ALBiUS Wide-field Calibration

- 2.2.1 UMAN 12 fte, deliver month 21
  - maybe horsetrading to bring in NRAO, UCAM
  - Direction-dependent ionospheric, tropospheric calibration for test data set
- Synergies
  - (Heterogenous) primary beam effects
  - Source characterisation
    - for use as models in calibration
  - Polarization calibration
  - Flagging by gain

Review existing approaches

- Peeling

  - Best developed for point sources

  - Solutions not independent (put to advantage?)

- Cotton: field-based using Zernicke poly's

- Bhatnagar: measurement equation based

  - aips++ cal tables can usefully contain direction-dependent terms?

- LOFAR uses CASAcore, BBS (+MEqTrees)

  - 'Blackboard' distributed

Scope of problem

- Complex gain solutions per antenna as function of time & sky direction
  - Primarily ionospheric phase effects
  - Polarization - 4 solutions? Jones matrices?
  - Troposphere and PB affect amplitudes
    - Test angular scale and ν-dependence
      - inspect phase/amp diffs for phase-ref/target pairs
  - ν-dependency? (Delay solutions? Scaling?)
- What regimes are affected?
  - LOFAR, SKA, EVLA, VLBI at low frequencies
  - EVLA, e-MERLIN 1.4-GHz but PB effects worse?

Ultimate goals?

- Who would use software when mature?
  - Observatory pipeline/major project experts?
    - most interactive for new instruments!
  - The average radio astronomer?

- Implemented in which packages?
  - Those commonly used in relevant regimes
  - e.g. CASA, need to be able to exchange suitable products losslessly with AIPS

- How use for a large image?
  - Facets?
  - Apply corrections at convolution stage?