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PROGRESS IN TWO RADIO SETI EXPERIMENTS: THE SEARCH FOR EXTRATERRESTRIAL

RADIO EMISSION FROM NEARBY DEVELOPED INTELLIGENT POPULATIONS (SERENDIP) AT ARECIBO OBSERVATORY AND SETI IN THE KEPLER FIELD WITH THE GREEN BANK TELESCOPE

Abstract

Over fifty years after Frank Drake pointed an 85ft radio telescope at two nearby stars looking for signs of a distant civilization, searches for electromagnetic emission from advanced technology remain the best known tracer of intelligent extraterrestrial life. While the basic methodology of most electromagnetic searches for extraterrestrial intelligence have remained the same during the last half century, the speed and sensitivity of current searches are many orders of magnitude greater than their predecessors. Modern digital electronics and efficient algorithms allow billion point channelization across GHz of bandwidth, with the ability to search the entire terrestrial microwave window for cosmic narrow band signals less than a decade away. The supporting astrophysics and biology for the search for extraterrestrial life has also made great strides, as we are now in an era where we can say with scientific certainty that planets are the rule, rather than the exception, that the galaxy is teeming with biomolecules and water and that life can exist in extraordinarily extreme environments.

Here we will present two experiments our group is conducting to detect intelligent extraterrestrial life via radio emission from their advanced technology, the SERENDIP Sky Survey and Kepler SETI at the Green Bank Telescope. The Search for Extraterrestrial Intelligence from Nearby Developed Intelligent Populations (SERENDIP) is currently being conducted in sky survey mode at Arecibo Observatory using the 21cm feed array 'ALFA.' Our digital instrumentation performs a 128 million point Fourier transform over a 200 MHz band between 1.3 and 1.5 GHz in real time, and reports individual frequency channels with an instantaneous power exceeding a user-set threshold. These data are analyzed off-line for signals that are isolated and stationary on the celestial sphere. Our Kepler SETI at the Green Bank Telescope experiment consists of a 24 hour survey of the 105 sq deg. Kepler spacecraft field, including both a raster scan of the full field and targeted observations of stars hosting potentially habitable planet candidates. In this experiment we have recorded nearly 50TB of baseband voltage data between 1.1 and 1.9 GHz, and we are currently conducting searches for a wide variety of signal types, including narrow-band signals and dispersed pulses.