The University of Iowa
Department of Physics and Astronomy
Iowa City, Iowa 52242
319/353-4343

Feb. 01, 1983

Dear Alan,

Enclosed is a preliminary draft of a paper which I will probably submit to Ap. J. Letters (doubtless requiring elimination of some of the "boilerplate" in the present version). I would greatly appreciate it if you could tender comments.

I would also appreciate your advice on a related matter. Should I submit this paper with the present content, or should the M84 results be included in a longer version? My inclination is to submit this paper essentially as is, and prepare a second paper, with yourself and Robert as co-authors, describing the application of the results to M84. My reasons are two-fold: (1) shorter papers tend to have more impact, and the M84 analysis would be a substantial undertaking in its own right, (2) a scientific alliance of Robert, yourself, and me would resemble a nocturnal congress of male cats, and a mutually agreeable result might be some time in coming.

Steve

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Department of Physics and Astronomy
Iowa City, Iowa 52242
319/353-4343

Jan. 19, 1982

Dr. Alan Bridle
National Radio Astronomy Observatory
Edgemont Road
Charlottesville, Virginia 22901

Dear Alan,

Thank you for copies of your excellent observations of M84. It is a good indication that one is washed up as an observer when he finds himself writing to colleagues for data decent enough to compare with theories!

The reason for my request is as follows. Largely at Robert's urging, I have reinvestigated the problem of synchrotron radiation transport in a random medium, this time assuming that the Laing model of the field being almost wholly random is correct. According to my analysis, the best place for studying such fluctuations is in areas where the mean polarization is very low. The reason for this curious result is that while the mean polarization is close to zero, the fluctuations in the polarization can be nearly as large as those in regions where the mean polarization is large. I will go

over the arguments for this during my anticipated trip to Charlottesville in March. At any rate, it turns out to be of considerable interest to study the fluctuations (or upper limits thereto) in Q and U in regions like the middle of the south lobe of M84.

The source M84 appears to be an outstanding candidate for such an analysis for two reasons. (1) It is one of the most compelling cases for Robert's sheared B field model. (2) Your 5 GHz observations with 1.″5 resolution (map 'M84 GBC V3') has the best resolution across an extended object that I am aware of. Such high resolution is absolutely necessary if the type of analysis I have in mind is to have a prayer of succeeding.

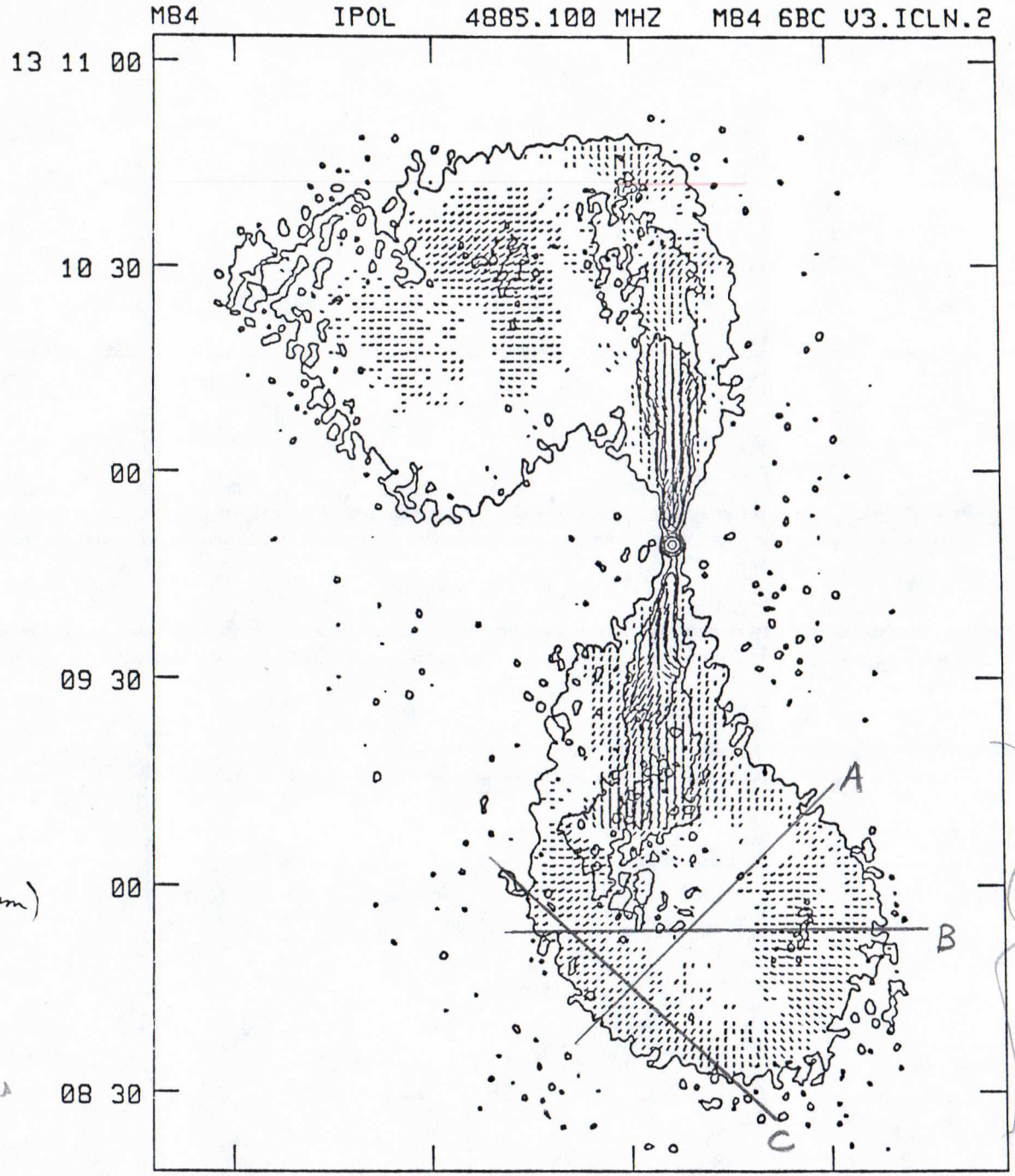
The data I now request is in the form of three slices in the southern lobe of M84. I have indicated these as slices A, B, and C on the enclosed map. The slices should be made from the high resolution map, and should be plots of Q and U separately, not polarized intensity. The reason for this is that I need to calculate the variances and, if possible, the autocorrelation functions of Q and U independently. Since I intend to make measurements from these plots, they should be of good quality and scaled so as to facilitate measurement from them. I will also need values for the noise rms in Q and U.

I am most interested in analyzing the high-resolution 5 GHz map, but if it is convenient for you, I would also appreciate receiving the Q and U slices from the highest resolution 1.4 GHz map you have available.

I greatly appreciate your willingness to make your data available, and I am anxious to begin the analysis of these fluctuations.

Regards,

Steve Spangler



E

Please make Q and U slices along these lines

1.2

XIN = YIN = 4 (1 pt/beam)

FACTOR = 20

How much signal in the center? If < 1% need small scale sizes, won't see fluctuations in the bright min.