

PORTING OF A CASPER WIDEBAND FULL-STOKES PARAMETERIZED SPECTROMETER TO THE ZCU111

Brian Bradford, Ian Wilson-Langman, *Iowa State University*; Jack Hickish, *University of California, Berkeley*.

This talk presents the development of a wideband full-stokes parameterized spectrometer (polarimeter) for radio astronomy applications, targeting the Xilinx Zynq RFSoc platform. In the past, progress has been limited by the cost, performance and complexity of developing such systems. CASPER has addressed this problem by developing platform independent hardware and open-source software to take advantage of developments in Field Programmable Gate Array (FPGA) and Analog to Digital Converter (ADC) technology in order to “quickly” target new platforms. This project focused on the porting of a CASPER spectrometer instrument and dependent libraries to the Xilinx ZCU111 evaluation platform. The port was based on Migen, an open-source python library for generating and building gateware, that has gained traction in the open-source community. Additionally, Xilinx released an open-source, python-based software project called PYNQ. This project enabled near-native software control of ZCU111 hardware designs via its extensive APIs exposed as python libraries. These libraries allowed for a simple pythonic interface in order to control the gateware that is automatically generated as part of the Migen build process as well as a wide-range of existing Xilinx IP cores. This talk will discuss the pros/cons and lessons learned regarding Migen and PYNQ, whether these tools would be viable for a future toolflow, or whether certain aspects should be integrated into the CASPER toolflow.