

# PAPER: Configuration of Eight-Element Green Bank Array

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The eight element array in Green Bank in June 2006 is mapped in Figure 1. In the center of the array is the hut which is the location of the correlator, receivers, and operations. Each dipole lies on a circle of radius 455 feet from the hut. These were placed with the help of a reference triangle, an equilateral triangle with one side running from East to West. The location of the antennas are also listed in Table 1.

These positions were determined by a C program written by Chaitali Parashare. The user can set the number of antennas, minimum baseline length, minimum difference between baselines, and an additive factor,  $\delta\theta$ . The first antenna on the eastern side of the circle is marked at angle zero. Each successive antenna is placed at an angle  $\delta\theta$  radians away from the previous antenna. If this position does not meet the conditions specified by the user, then  $\delta\theta$  is multiplied by 1.01 and the position is recalculated. If this again does not meet condition,  $\delta\theta$  is multiplied by 1.02, then 1.03, and so on until a solution is reached. For this iteration, the minimum baseline is 100 feet,  $\delta\theta = 0.65$ , and the minimum difference between baselines is 10 feet.

The antenna positions were entered into Miriad and  $u-v$  snapshot was created with a point source at declination  $+51^\circ$  at three frequencies in Figure 2. The current configuration provided the best  $u-v$  plane coverage of all tested configurations. This emphasizes more on the longer baselines for resolution and has the most symmetric coverage over the  $u-v$  plane.

The location of each antenna was determined by use of a surveyor's pole and a level sight. All antennas were measured with respect to the reference triangle from one of the bisectors A, B, or C (see Figure 1). Each groundscreen was placed with its crossbeams pointing north-south and east-west as determined with a hand compass. Each screen must be level in all directions. The feet of the screens are adjustable with height to make up for uneven ground. At this time, no other compensations are made for elevation.

In the future, a simple plot of Galfred Meadow with obstructions such as trees and the road marked will be helpful in determining antenna positions. In the present configuration, antennas 6 and 1 are very near to trees. Also, antennas within the circle rather than on the perimeter should be considered. As long as the reference triangle is held fixed, nearly any position in the field can be sighted. This will allow for more flexibility in finding uniform  $u-v$  coverage.



XX 0.1300 GHz

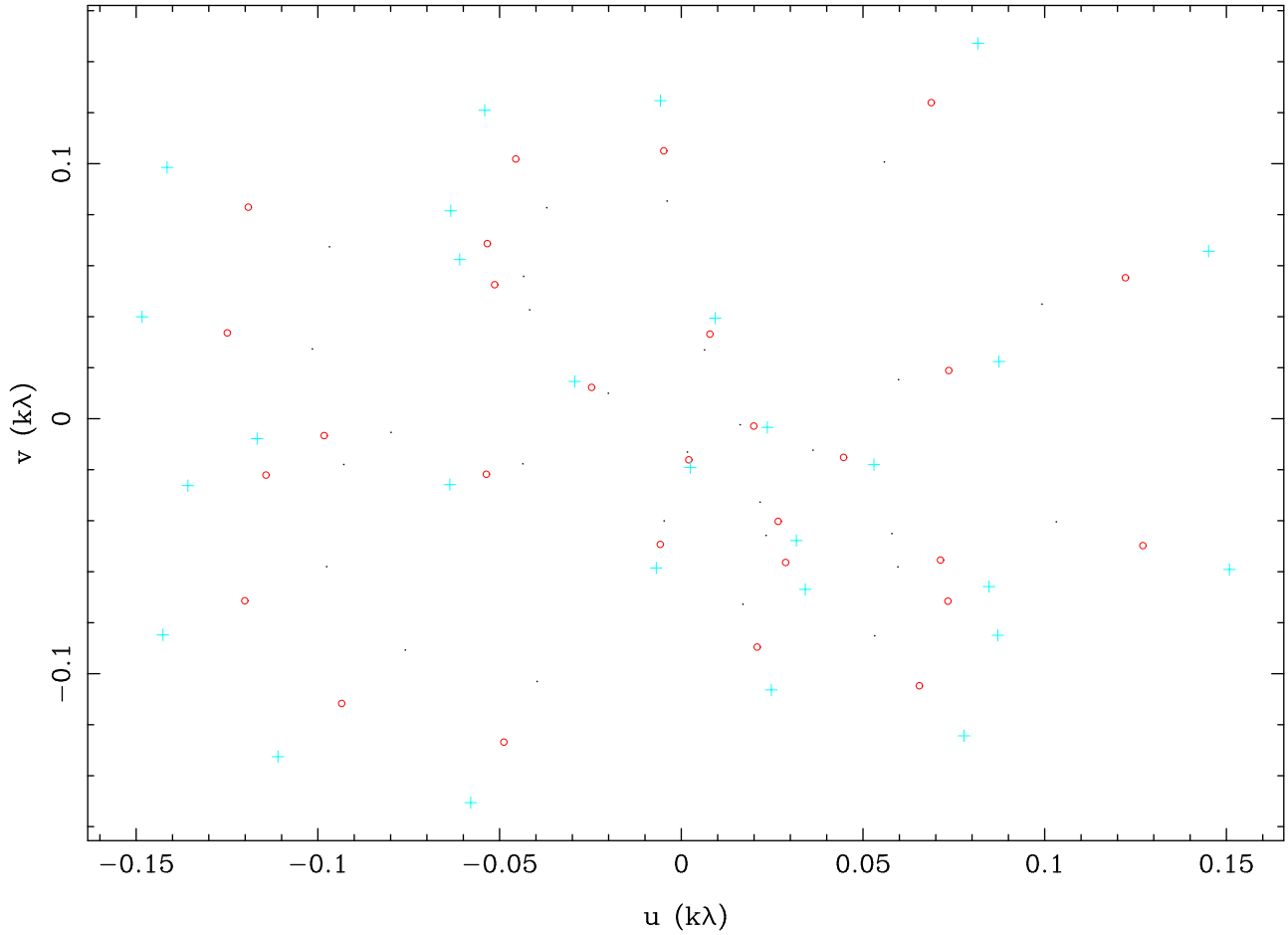


Fig. 2.—  $U$ - $V$  snapshot of a point source at  $\delta = 51^\circ$  at 130 MHz (dots), 160 MHz (circles), and 190 MHz (crosses).

Table 1. Antenna Locations

Number	x	y
1	455.0	0.0
2	362.2	275.4
3	110.3	441.4
4	-200.9	408.3
5	-347.4	-293.8
6	314.3	-329.0
7	8.8	454.9
8	438.1	122.8

\*The origin is at the center of the circle.