and quite acceptable in the spring and fall seasons.

The new observatory was built on Pine Mountain in the spring and summer of 1967, and the first observations were made the night of September 7. This facility was financed by a construction grant from the National Science Foundation (GP 7270), matching funds from the University of Oregon Development Fund, and funds collected in a drive conducted in central Oregon. Operation during the summer of 1967 was financed by another NSF grant, GP 7388.

The observatory site is at an altitude of 6300 feet on Pine Mountain in the central Oregon desert plateau 50 miles east of the Cascades. It is 165 miles from the Eugene campus, 35 miles southeast of Bend, and 8.5 miles by gravel road from Millican Store on US 20. The site is a five-acre permit area leased from the U.S. Forest Service (Deschutes National Forest). The approximate longitude and latitude are, respectively, 120° 56′ W and 43° 48′ N. Pine Mountain is a large andesitic-basalt outflow five miles long and three miles wide, and the top is some 2000 feet above the surrounding desert at the base. Almost the whole mountain is covered with Ponderosa pine. The distance from the Cascades places it beyond reach of the occasional atmospheric-wave clouds found on

the eastern (leeward) side of these mountains; and thanks to its height above the desert, the site avoids most of the dust raised by daytime atmospheric convection. As measured during the summer months, the diurnal temperature variation is about 25 degrees F. During the summer months about 70% of the nights are clear, and almost all are of photometric quality. The limited experience of last summer shows that average seeing conditions are excellent.

The new telescope is a Boller and Chivens 24-inch reflector with a 6-inch finder. The *f*-ratio at the Cassegrain focus is 13.5. In addition to the slew and set motions, the Boller and Chivens synchro-paddle supplies a fine control that moves the telescope in either coordinate by increments as small as 0.5 seconds of arc. The 18.5-foot Ash Dome shown in Plate I is mounted on a circular, two-story substructure, the lower floor of which contains a photographic darkroom, the telephone equipment, table space, and the main electrical distribution panels. Access to the upper observing floor

