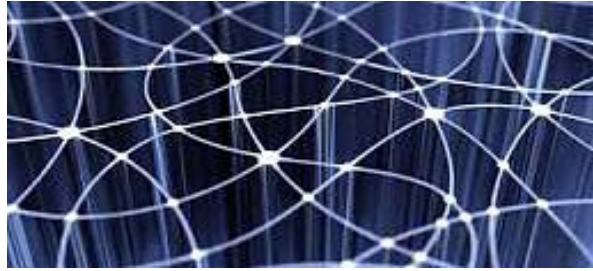


High-performance Signal and Data Processing: Challenges in Astro- and Particle Physics and Radio Astronomy Instrumentation



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ARM processors as a low cost alternative tool for computation of FFTs for radio astronomy

The Fast Fourier Transform (FFT) has many uses in science and in particular, radio astronomy, by the F-Engine of the correlator. This operation must be done for all polarisations of all antennas and is highly parallel. A possible alternative to the use of expensive GPUs and FPGAs is a cluster of ARM processors that can perform FFTs in parallel, cost effectively and with low power consumption. ARM Cortex-A7 and Cortex-A9 CPUs are benchmarked using FFTW, a high-performance, open-source FFT library. Single- and multi-thread as well as multi-processor tests are done. The results are used to characterise the theoretical processor throughputs in Bytes/s for one-dimensional complex FFTs of various sizes. It is found that a single 1 GHz quad-core Cortex-A9 processor is able to process a 32768 point one-dimensional complex FFT at up to 250 MB/s with a power consumption of approximately 5 W.

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