Fast Transients in the VLASS

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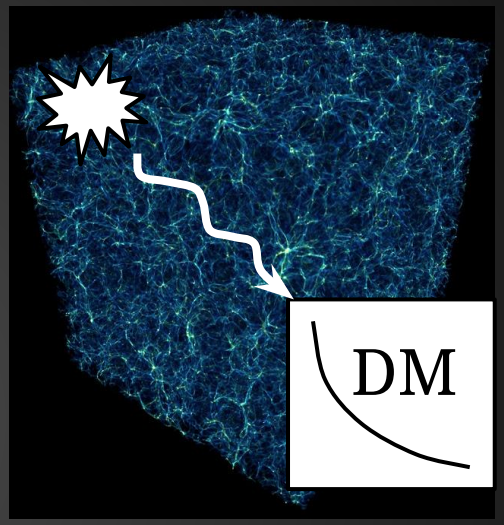
Key Points

- Arcsecond localization is transformative
- Coherent emission brighter at lower frequencies (L, S bands)
- Fast timescales (~10 ms) more sensitive and measures dispersion



Science

- Fast Radio Bursts
  - Dispersion gives unambiguous measure of IGM baryon density
  - If FRBs are merging NS, they find GW sources
- Galactic RRATs and pulsars
  - Associate to X-ray source to find magnetars or time periodic emission to find peculiar binaries
- Coronal mass ejections of nearby stars
  - Identify optical counterpart of radio flare allowing joint constraints on stellar plasma and planetary habitability

How to run a fast VLASS

Key Points

- Correlator supports up to 5 ms, 1 TB/hr
- Real-time transient detection needed to avoid archiving all data
- Analysis software largely in place, but dedicated computing (~20 nodes) needed.

Observing options

- Dual (fast and slow) data streams
  - VLA @ L band is deeper with ⅓ sky coverage of large ongoing pulsar surveys (e.g., HTRU)
  - *Hundreds* of FRBs, *hundreds* of Galactic NSs, and each pointing contains a local M dwarf @ L band
- Fast full VLASS
  - Wider band limits integration times to slower than ~30 ms
  - Survey is deep, but time dilution hurts more
  - L band => 10s of FRBs and Galactic NSs, stellar flares not as strongly affected