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To: GSEIELST
Subj: Replacement dish comments from G. Heiligman (XRAY@LL.ARPA)

NLSRT Memo No. 22

Subj: New NRAO dish requirements

I have a lot of thoughts about the Green Bank replacement dish. I'm not sure any of them are worth beans, but here are the chief ones.

- 1) Design the instrument for cm-waves primarily, but give it a "light bucket" mode at higher frequency. Thus you take advantage of the National Radio Quiet Zone-- which is Green Bank's big plus over other sites-- but still have a front-line research facility. Green Bank is probably well suited to operations on a two-season system: cm and meter waves in the summer and fall, 1.3 cm and mm waves in the winter and spring.
- 2) As far as I can tell, pointing ANY dish to an accuracy better than 20 arcsec is a very tough proposition; so I would go for 20+ arcsec resolution rather than try to push the technology in this rather inelastic dimension. This means that the full dish should be nearly diffraction-limited at 1.3 cm; maybe you want to make the inner 50 meters good at 43 GHz; and beyond that it's purely a light bucket.
- 3) For pulsars, variable QSO's, etc., keeping continuity with the 300' archival data is very important. You want to make sure that you can repeat with the new dish just about any experiment you did with the older one. A minimum 300-ft aperture should be a hard requirement; 101.6 m (4000"): the largest full steerable telescope on earth) has a certain political appeal to it.
- 4) For Heaven's sake, keep the QUASAT/Radioastron people out of this! A new NRAO instrument, at \$5"M, is 1/10 of QUASAT... and the annual operating budget is probably 1/100 as much. If the VLBI people need a big ground-based dish before QUASAT data is really useful, fine; build it with QUASAT money from NASA, not 300-ft money from NSF.
- 5) KISS (Keep It Simple, Stupid!) The temptation to design the "ultimate" radio telescope must be fought; astronomy is much better served with a modest instrument soon than with a superb instrument later.
- 5) Why not spend 10% of the money on an interim dish while the 300-ft replacement is under construction? This worked in 1962, it might work again.

Gary