ALMA Calibration Introduction

Bryan Butler

NRAO

Definition

calibration:
1 : the act or process of calibrating **:** the state of being calibrated

calibrate:
4 : to measure or adjust precisely

so, in the broadest sense, “calibration” includes the effort of measurement (and application) of all instrumental parameters.

split into two types:

1 – quantities which **must** be known when the observation is made (signal adjustments pre-correlation) – these are mostly component values which change only infrequently, or array parameters which change with antenna moves, e.g.;

2 – quantities which can be applied to the data at a later date (but might have to be measured during obsn) – these are mostly instrumental parameters which change with time or ambient conditions.

the timescale is important!

The Elements

- Antenna
  - Pointing
  - Surface & primary beam
  - subreflector & feed positioning
- Amplitude
  - Fluctuating (opacity, receiver – T_{sys}; decorrelation)
  - Flux density scale
  - Single dish
- Delay
  - Geometric
  - Atmosphere (the fluctuating part is what we often call “phase”)
  - Antenna structure
  - Electronics
- Bandpass
- Polarization
- Miscellaneous (solar, e.g.)

Agenda

Amplitude Calibration

13:50 Introduction Guilloteau
14:00 Tests of Dual-Load System Welch
14:10 Tests of S/T-Vane System Pintado
14:20 New Grid System Guilloteau, Lamb
14:40 New Absolute Scheme Welch
15:00 Mod to New Absolute Scheme Guilloteau
15:10 Receiver Gain Stability D'Addario, Guilloteau
15:20 Discussion

15:30 Break

Phase Calibration

15:40 Introduction Wootten
15:50 Fast Switching Holdaway
16:00 Discussion

Agenda

Bandpass Calibration

16:10 Introduction Guilloteau

16:20 Use of Astronomical Sources Guilloteau

16:40 Discussion

Polarization Calibration

16:50 Introduction Butler

17:00 Discussion

17:10 Miscellaneous (Antenna Location, Focus, Delay, etc...) Butler

ACA

17:30 Introduction Hasegawa

17:35 Discussion

17:40 Milestones Guilloteau, Wootten, Butler