MILLIMETER ARRAY NEWSLETTER

Volume I No. 2 July 1984

I. Millimeter Array Newsletter

This is the second issue of a newsletter intended to keep the astronomical community up to date on progress toward construction of a synthesis array for millimeter wavelengths in the U.S. Starting with the next issue, the newsletter will be edited jointly by F.N. Owen, P.C. Crane, and L.E. Snyder. Comments, requests, and/or contributions (of text or money) should be sent to

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We invite contributions in the form of letters or articles. We also invite requests for additions to our mailing lists for this newsletter or for the millimeter-array memos (see Section IV).

II. Developments

On March 1 and 2, 1984, NRAO held the first meeting of the millimeter-array technical advisory committee at the VLA site and in Socorro. The committee issued a report which included answers to general questions posed to them, which has been released as Millimeter-Array Memo No. 16. A copy of this memo is included with this newsletter.

The discussions with the committee have led us to concentrate on three areas of study for the next year. These are 1) detailed study and simulation of possible configurations for the array, 2) mechanical engineering studies of the proposed central element, and 3) atmospheric studies of the VLA site.

The study of the configuration will be headed by Bob Hjellming, along with Tim Cornwell. The goal is to produce enough material that the community will be able to evaluate the performance and tradeoffs of

particular configurations as they relate to a set of typical experiments which may be carried out with the array. This subject is rather broad as it now stands and we will be forced to limit our options if we are to make major progress over the next year. We probably will not produce a final configuration but only a set of reasonable possibilities.

The mechanical engineering effort will be aimed at understanding the level of difficulty in measuring or calculating the positions of small dishes mounted on a large structure. A number of designs for a central element have been discussed but initial calculations will center on structures like the one shown in the first newsletter. These calculations will be performed by Lee King and Bill Horne as time permits during their VLBA work. We are unsure of the available manpower in this area due to the uncertain demands of the VLBA.

The atmospheric work will be headed by Dick Sramek. Although we are continuing to look at a number of sites for the array, at present the VLA site looks most attractive. Owens Valley and Hat Creek will be considered mainly because of the availability of data from the existing millimeter arrays. But both are much lower than the VLA and seem unlikely to be better. All known sites much higher than the VLA (>9000 feet) seem to have major problems. Thus we are concentrating on evaluating the VLA site.

We will continue to carry out regular phase-stability measurements with the VLA which now have been going on for about 18 months. We now have our 230-GHz tipping system for measuring atmospheric transparency at the VLA. The system was built by John Payne and Graham Maury in Tucson. At the VLA we will put some finishing touches on the system, and we hope to have it in continuous, automatic operation by the end of September. We also are planning to lease an acoustical sounder in the fourth quarter of 1984 to study the location of turbulence in the lower atmosphere and its relation to our phase stability.

These and other atmospheric projects will likely continue for several years but we hope within the next year to get a reasonable idea of the viability of the VLA site for astronomy at 230 GHz.

III. Other Possible Sites

If the VLA site proves unacceptable for the array, we will need alternative sites. Thus we are continuing to search for large, fairly flat, and high sites in the southwest. During May 30 to June 2, Cam Wade, Pat Crane, and Frazer Owen examined a possible site for the array in south-central Utah. This site sits on a large stucture known as the Aquarius Plateau which, we are told, is the highest plateau in the continental U.S. The highest part of the plateau is called Boulder Mountain or Boulder Top. It varies in elevation from about 11,000 to 11,300 feet over an area about 10 to 15 km on a side. The Top is covered about half and half by slightly rolling alpine meadows and groves of spruce trees. A few percent of the surface is covered with small lakes during the summer months. The Top is also used for sheep grazing about two months per year, and some logging is done there as well. The access is good in the summer and fall using a well-maintained dirt road to and on the Top.

It seems very likely that an array could be built on this site with room for expansion. Probably the transparency is very good although further study is needed to confirm that feeling. However, it is also clear that problems do exist with this site. First, it would be much more expensive to build and operate on Boulder Top. No power exists on the Top, and access and

snow acumulation during winter and spring would be serious problems. Only very small towns and no college exist within daily driving distance. Thus we feel that we may have found a usable site but one with many penalties associated with it.

We are also starting to look at the Grand Mesa near Grand Junction, Colorado, and a possible site on Mauna Kea near the 12,000-foot level. We will keep you informed through the newsletter and welcome any comments and suggestions about possible sites.

IV. Current Millimeter-Array Memos

The current Millimeter-Array Memos (as of 11 July 1984) are listed below.

1	The Concept of a Millimeter Array 820910	F. Owen
2	Science with a Millimeter Array 830210	Various authors
3	Fiber Optic Links in a Millimeter Array 830603	S. Weinreb
4	A Millimeter Array Development Plan 830906	S. Weinreb
5	Estimate Antenna Costs - Millimeter Array 821201	W. Horne
6	Cost Equation of Millimeter Array 830915	S. Weinreb
7	Performance Considerations for Correlating Acousto-Optic Spectrometers 830901	J.W. Archer
8	VLA Phase Stability at 22 GHz on Baselines of 100m to 3km [VLA Test Memo No. 143] 831020	R. Sramek
9	Report of Subcommittee on Millimeter- and Submillimeter-Wavelength Astronomy 830401	A.H. Barrett et al.
10	Concept of a Compound Millimeter Array 831215	F.N. Owen
11	Multi-Element Array Configurations 840308	A. Moffet
12	Imaging of Weak Sources with Compact Arrays 840326	T.J. Cornwell
13	The Relation Between Optical Seeing and Phase	T.J. Cornwell

Stability
840326

14 Notes on Presentations at the First Meeting of the Millimeter-Array Technical Advisory Committee — J. Moran
840326

15 Theory of Electromagnetic Plane Wave Propagation in a Turbulent Medium — B.L. Ulich
840321

16 Report of the Millimeter-Array Technical Advisory Committee on Their Conclusions as a Result of the Meeting on March 1 and 2, 1984 — R. Wilson
840301, Revised 840701

17 A Possible Optics Plan for the Multi-Element Antenna — B. Martin
840601

18 Quality Indicators for the Millimeter Array — T.J. Cornwell
840705

Copies of individual memos may be obtained by writing to

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