

## SKA a bridge too far, or not?

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### **Abstract**

The computational and storage demands for the future Square Kilometer Array (SKA) radio telescope are significant: in particular in the light of the recent slowing of traditional growth rates in computer and storage technologies, the current SKA-1 and SKA-2 requirements might end up being a bridge-too-far, if not from a realization point of view, then certainly from an operational cost point of view. Novel approaches in exascale computing using concepts which relentlessly focus on energy efficiency, streaming data processing, automatic controlled multi-tier storage systems and nano-phonic data transport will be necessary. In this presentation, recent research results using highly efficient A-to-D convertors using less than 4mW per GSample/s, optical interconnects and integrated optics for high bandwidth and power efficient data-communication, dense packaged servers -which we believe can get close to a Peta-FLOP per rack using e.g. watercooling-, various accelerators, which we believe are more efficient than general-purpose CPUs, and novel storage tier control - which could make 1.5 orders of magnitude difference in total cost of ownership (TCO)-, amongst others, will be presented which can make a difference for SKA realization. Starting from some unique tooling, verified by a retrospective analysis of the LOFAR implementation, we are currently trying to determine the salient properties of an affordable SKA-1 and SKA-2 implementation proposal - given expected technology roadmaps and parameters. This research represents some of the very initial results of the just over one year-old ASTRON & IBM Center for Exascale Technology, collaboration between ASTRON and IBM Zurich Research laboratories. Recently SKA South Africa has joined this collaboration.

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