

Marked "Confidential"

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THE POLICY OF THE ASTROPHYSICAL OBSERVATORY

It may be advantageous at this stage of our preliminary work to emphasize the two guiding principles in the policy of the Astrophysical Observatory and Laboratory of the California Institute: the maintenance of an open mind regarding all questions of procedure, and the importance of securing the cordial cooperation of the best authorities in this country and abroad in solving them. Thanks to the unanimous judgment of the Observatory Council, its Advisory Committee, and their many able advisers, several general decisions, which have greatly expedited the preliminary work, have been made. But we cannot be in a position to settle other questions of equal scientific and technical importance, not to speak of matters of detail, until an exhaustive study of all the possibilities suggested by recent progress here and in Europe has been completed.

Decisions

The principal ~~discussions~~ and results thus far reached are as follows:

- (1) The 200-inch mirror disk should be made of solid fused quartz. Through the cordial cooperation of the General Electric Company, promised by its President, Mr. Gerard Swope, work was undertaken ^{in July} by Dr. Elihu Thomson at West Lynn with this object in view. Dr. Thomson hopes to complete a 60-inch quartz disk and begin a 100-inch disk by next May, much in advance of earlier estimates.
- (2) A rigorous comparative study of promising mountain sites should be made without delay. Precise measures of seeing, rather than estimates, are essential. Dr. Anderson accordingly devised a simple means of measuring the oscillations of star images under a power of 600 with a 4 or 5 inch telescope, and Mr. Ellerman tested it satisfactorily on Mount Wilson, in comparison with the estimates of observers with

the 60-inch and 100-inch telescopes. Preliminary tests by Messrs. Ellerman and Humason of this method indicate that both day and night seeing at Palomar and the day seeing at Horse Flats is somewhat better than at Mount Wilson, while the darkness and purity of the sky at both of these sites are much superior. Preliminary tests at Table Mountain are such as to make it desirable to make further examination of this site. The Chief of the Weather Bureau has kindly loaned three sets of meteorological instruments, which will soon be installed.

- My earlier letter, based on a preliminary report, said 100, but this doubtless included close visual binaries.*
- (3) Data kindly supplied by Dr. Aitken indicate that at least 30 spectroscopic binaries, not to speak of many close visual binaries, could be measured with a 40-foot stellar interferometer, which should be built so as to rotate in position angle without getting out of adjustment. This demands an extremely rigid design, both for the interferometer and the telescope tube.

- About 17 inches, a splendidly large field.*
- (4) Theoretical studies of the field of an F/3.3 paraboloidal mirror by Messrs. Anderson and Seares, confirmed by a more complete investigation by Dr. Ross, show that it is small, but large enough to render the use of this ratio desirable. This conclusion is strengthened by Dr. Ross's belief that he can design a lens, for use in front of the plate, which will greatly enlarge this field when desirable. Dr. Ross has also determined the field of an F/10 Cassegrain combination, and finds it to be essentially perfect over 30' in diameter. He will continue his investigations of the optical design of the 200-inch telescope during the coming year.

- (5) Dr. Pease has continued his work on the preliminary design of the mounting, which we hope can be made of the forked equatorial type, with

coudé mirror attachment. The final design will be worked out jointly by Dr. Pease, Dr. Anderson, Mr. Ambrose Swasey and his associates, Mr. Gano Dunn, and others, with the advice of the astronomers, physicists and opticians of the California Institute and the Mount Wilson Observatory, and of others whom we are consulting.

- (6) The extensive study of auxiliary instruments that forms a prime feature of the general scheme has been begun, as follows:
 - (a) Mr. George Eastman and Dr. C.E.K. Mees have generously agreed to deal with many of the photographic problems at the Research Laboratory of the Eastman Kodak Company.
 - (b) A Zeiss recording micro-photometer has been ordered, for study and possible improvement by Dr. Pettit and other members of our staffs.
 - (c) Dr. Sinclair Smith will attempt to develop and improve the radiometer recently used very successfully by Dr. Abbot with the 100-inch Hooker telescope. He will also make a study of the best means of producing grating replicas.
- (7) A well-equipped astrophysical instrument-shop will soon be erected on the campus of the California Institute.
- (8) Preliminary studies have been made for the design of the Astrophysical Laboratory on the campus of the Institute.
- (9) A committee has been appointed to prepare a comprehensive scheme for the proposed Graduate School of Astrophysics.
- (10) Dr. St. John and Dr. King, who have visited many European observatories, laboratories, and instrument-shops in search of useful ideas and suggestions, have prepared valuable reports on the results of their inquiries.

These strongly emphasize the necessity of our acquiring ample knowledge of recent developments. For example, the radical changes made by Zeiss and others in the design of driving-clocks and of counterpoise systems for equatorial telescopes must be fully studied before we attempt to complete even a preliminary design for the 200-inch mounting.

In general, the work thus far ~~accomplished~~ accomplished clearly demonstrates the necessity of effective team-play in every phase of our large undertaking. All who are taking part have cordially shown their willingness to join on equal terms with others in developing their share of the work, and it is through the continuation of this spirit of unselfish cooperation that we may hope for the success we are seeking.

George E. Hale.

July 11, 1928.