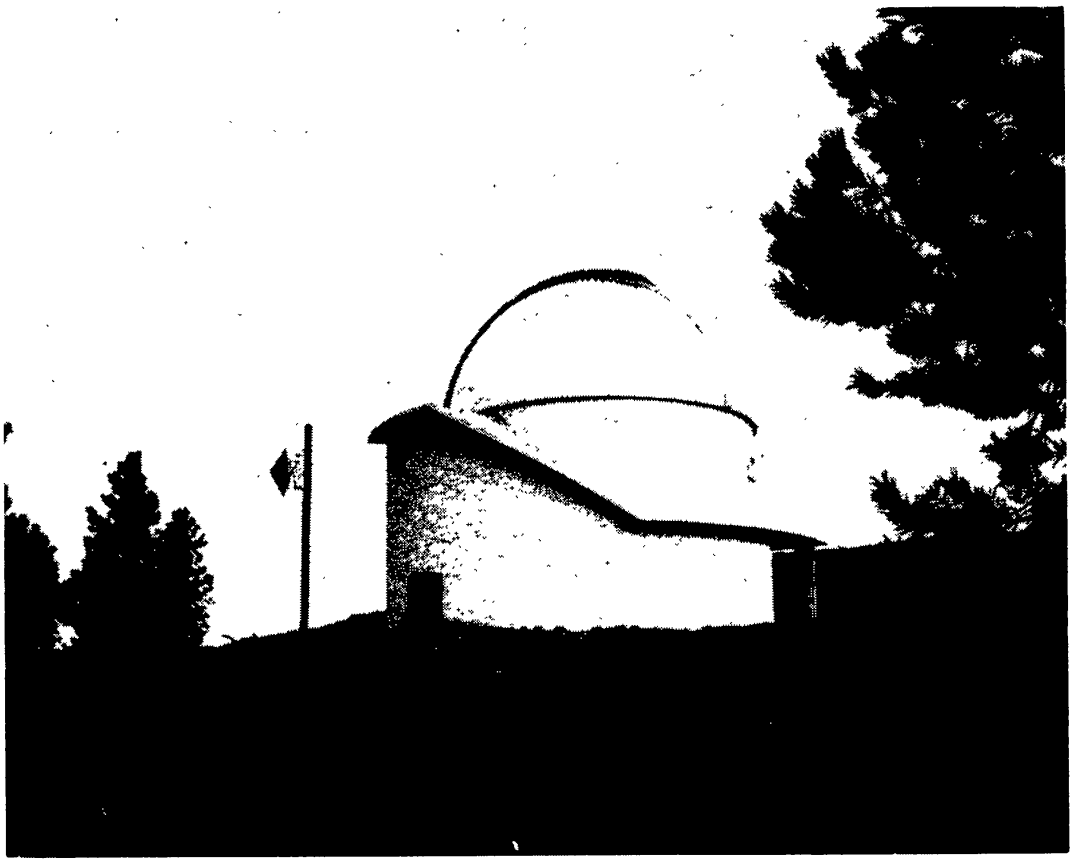

PLATE I
Pine Mountain Observatory and the microwave tower

is by means of an outside staircase. The concrete telescope pier rests on bedrock.

A 20 × 52-feet residence (see Plate II) provides comfortable living quarters for the professional staff and night assistants. A night observer and caretaker, Mr. Martin McCoy, lives year round at the observatory. A 17,000-gallon cistern and pressure pump supplies water for the observatory and residence. Electric power is furnished by the Central Electric Cooperative of Redmond. The power cable was laid underground for 20,400 feet from a transformer near a well at the north base of the mountain. This underground feature prevents power interruptions due to falling trees or snow. Telephone communication is provided by Pacific Northwest Bell Telephone Company. This consists of a microwave link (2 GHz) with one antenna on the mountain and the other 30 air miles away in Bend. This facility is capable of 24 channels of simultaneous communication.

