

53rd IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) –  
The Next Steps (A4)  
SETI 1: SETI Science and Technology (1)

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KEYNOTE: "PESEK LECTURE" - EARLY RESULTS FROM BREAKTHROUGH LISTEN'S  
AUTOMATED COMMENSAL TECHNOSIGNATURE SURVEY AT MEERKAT

### Abstract

Radio telescope arrays are increasingly built to offer commensal access, via Ethernet, to the data they produce. The MeerKAT radio telescope in South Africa provides access to a wide range of components, from each antenna's digitiser to the main F-engine. It supports a number of commensal User Supplied Equipment (USE) systems in a colocated RFI-shielded datacenter. Breakthrough Listen has built a powerful USE system (BLUSE) to conduct an automated commensal SETI survey at MeerKAT, processing the full available bandwidth for all antennas. Its primary mode of operation is to upchannelise the incoming F-engine data to  $\sim 1$ Hz resolution, synthesize coherent beams on objects of interest, and search the resultant data for evidence of technosignatures. Over the past two years, BLUSE has processed data from coherent beams synthesized on approximately half a million individual pointings.

In this talk, we present scientific results and analysis of two years of automated commensal observing. We discuss the technical evolution of BLUSE over this time period, examining challenges faced and addressed early on. We also describe ancillary projects and alternative SETI survey approaches conducted alongside the primary mode of operation. Finally, we discuss areas of ongoing research and development.