

Swarm: 4-GHz Submillimeter Correlator and VLBI Beamformer

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A new wideband backend has been developed for the Submillimeter Array (SMA) which has 4 GHz bandwidth in single polarization mode, flexibly reconfigurable as 2 GHz full Stokes dual polarization. The system is based on CASPER's ROACH2 platform and the ASIAA 5 GSps analog-to-digital converter board. The correlator consists of one 16k-channel Polyphase Filterbank (F-engine) per input followed by a 10 GbE switch based corner-turn which feeds into correlator-accumulator logic (X-engines) co-located with the F-engines. This arrangement makes very effective use of the minimum amount of digital hardware, with the challenge being meeting timing for a large, complex and high speed logic design in the ROACH2 FPGA. I will discuss in detail the technical design and challenges of the so-called SWARM back-end. In addition, I will present recent 6-baseline fringes from a test observation on Uranus and the Quasar BL Lac.

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