

Real-Time Radio Transient Detection with Interferometric Closure Quantities

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Radio interferometers have great potential in the study of transients since they can survey efficiently, localize sources, and reject terrestrial interference. However, they have not traditionally been used to study fast (<1 s) transients due to their seemingly overwhelming computational demand. We will present our work developing the Allen Telescope Array and Very Large Array in the study of the fast transient universe. In particular, we demonstrate a new technique for detecting radio transients based on the bispectrum, an interferometric closure quantity. The bispectrum is calibration independent, resistant to interference, and computationally efficient, so it can be built into correlators for real-time transient detection. We have recently proven the algorithm with the blind detection and arcsecond localization of pulses from a transient pulsar, J0628+0909. Future work will focus on implementing a real-time, all-time transient detection system at the VLA, which will open new access to extragalactic transients, pulsars, flare stars, and exoplanets.