

# All Sky Monitor Workpackage

MWA/LFD Kickoff Meeting

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# ASM Functionality

- Software app running on realtime computer, designed to detect and study transient and burst emission
- Observe the whole sky visible from WA, across the entire MWA-LFD spectrum (80 – 300 MHz)
- Run in tag-along mode, looking in direction of of tile beams (v.1), and at the current freq. channels
- Performing a 5-dimensional search {RA, Dec, start time, duration, dispersion}
- Logarithmic binning chains in duration and dispersion

# Relevant Science Specifications

- Key metric is discovery **phase space coverage**; anticipated sources include GRB afterglows, micro-quasars, AGN flares, scintillation events, and pulsar giant pulses; unanticipated sources include ...
- Processed BW: 32 MHz
- FOV: tile beam ( $\leq 2\pi$  steradians)
- Frequency resolution: 32 KHz (8 KHz)
- Angular resolution: 2' at 300 MHz
- Polarization: Intensity only (full Stokes)
- Time resolution: 8 sec (0.5 s)

# ASM Search Process (v.2)

- **Predicted source contributions** – using the GSM and the ionospheric map, form a visibility grid and a variance map
- **Process the visibilities** – grid calibrated, filtered data; subtract predicted contributions
- **Form de-dispersed intensity maps** – FFT, map into sky coords., form dispersion chains
- **Transient identification** – search dispersion chains for statistically significant events, using variance maps and global intensity statistics (for RFI)

# Challenges and Risks

- Imperfect calibration of ionospheric and direction-dependent instrumental effects will set a noise floor on the level of detectable transients
- Imaging the whole sky above  $30^\circ$  elevation (v.2) at  $2'$  resolution will require about 10 megapixels in the processing chain – computing requirements need to be assessed
- Since # search pts will cause common  $5\sigma$  points, we will be searching the tail of the distribution, for perhaps 9 or  $10\sigma$  pts, and will need to understand statistics of our data distribution for robust detections

# Needed Skills

- Astronomer – to design imaging and detection algorithms, interpret results
- Software Engineer – to develop the code base and make it efficient
- Hardware Engineer (possibly) – to design circuitry for hardware acceleration of source subtraction and/or image formation

# Dependencies & Interfaces

- Calibrated visibilities from realtime computer dataflow
- Ionospheric phase screen for full sky from ionospheric calibration subsystem
- GSM from survey subsystem
- M&C interface
- Notification interface (probably in v.2)