



Array Configuration for MUSER in Lower Frequency

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The ground-based network to monitor Solar-Terrestrial space environment(The Meridian Project), which is important facility for conducting space weather research and ensuring national space activities and space security. The Meridian Project II consists of a chain of ground-based observatories with multiple instruments including the spectral radioheliograph in metric-decamic wave ranges, solar radio spectrometers, interplanetary scintillation telescope and so on. The spectral radioheliograph frequency range is 30MHz-240MHz which is a radio interferometric array with 100 logarithmic periodic antennas and the other 80 logarithmic periodic antennas for calibration. The layout of the array determines the performance of the device and the quality of image. In this paper through optimization of some parameters, some image simulations and combining local geographical conditions, we suggested an optimized spiral array.

The Mingantu spectral radioheliograph in metric-decamic wave ranges is a solar radio observing equipment, which uses the synthetic aperture technology with two-dimensional imaging. The solar image can be obtained with Fourier transform by the complex visibility which is the cross-correlation between two antennas. The more antennas, the better of the image. But the more the quantity, the higher the cost. Therefore, the number of units of the equipment should take into account various factors such as solar radio radiation properties, mapping quality requirements, data processing capabilities, and cost. According to the UV plane characteristics, BEAM characteristics, simulated mapping quality, requirements for solar observations and existing conditions for the Mingantu observatory conditions, we recommend using the existing MUSER three-arms spiral array with the remote antennas coincide with the existing MUSER spiral arms. The details are shown as Figure 1.

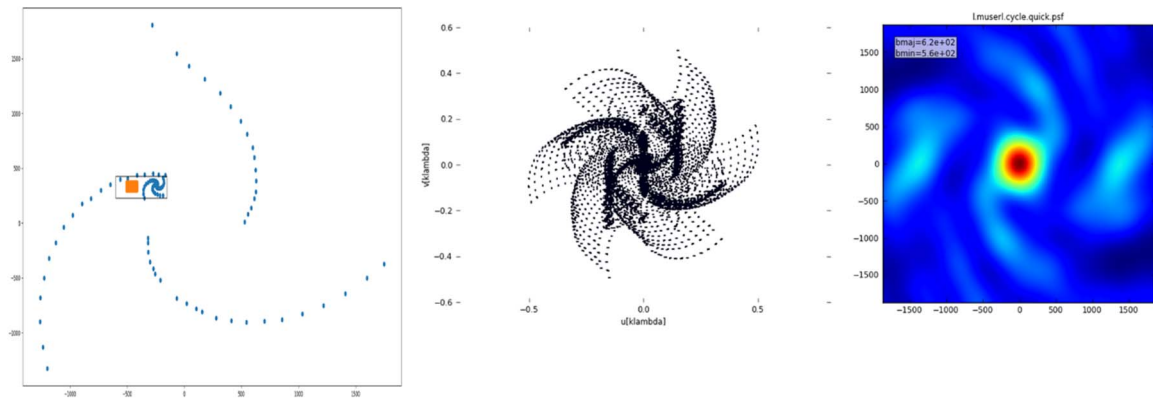


Figure 1. (Left) Three-arms spiral array map; (Middle) UV distribution (including 80calibration antennas); (Right) The center area of the dirty beam.

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