VAST: An ASKAP Survey for Variables and Slow Transients

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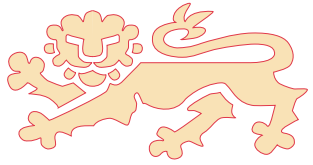
An ASKAP Survey for Variables and Slow Transients

- Unprecedented opportunity to investigate radio transient sky
- Will explore local to cosmological phenomena including:
  - Propagation : extreme scattering events, IDVs
  - Explosions : SN, GRBs
  - Accretion : XRBs
  - Magnetospheric : Pulsars, stars, planets
  - Unknown : Weird stuff
- Focus on timescales $\geq$ imaging/visibility data
- VAST: $\sim$ 50+ Australian and international collaborators



VAST collaboration

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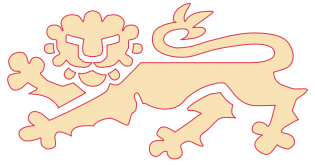
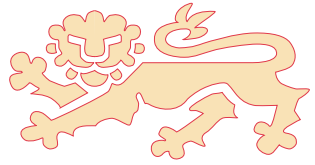


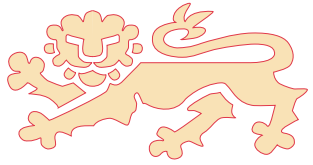
VAST: Possible survey strategies

1. Survey the whole sky as often as possible
   - Shallow but wide
   - Conceptually easy to schedule.
   - Uniform survey sensitivity across entire sky
   - Sensitive to "rare–bright" events.
   - Not as sensitive to transient sources that are below the detection sensitivity of each individual pass ("common–weak")
2. Survey a hierarchy of field sizes.
   - Progressively deeper integrations on smaller patches of sky.
   - Easy to piggyback with other surveys on specific areas
   - Sensitive to "common–weak" transients.
   - Sacrifices sky coverage that might detect "rare–bright" events
3. Combination of all-sky survey and targeted fields



VAST: Additional operation modes

4. Piggyback on other major ASKAP surveys
   - Make most of all telescope time, including source monitoring
   - Can be done completely in software
5. Regular monitoring of known target sources
   - Aim for detailed characterisation of light curves
   - Could be done completely in software
6. Triggered observations
   - ASKAP is not likely to be best instrument for follow-up
   - Could include self-triggers
7. Archival searches for longer timescales (and fainter sources)
   - Allows more sophisticated search techniques
   - Done completely offline using long term archive



Technical specs

Piggyback surveys	Always
Angular resolution	$\sim 10''$
Spectral resolution	< 10 MHz
Time resolution	$\sim$5 s
Bandwidth	300 MHz
Observing frequency	1.2–1.5 GHz
Point source sensitivity	High
Dynamic range	High
Polarisation products	Stokes IQUV