This is a copy of the letter of which I spoke to you yesterday. The original has not yet been posted. I have sent it to Jerry Tape to look over prior to dispatch. In any case, it gives my current views on this project & I think these can be helpful to you. I am sending a copy to Rabi provided it passes Jerry Tape will the remark that it is highly provisional and could well be modified after further discussions with your people at Green Bank.

Joe
(per Lenore Pawsey)

Massachusetts General Hospital
Phillips House
Boston, Massachusetts
27 June 1962

Dr. W. C. Erickson
Sterrewacht
Leiden
Holland

Copy for David Heeschen

Dear Bill:

You must be wondering why you have not heard from me after our cancelled Paris meeting. The answer is that with the exception of one week, I have been in hospital since March 27. After one week in the U.S. on what was intended to be a one-month preliminary visit prior to taking over the Directorship at Green Bank in the fall, I suffered a paralysis of the left side. I spent five weeks in hospital in Washington and made a substantial recovery and we thought all was well. However, after a week of convalescence, I commenced to deteriorate. I then came up here under Dr. Sweet who is an outstanding neurologist and also happens to be a Trustee of A.U.I., and so he has a personal interest in me. Radio isotope tests showed that the cause of my trouble was a brain tumor which has been removed.

The present position is that I am substantially recovered from the effects of the operation, but I am left with serious weakness in the left arm and leg. However, Dr. Sweet expects me to recover sufficiently to lead a normal life and does not expect any residual effects on my intelligence, thank goodness. On this basis A.U.I. plans to go ahead with my appointment as Director. Dates depend on my recovery but the guessing is that I shall be in Green Bank this fall.

My purpose in trying to see you in Paris was to try to interest you in a project which I regard as the Number One project at Green Bank, and to see if you might be interested in taking a senior position at Green Bank where you would be the person in charge of the project. I think the project really stimulating and I should love to have you working on it.

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. isophotes, 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. This, 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.

I should also like to comment on the suitability of the A.U.I. set-up for achieving an ambitious objective like this. Firstly, I accepted the directorship because of my faith in Dr. Rabi, the president of A.U.I,, as a scientific leader. This faith has been strengthened through my association with him since my arrival in the U.S., and I am sure he can provide both inspiration and very strong support. Secondly, the remainder of the management of A.U.I. appears to me to be able to provide absolutely first-class scientific management. They have a strong desire to make a success of things and a remarkable freedom from red tape. Thirdly, N.S.F. is solidly behind Green Bank with tremendous financial resources. Fourthly, the existing scientific

staff at Green Bank I think are quite good. They are very keen and quite able though inexperienced and suffering from the effects of inappropriate leadership in the past. The outstanding weakness at present is, of course, their lack of experience in all the phases of radio astronomy excepting those utilizing single paraboloidal antennae. This weakness, of course, runs right through the U.S. We have vacancies, and could appoint promising scientists readily. What we want is one or two like Jan Högbom or Peter Scheuer.

You might be interested to hear of a comment of Rabi's on overcoming the technical difficulties. He remarked that three times in his lifetime he has seen a similar situation of apparently insurmountable technical complexity conquered by the tremendous technological resources of America.

With reference to the lack in the U.S. of people skilled in radio interferometry, I have in mind the possibility of trying to stimulate one of the universities with stronger technical facilities to undertake a high resolution solar project. Such a project could be highly rewarding scientifically at this phase of solar radio astronomy and produce as a side effect a number of persons skilled in the art in which we are interested.

I should very much like to know your reactions to this project, and if they are favorable, whether you would be interested in taking part. You told me that you were committed to taking a position at the University of Maryland. I should be interested to know the details. If you are definitely to go to Maryland it is possible that we might arrange some plan of co-operation, but as you can see, the project will be an exacting one and will demand quite a lot of work.

Yours sincerely,

J. L. Pawsey

JP:jz