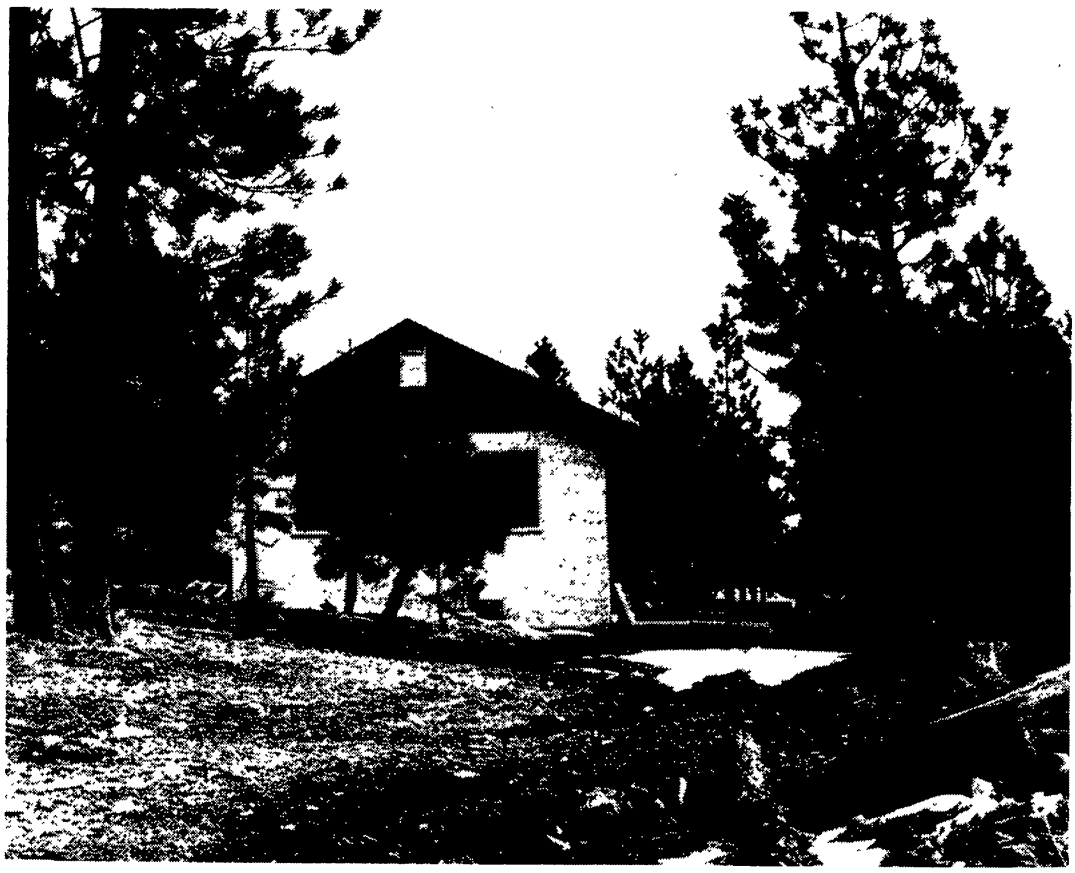

PLATE II
Residence at the Pine Mountain Observatory

The 24-inch telescope is an all-purpose instrument presently equipped for photoelectric photometry and photography at the Cassegrain position. The photometer is a single channel, multicolor instrument with thermoelectrically cooled photomultiplier (EMI 9524S). The photometer with its offset guider was constructed in our science instrument shop. A multichannel photometer for simultaneous observations in several colors is planned for the future. We also intend to add a low-dispersion spectrograph.

The recording of data is accomplished by a Dymec digital data system. The photomultiplier current is fed through a chopper-stabilized amplifier and capacitor integrator. At the end of the integration period the capacitor voltage is determined by an auto-ranging digital voltmeter (H.P. 3440A). An electronic scanner reads the positions of three manually set switches on a box near the photometer which indicate (*a*) whether the observation is on the comparison star, the variable, or the sky; (*b*) the filter color; and (*c*) the amplifier factor. The scanner then reads two electronic clocks for the Julian day and the local sidereal time in hours, minutes, and seconds, and finally the voltmeter. The output of the scanner is fed to a serial printer for visual inspection of the data and punched out on a paper tape in ASCII 8-level code.

Perhaps the most interesting feature of the observatory is our ability to study the reduced photometric data from a given night before the beginning of the next night and, therefore, to keep better control over the observing program. At the end of a night's work the punched tape is fed into a teletype and the electrical signals are sent via the microwave link and land lines directly to the Computing Center on the Eugene campus where an identical punched tape is produced. The raw data on the tape are fed into the IBM 360-50 computer for reduction, and an output tape is produced. This last tape is fed into a tape reader in the Computing Center and the results are returned to the mountain and recorded by the teletype. The whole procedure can require as little time as one hour. Improvements in this system are expected as we gain experience.

For the present, the main research effort of the observatory consists of photometric investigations of eclipsing binaries and magnetic variable stars. One of us (R.J.D.) is particularly interested in the development of techniques for the detection of extremely faint point and surface sources. A simple timing device has been

built which uses the set rate motion of the telescope to move it semiautomatically and rapidly back and forth between the comparison and variable stars. We have also designed and will build, when funds are available, a more fully-automatic system for setting the telescope in which the coordinates of several program stars are fed into a small computer at the observatory and the resultant hour angles and apparent declinations are determined after corrections have been made for refraction and flexure. This information will be fed to encoders on the telescope and it, together with the dome, will be directed to the proper position in the sky. The telescope has already been modified by Boller and Chivens toward this project. This system will permit very rapid motion from one star to another and help reduce variable transparency errors.

In conclusion, it is a pleasure to acknowledge the financial assistance of the National Science Foundation. Our further thanks are given to Governor Tom McCall of Oregon and President Arthur S. Flemming of the University of Oregon. We are also grateful for the effective cooperation of the Pacific Northwest Bell Telephone Company, the Central Electric Cooperative, the Deschutes County Road Department, and the U.S. Forest Service (Deschutes National Forest). Our particular gratitude is directed to those many citizens and firms of Central Oregon who gave most generously of their funds and services to make this observatory possible.