The Southern Hemisphere VLBI Experiment (SHINE)

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Abstract

Radio telescopes at eight sites in Australia and one in South Africa operate as a VLBI array during several periods each year. Several improvements to the array during the last few years have significantly improved its sensitivity, frequency range, and u-v coverage.

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The first VLBI imaging experiment in the southern hemisphere took place in 1982 [P89]. In the last few years a significant effort has been undertaken to enhance the southern hemisphere array [J 91]. These programs are known as the Southern Hemisphere VLBI Experiment, or SHEVE.

The array now usually operates for one to two week periods every four months. The telescopes in Australia that have frequently participated in these observations include the NASA tracking antennas at Tidbinbilla, the Parkes Radio Telescope, the Mount Pleasant Observatory at Hobart, two individual antennas of the Australia Telescope at Culgoora and Mopra, a Landsat Station at Alice Springs, and an ESA tracking antenna at Perth. The Hartebeesthoek Radio Astronomy Observatory in South Africa usually joins the observations, and northern hemisphere telescopes are sometimes added to improve u-v coverage for the more northerly southern hemisphere sources. Since the early SHEVE experiments in 1982, the sites at Culgoora, Mopra, and Perth have been added to the array and a larger, more versatile telescope has been erected at Hobart. An additional Australian telescope, the Molonglo Synthesis Telescope, has occasionally participated in observations at 0.84 GHz. A map showing the principal telescope locations appears in Figure 1 and an example of the u-v coverage achievable is shown in Figure 2.

The observing frequencies supported by most of the SHEVE array include 1.7, 2.3, 5.0, andl 8.4 GHz, although not all telescopes support all frequencies. The present recording systems include Mark 1 I at all sites and Mark 111 at four sites, with data being correlated at the JPL/Caltech Block 1 I correlator. By 1994, S2 recorders will be implemented in the array and correlation will be done at a new ATNF S2 correlator.

Several new results from the SHEVE array are presented at this conference including observations and images of the new strong Einstein ring 1830-211 (see Jauncey *et al.* and Jones *et* cd.), the nucleus of Centaurus A (see Meier *et al.*), southern galaxies and quasars (see Murphy *et al.*), the peculiar radio source MSH04-71 (see Reynolds *et al.*), the first interstellar VLBI speckles (see Gwinn *et al.*), a sample of peaked spectrum sources (see King *et al.*), and methanol masers (Norris).

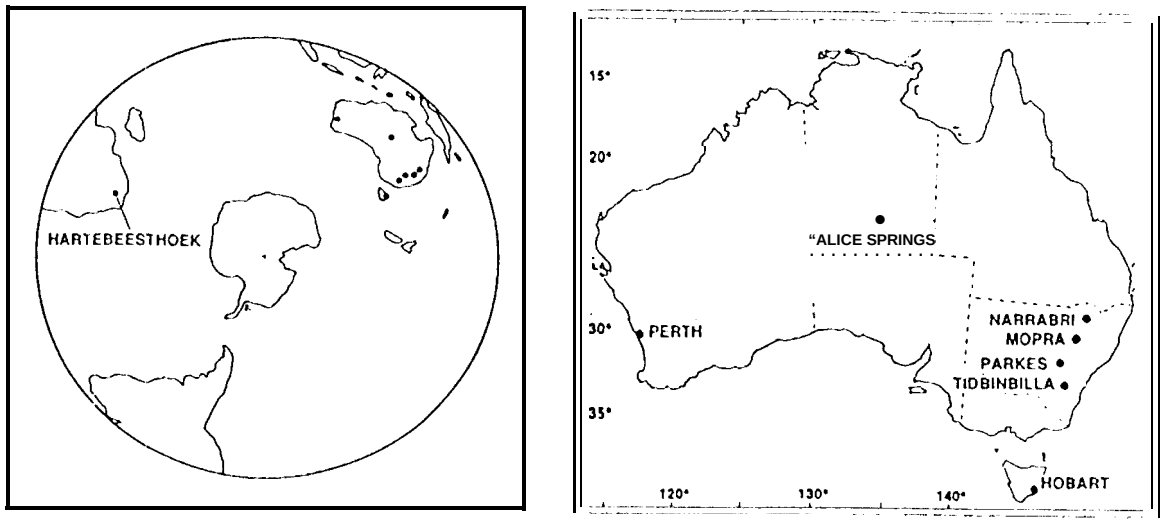

Figure 1. The SHEVE array

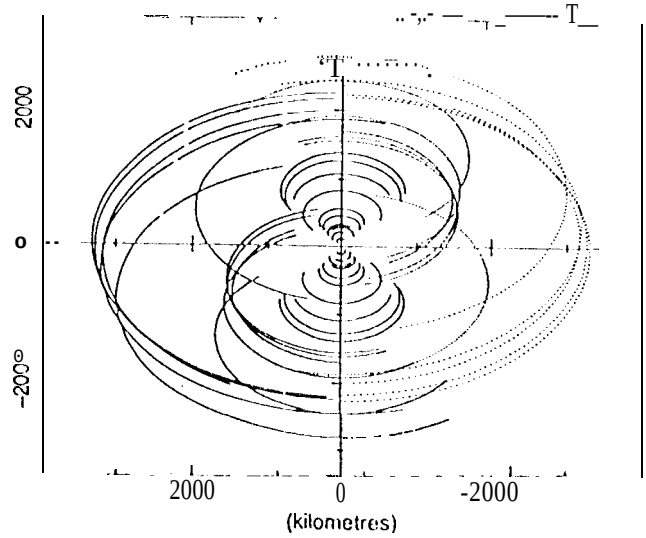

Figure 2. The UV-coverage at 2.3 GHz for the SHEVE array (Australia only) at $\delta = -42°$

References

[P89] Preston, R. A. *et al., The Southern Hemisphere VLBI Experiment. Astronomical Journal, Vol. 98 (1989), pp. 1-26.*

[J91] Jauncey, D. I,.; *VLBI in Australia - A Review. Australian Journal of Physics, Vol.* 44 (1 991), *pp.* 785-803.