Developments in the Radio Search for Extraterrestrial Intelligence

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Recent results in the effort to characterize the galactic population of extrasolar planets suggest that Earth-size planets in the habitable zone of their parent star may be numerous. This finding adds to a growing collection of evidence that the environment and chemical precursors that we believe led to the development of life on our own planet could be common. If life has developed elsewhere in the galaxy, a key question is whether or not any of that life has evolved intelligence and a technological capability. We report on several experiments, currently underway, in which we are attempting to determine the prevalence of intelligent life via detecting radio emission from their technology. These experiments include both commensal sky surveys and targeted observations. At Arecibo Observatory, we conduct three simultaneous commensal experiments; SETI@Home, Astropulse and SERENDIP (the **S**earch for **E**xtraterrestria**R**adio **E**mission from **N**earby **D**eveloped **I**ntelligent **P**opulations). Both SETI@Home and Astropulse operate on a 2.5 MHz band of recorded voltage data from the ALFA receiver and employ distributed computing to perform a sensitive search for a wide variety of signals compressed in time and/or frequency. SERENDIP also uses the ALFA receiver, and performs realtime thresholded spectroscopy over a 200 MHz band. At the Robert C. Byrd Green Bank Telescope we are conducting an ongoing multi-band targeted observation campaign of known and candidate extrasolar planets and the galactic center, and we are preparing for extensive commensal observations that will cover regions of both sky and spectrum inaccessible from Arecibo. Additionally, we are beginning to experiment with signal processing techniques not commonly used in SETI searches, e.g. autocorrelation and automatic modulation classification. As a part of our experimental effort, we are developing high performance signal processing systems capable of performing high resolution spectroscopy across ∼GHz bandwidths, real time Doppler drift searches, thresholding and interference rejection.