OVERVIEW

A major upgrade of the VLA’s low frequency observing system, called Low Band (LB), promises to open a rich new era of Galactic Center (GC) transient monitoring with the VLA. Our previous searches using the VLA and GMRT have revealed a modest number of radio-selected transients, but have been severely sensitive and observing time limited. The new LB system, currently accessing the 236-492 MHz frequency range, promises ≥ 5X improved sensitivity over the legacy VLA system. We present early data from our new transient monitoring program demonstrating the promise of the new system. Fortuitously, it is also emerging from commissioning just in time to catch any enhanced sub-GHz emission from the G2 cloud event, as anticipated by theory, and we review existing limits based on recent observations. Finally, we describe a proposed 24/7 commensal system, called the LoFasm Observatory (LOBO). LOBO offers over 100 VLA GC monitoring hours per year, possibly unleashing a flow of new detections and validating ASTRO2010’s anticipation of a new era of transient radio astronomy.

The VLA Below 1 GHz: Past & Future

Prior to VLA upgrade
- Two narrow-band legacy systems: 74 MHz: Δν=1.6 MHz
- After the VLA upgrade
  - Low frequencies return as “Low Band” (LB)
  - Single receiver samples ∼50-500 MHz
  - Current feeds access 54-86 MHz, 236-492 MHz.
  - Significant improvements over old VLA system.

LOBO and VLITE

LOBO is a proposed, radio synoptic, high-z spectroscopy, and real time JVLA transient monitoring capability. It will utilize the primary focus feeds to observe in parallel with the Cassegrain feeds. With ∼5 deg² FoV @ 330 MHz, LOBO will perform continuous, blind searches for non-thermal transients and high-redshift spectral lines, annually surveying 25% of the available sky. A block diagram is shown below. A 10-antenna LOBO pathfinder called, the VLA Low Band Ionosphere and Transient Experiment (VLITE) is currently funded by NRL and under development with NRAO.

The LOBO Sky in 1 Year

The fraction of the sky observable by the VLA as a function of dwell time. About [25, 10%] of the accessible sky is observed for at least [100 sec, 1 hr] per year, respectively. For a future LOBO operating in the VLA’s 74 MHz band, the fractions are 96% and 85%, respectively.

1 YEAR of LOBO:
- ~6000 hrs on sky, ~25% of the VLA sky (~20% of full sky)
- > 100 hrs on the Galactic center

What does this mean for GC Transients?

Past experience (Hyman et al.2009)
- ~200 hrs of monitoring yields ∼0.05 events at 330 MHz per VLA FoV, S > 50 mJy (t_{vis}~ 1.5 hr)

New Low Band VLA:
- ≥ 5X more sensitive
- ~0.2 events per VLA FoV, S > 12 mJy, t_{vis}~ 1 hr.
- For ≥ 100 hrs/yr LOBO detects ≥ 20 GC transients/yr

LOBO Synergy with Other Instruments

Telescopes sharing the VLA sky, notably dipole arrays, including LWA1, LoFASM, LWA-OVRO, & LOFAR can track the LOBO FoV. (LWA1: 1st Long Wavelength Array station, located with the VLA. See poster by G. Taylor.)

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