

## THE ARIZONA RADIO OBSERVATORY WIDEBAND SPECTROMETER

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I will describe the Arizona Radio Observatory Wideband Spectrometer (AROWS), a new digital spectrometer built for the ARO 12-meter telescope on Kitt Peak. AROWS is a spectroscopic backend for the telescope's millimeter-wave heterodyne receivers, and was designed to match the 4 GHz usable IF bandwidth of these receivers. The primary scientific application of this instrument is deep molecular line surveys, for which baseline discontinuities between spectral segments are problematic. This led to a requirement for 10 GSPS, 8 bit digitizers, which, as of the inception of the project in 2015 had only recently become available as COTS products from the defense industry. A combination digitizer/FPGA module called CHAMP-WB-A25G was purchased from Curtis-Wright to form the basis of the spectrometer. The vendor-provided system gateware was not compatible with the CASPER tool chain, so AROWS combines programming blocks (FFT engine, decimator) from multiple non-CASPER sources, with the rest of the gateware written in-house. The evolution of commercial technology has opened new avenues for very-wide-bandwidth digital spectrometers, with Xilinx RFSoc products providing particularly attractive possibilities. I will also describe our incipient efforts to build a next generation of ARO backends within the CASPER framework.