

DEVELOP DIGITAL RECEIVER FOR REDSHIFT RECEIVER USING RFSOC

Chao Liu, *Astrophysics, University of Oxford.*

The ultra-wideband redshift search receiver (RSR), which covers 73 - 110.5 GHz simultaneously, has been built about 10 years ago. Due to the limits in the speed, performance and cost of the high speed sampler when the receiver was designed, the receiver was implemented using analog autocorrelator. As the price-performance rate in digital technologies is constantly improving, replacing the analog RSR receiver by digital one becomes feasible. The digital system could offer higher frequency resolution and more system flexibility for more advanced science cases. This project was aimed to design and implement digital system for RSR. The RFSoc from Xilinx caught the attention of radio astronomy community when first released. RFSoc device has been selected as a core platform for the RSR receiver, as it can offer 8x4G ADCs, large amount of programmable logic resources and multiple powerful processors. Therefore, the RFSoc can cover the signal sampling, processing and transmission. The talk will be focused in the receiver platform built for RSR or general radio receivers based on the RFSoc. The platform acts an I/O ring RFSoc, which is the combination of firmware in logics and software applications in processors. The platform is responsible for configuring the clocks, writing/reading the registers, managing the data movement from logics to processor, transferring data via GbE and etc. If the I/O ring platform can be packaged independent of the DSP, it could be used with any DSP libraries, such as CASPER blocks, and therefore, make the system bring up much easier for different projects.