

51st IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) –  
The Next Steps (A4)  
SETI 1: SETI Science and Technology (1)

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BREAKTHROUGH LISTEN ON THE GREEN BANK TELESCOPE - BIG DATA SETI WITH A BIG  
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**Abstract**

The Green Bank Telescope (GBT) — the largest steerable single-dish radio telescope in the world — is the primary facility in the Northern Hemisphere tasked with carrying out the Breakthrough Listen (BL) technosignature survey. BL's backend instrument is capable of digitizing billions of frequency channels simultaneously, operating with a wide variety of GBT feeds covering wavelengths from millimeters to meters.

BL is one of the major users of GBT, with control of the telescope as primary user for over 1000 hours each year. In addition, 100 hours per year are available to the community in shared risk mode. This can be used for technosignature searches, or for other programs including studies of fast radio bursts. Here the combination of GBT's sensitivity and the BL backend's flexibility provide a unique combination of capabilities for a variety of scientific investigations.

In BL's primary user time, targets observed include over 1000 nearby stars, the centers of 100 nearby galaxies, exoplanet candidates (including systems selected from the TESS catalog), and a survey of our own Galactic Plane and Center, in addition to casting a wide net over a variety of objects including some Solar System targets. Algorithms used to search for technosignatures include classical Doppler drift searches as well as machine learning algorithms such as neural networks. A crowdsourced machine learning challenge using GBT data, in collaboration with the Kaggle data science platform, resulted in over 700 teams participating in developing improved algorithms for SETI. BL data from GBT are available in a petabyte-scale public archive, which is being used for scientific investigations including dark matter searches, public tutorials, student training and research, and more.

I will give an overview of BL on the GBT, including highlighted results from the last year of the project, and plans for the near future.