2nd URSI AT-RASC, Gran Canaria, 28 May – 1 June 2018

Optical Configuration of the ngVLA Double-Offset Reflector Antenna

Sivasankran Srikanth
National Radio Astronomy Observatory, Charlottesville, VA, USA; e-mail: ssrikant@nrao.edu

This paper discusses the various options that are being considered for a double-offset reflector antenna. This study was undertaken to narrow down the design options for the Next Generation Very Large Array (ngVLA) antenna.

The science goals set by the Science Advisory Council for the ngVLA [1], include study of star and planet formation, imaging the Milky Way and nearby galaxies, study of galaxy formation, cosmology etc. In order to achieve this targeted science, the ngVLA concept proposes 214 eighteen-meter antennas distributed over an area with a minimum extent of 300 km (E-W) by 500 km (N-S) in the western New Mexico region. The antennas will be outfitted with front ends that provide frequency coverage from 1.2 GHz to 50.5 GHz and 70 GHz to 116 GHz with maximum sensitivity [2]. The cryogenically cooled receiver configuration will be implemented as six independent bands, balancing cost and performance.

The baseline design consists of a double-offset antenna with an 18 m main reflector and a 3.2 m subreflector. In addition to the advantages of higher gain, low near-in sidelobes, lower antenna temperature, minimized standing waves, etc., compared to an on-axis antenna, this design provides sufficient real estate for accommodating the receiver cryostats. Cassegrain and Gregorian subreflectors were considered. While the former allows closer spacing between antennas in the array, it results in partial blocking of the main reflector aperture. The importance of the opening angle of the subreflector subtended from the secondary focus will be discussed. The angle of the subreflector has impact on the type and size of the feeds, as well as on the performance of the antenna. The pros and cons of the low/high feed arm configuration with Cassegrain/Gregorian subreflector will be presented.

1. A. Bolatto et.al., "Key Science Goals for the Next Generation Very Large Array (NGVLA): Report from the NGVLA Science Advisory Council," *ngVLA Meno #19*, 27, November 2017.

2. R. Selina and E. Murphy, "ngVLA Reference Design Development & Performance Estimates," *ngVLA Memo #17*, 18, July 2017.