



The Digital Signal Processing in Radio Astronomy (DSPIRA) program

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The Digital Signal Processing in Radio Astronomy (DSPIRA) program is an NSF funded RET site which provides high school teachers with hands on experience using high quality open source software development tools, in both research engineering and educational settings. The goals of the program are to: (1) Prepare teachers to implement DSP projects with their students, exposing them to exciting STEM career opportunities; (2) Inspire high school students to pursue careers in STEM disciplines through building radio astronomy telescopes and using them for observation; (3) Broaden the reach of the DSP activities developed through DSPIRA, and (4) Develop the communication / pedagogical skills of the teachers, project staff, graduate and undergraduate students.

We will discuss using GNU Radio software defined radio (SDR) platform as a basis for learning and implementing digital signal processing techniques. This framework enables students to create their own telescope backend, deepening their understanding of digital systems. The digital backend is used with a small horn telescope which the students also build. They can observe the neutral hydrogen in the Milky Way to make sky maps and build a rotation curve.

We will show what the first cohort of high school teachers were able to accomplish during the six-week program in the summer of 2017. The group swiftly progressed into designing and building their own small radio telescopes for use in the classroom. These were all then tested and enhanced at the Green Bank Observatory, where all were able to make observations of the Milky Way, and teach summer students about digital signal processing.

We hope to expand the program, with all labs open-source and on the website. The teachers are designing lesson plans and radio astronomy programs to use in the classroom.