The Allen Telescope Array for SETI and Radio Astronomy

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The first 42 antennas of the Allen Telescope Array (ATA-42) are beginning to collect data at the Hat Creek Radio Observatory in Northern California. The array is being built and operated as a partnership between the SETI Institute and the Radio Astronomy Lab at UC Berkeley. The ATA will eventually include 350 antennas and is the first radio telescope designed to enable traditional radio astronomy and SETI observations simultaneously in a multiple-concurrent mode of operation. The ATA collecting area and sensitivity will be equivalent to a 114 m telescope (the ATA-42 has a 40 m equivalent diameter). Because the array is composed of small antennas, that will be spread as far apart as 900 m, it will observe a very large field of view (3.5° FWHM at 1 GHz) and achieve excellent spatial resolution (~100 arc seconds at 1 GHz). The receiver system for the array provides continuous frequency coverage from 0.5 to 11 GHz; four separate frequency bands of 100 MHz bandwidth can be observed simultaneously. Electronics enable the formation of four dual-polarization phased array beams at each frequency (32 beams total), and two spectral-imaging correlators can be used to make maps of the entire field of view at two frequencies. This paper describes the ATA and how it will be used as a wideangle, polychromatic radio-camera for astronomy surveys and for SETI, starting with a search of 20 square degrees of the galactic plane over the entire "water hole" from 1420 to 1720 MHz.