BRAZILIAN FIVE ELEMENT INTERFEROMETER

H. S. Sawant(1), C. Faria(2,3), J. R. Cecatto(1), F. C. R. Fernandes(1), L. F. S. Cicconello(1), A. B. Cassiano(1), F. R. H. Madsen(1,4), K. R. Subramanian(5), R. Ramesh(5), M. S. Sundararajan(5)

(1) National Institute of Space Research – INPE, São José dos Campos – SP, Brazil, (2) Computer Department – PUC-Minas, Poços de Caldas – MG, Brazil, (3) Laboratory of Applied Computer - LAC / INPE, São José dos Campos – SP, Brazil, (4) CNPq Research Scholar – CNPq, Brazil, (5) Indian Institute of Astrophysics – IIA, Bangalore, India

Brazil is now among the countries that dominate the technology of radio interferometry for astrophysical high spatial and time resolution observations in microwave band. The Prototype of the Brazilian Decimetric Array (PBDA), unique in Latin America, has been successfully developed by the National Institute of Space Research (INPE) in collaboration with national and international partners. The PBDA, consisting of 5 elements array with base lines up to 220 meters in E – W direction has been recently put into regular operation at Cachoeira Paulista – SP, Brazil (longitude 45 0 20 W and latitude 22 41 19 S). During the months of November and December of 2004 about of 50 hours of solar and non solar observations were carried out using PBDA. Interferometer configuration, details of front-end, including that of the parabolic antennas with f/d of 0.38, crossed log periodic dual polarised feeders, with 50 ohm impedance\'s operating in the frequency range (1.2-1.7) GHz and receivers operating in the frequency of (1.2 – 1.7) GHz will be presented. The antennas are alt-azimuth mounted having tracking capabilities of ± 90o in elevation and 340o in azimuth. Mechanical Alt-azimuth mount for the parabolic dishes of 4 meter diameter mesh type antennas have been developed locally. Alt-azimuth tracking systems – hardware and software - to track antennas simultaneously ~15/hour has been incorporated by Inteltek Automation Ltd. Company of Pune, India. A brief description of the tracking system and the tracking and pointing accuracies will be presented. The baselines, frequency range and number of antennas will be increase during the next phases to 2.5 x 1.25 km, 5.6 GHz and 38 antennas, respectively. Then, the final version of the BDA will be an interferometer array consisting of 38 parabolic antennas of 5-m diameter with a compact “T” shaped array at the center having 32 antennas spread up to ~ 400 m in E-W direction and ~ 180 m in south direction. The array will have high spatial and time resolutions of ~ 5 arcsec at 5.0 GHz and 100 ms, respectively. The BDA will have the capability to observe solar and non-solar phenomena in the following radio protected bands: 1.2-1.7, 2.7 and 5.6 GHz. The sensitivity estimates show that the BDA will have rms sensitivity of 3 mJy at 21 cm for a system temperature of 50 K, using low–noise amplifiers. An overview of the instrument and the status of the BDA project will be summarized and presented.