

NATIONAL RADIO ASTRONOMY OBSERVATORY

September 4, 1962

TO: Scientific Staff

FROM: DSH

Below is excerpt from letter by Pawsey describing his ideas about VLA.

---

"Now about the project. For some years I have believed that the next big break in instrumental cosmic radio astronomy is the development of equipment capable of giving "pictures", i.e. isophotos, at a suitable wavelength of an adequate sample of the discrete sources in the sky with sufficient resolution to show all the significant physical features. This differs from the Leiden project in that the latter clearly has not sufficient resolution. In other words, I am putting forward for radio astronomy the concept of the complementary facilities provided optically by the Palomar 40 inch Schmidt and the 200 inch. The Leiden project and Bernard Mill's Cross should supply the equivalent of the Schmidt. I want to build the equivalent of the 200 inch.

On the basis of the considerable success along those lines achieved at Cal Tech, at Jodrell Bank (Palmer) and at Radiophysics (Peter Scheuer), I think the objective is likely to be technically feasible, and I want to "cast my bread upon the waters" and give it a try.

Before discussing practical matters I should like to present the case for such observations in another rather graphic way. You will have seen the recently published Hubble Memorial Atlas of Galaxies (Allen Sandage). It contains an extensive sample of magnificent photos of the brighter galaxies. It has, I believe, sufficient numbers to give an adequate sample, and resolution appears adequate to show the essential physical features. The ability to produce a comparable radio collection is my objective. Until we can do it, radio astronomy will remain the poor relation of optical. I do not think in terms of the full optical resolution because I believe the radio objects are generally bigger. On the technical side I think we should be prepared to spend a considerable time on each object under study, e.g. 2 days. Thus, in relation to the Leiden and Sydney Crosses, I should be happy to trade time for resolution.

Now turning to possible methods, one can visualize 1. aperture synthesis, 2. a colossal Mills Cross, or 3. possibly a Wild-type ring system. I do not like any of these in their current form, but my hope is that a systematic design study might throw up some bright ideas and change perspectives. Actually I have one such myself -- still in the wild and woolly stage.

My idea of the approach is as follows:

Phase 1: I want a careful study of existing observations to set the requirement in as objective a manner as possible. I should like to get Peter Scheuer and Henry Palmer at Green Bank to analyse jointly their respective observations to make the best possible estimate of the statistics of the distribution of Fourier

components in the sky. This should also involve Cal Tech participation, which I think would be easy to fix.

Phase 2: I want to write down the known methods, e. g.

- (a) Mills Cross
- (b) Wild ring
- (c) two-antenna aperture synthesis

and study the basic limitations of each (semi-thermodynamic approach) and also the technical difficulties.

I think it is proper in research to try to set the physical objectives even though the technical means to achieve these may not yet be fully realizable."

---