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NWU Radio Interferometry Commissioning and Verification

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The advent of the MeerKAT, a precursor to the Square Kilometre Array (SKA), has driven the need to invest in human capacity development in radio astronomy. The North-West University (NWU) is in the process of commissioning a small four-element radio interferometer. Nooitgedacht Observatory, owned by the NWU, was selected to house the radio telescopes due to the low level of noise present at radio wavelengths in the area. The array consists of four $3.7m$ prime focus parabolic dishes, with a surface accuracy of $0.5mm$, operating at C-band ($6.45 - 6.75GHz$). The beam size of the individual $3.7m$ telescopes is $43'$, whereas in an interferometer setup, with a fixed maximum baseline length of $180m$, the synthesised beam size is $0.9'$. Each dish has full sky coverage and is mounted with elevation ($0 - 90^\circ$) over azimuth ($0 - 360^\circ$) motors. The RF front-ends of the telescopes consist of a symmetrical feed horn connected to a C-band LNB ($6.45 - 6.75GHz$) via coaxial cables. The feed horns have dual polarisation capabilities but are connected for single polarisation observations. The RF back-ends comprise of four receivers that communicate with a pc, wherein each telescope is manually or remotely driven, using proprietary software called RTC. Recently the original receiver back-ends have been replaced by four new wideband receivers that operate in the frequency band ($10MHz - 6GHz$). This large band of operation will allow for future upgrades with the addition of LNBs that function in different frequency bands. L-band feeds are already in the beginning phase of commissioning, adding to the frequency bands wherein we plan to do observations. Commissioning of the radio telescopes as an interferometer is still an ongoing process. The future aim is to do both single-dish and interferometric observations. In single-dish mode, we will be able to observe very strong MASERS and also perform solar observations. Interferometer mode will enable the study of the morphology of extended objects, such as the Whirlpool galaxy, and radio jet observations.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc.

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