

Circular Note to: Drs. Berkner, Deutsch, Goldberg, Gordon, Hagen, Kraus, Tuve

From: Bart J. Bok, Harvard Observatory, Cambridge 38, Massachusetts

Date: March 29, 1955

Subject: Sub-Committee Report for NSF-AUI

At the March 26 meeting at AUI in New York, I was appointed as the Chairman of a Sub-Committee with membership as indicated above and charged with the responsibility of preparing promptly a report on a scientific justification for a variety of large steerable parabolic radio reflectors, with aperture of 150 feet, 300 feet and 500 feet. The Sub-Committee is instructed to limit its inquiry to parabolic reflectors, thus eliminating from our present consideration scientific problems relating to specialized equipment, search instruments and interferometers. In other words, our assignment is to state clearly what in our opinion are the types of problems that will receive special attention once we have in operation one or more steerable paraboloids, capable of covering the whole sky, and with apertures in the range between 150 and 500 feet - and possibly greater. I have promised Dr. Emberson that I shall submit the Sub-Committee's Report not later than May 5th of this year and this means that I would like to have your comments in my hands not later than Friday, April 15. Our report is to become part of a more inclusive Report to NSF, which Dr. Emberson is to prepare between May 5 and 15. Dr. Emberson's Report to NSF must be completed in time for the May 20 NSF Board and Division Meetings, which will deal with budgetary requirements. As you are probably all aware, the AUI Advisory Committee voted on March 26 to recommend to NSF that AUI be given the funds to proceed with the construction of the basic facility, this facility to include a 150-foot steerable paraboloid, and to initiate engineering studies leading toward the construction of a much larger steerable antenna. The preliminary request from AUI to NSF - which is to be accompanied by rough budget estimates and which will be superseded before the end of the year by the full Report from AUI to NSF regarding the use of the grant of \$85,000 under which we are now operating - should obviously be accompanied by a carefully thought-out scientific justification and this we are asked to prepare.

For your information, I am appending to this Note a copy of the statement under Item 7 of the Minutes of the July 26, 1954, meeting of the AUI Advisory Committee in New York, which contains a listing of the research objectives which were then thought to be relevant for a National Radio Observatory with very large equipment. In order to limit the work of each of us to some extent, I suggest that you comment mostly in the areas of research in which you have special competence and leave it to your chairman to combine the various suggestions into one single Report. Please feel free, however, to make any comments on suggestions you may have and do not hesitate to go beyond your specialty if the spirit moves you. I would appreciate especially if everyone of you were to give thought to the problems relating to distant galaxies and the universe of galaxies that will be of interest once we possess really large steerable reflectors. I hope, furthermore that everyone who receives this note will consult with any of his colleagues who may be interested, and ask for any assistance we can get, thus ensuring that we shall be able to take full advantage of the knowledge and thinking of as many as we can reach. Brief notes about special topics for research will be exceedingly helpful in the preparation of our Report. To facilitate wide consultation,

I shall send each of you five copies of the present Circular Note, which I hope you will find it possible to distribute promptly.

I wish to thank all of you in advance for your cooperation and may I remind you once more that all replies should be in my hands not later than Friday, April 15.

Bart J. Bok

APPENDIX I

Item 7 from the Minutes of the July 27 Meeting in New York.

There was a general discussion of research objectives, as follows:

- I. Solar system (using both passive and radar methods)
 - A. Sun - range and velocity
 - spots and other surface features
 - atmosphere and corona
 - B. Planets - range and velocity
 - atmosphere, including the "surface" radiation
 - C. Other small objects - meteors
 - comets (OH emission search)
 - dust
 - D. Material ejected by the sun
- II. Earth's atmosphere (using emission, absorption and reflection techniques)
 - ionospheric soundings
 - tropospheric phenomena
 - ionized regions (meteor trails, aurora)
 - ring current
- III. General sky survey (location and identification, photometry and spectrum)
 - localized sources (novae and super-novae)
 - extended sources
 - continuum (search for emission and absorption lines)
- IV. 21-centimeter studies
 - small dark nebulae
 - Andromeda nebula
 - galactic center
 - galactic spiral structure
 - discrete sources
 - intergalactic matter
 - H-II regions

APPENDIX II

You may find it helpful to have available for reference purposes the following rough table of angular beamwidths.

Aperture	Resolving Power	Frequencies in Mega Cycles per second				
		20Mc	100 Mc	500Mc	1420Mc	3000 Mc
150 feet		20°	4°	48'	16'	8'
300		10°	2°	24'	8'	4'
500		6°	1.2°	14'	5'	2.3'
1000		3°	0.6°	7'	2.5'	1.2'