



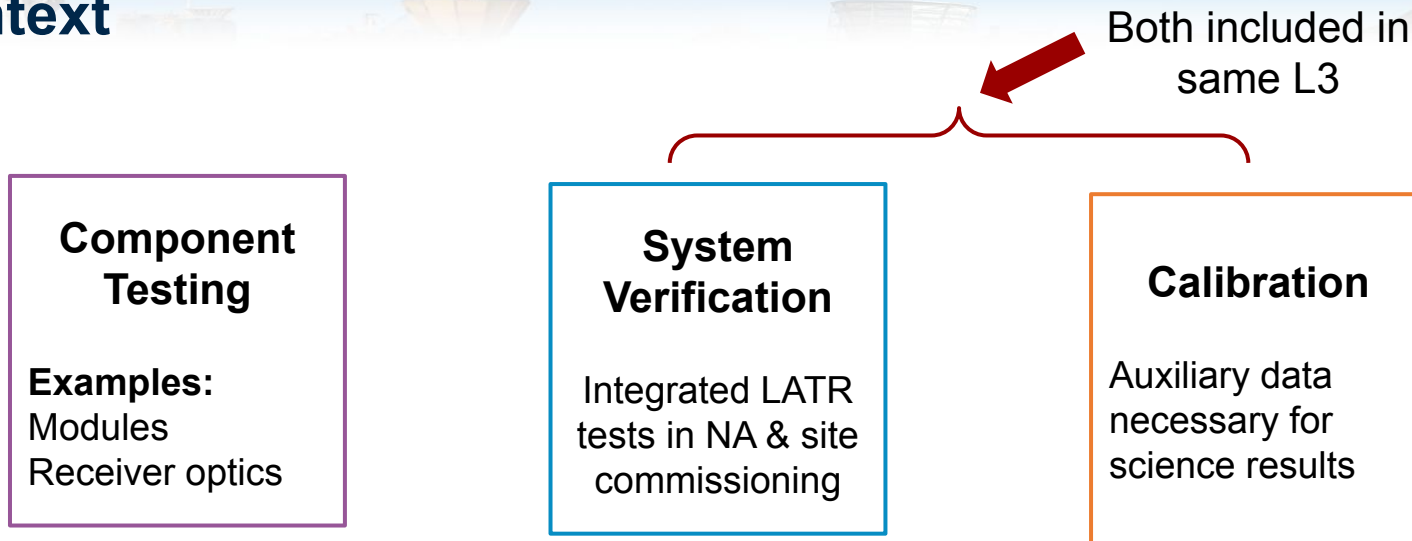
LAT Calibration Update

Johanna Nagy (she/her)

CMB-S4 Collaboration Meeting
May 9-13, 2022



Context



High level plan is somewhat independent of LAT design and observing site

System verification and calibration activities can be intertwined in NA and on site

General Considerations

- Perform as many measurements as we can in North America
- Use common calibration hardware designs as much as possible
 - If multiple LAT designs, use similar calibration hardware if possible/practical
 - Common designs with SAT and module testing if possible/practical
 - May be more efficient to produce multiple copies of a single, well-characterized design
 - More spare parts at testing locations and remote sites

→ The extent to which this makes sense will be influenced by calibration requirements
- High T_c detectors enable calibration measurements with bright sources

Planned LAT Calibration Hardware (North America)

Measurement	Required Equipment
Band properties	Fourier Transform Spectrometer
Pol. angle and effic.	Chopped polarized source
Optical efficiency	Beam-filling thermal loads
Beam maps at window	Thermal beam mapper
Power missing mirrors	Scattering mapper

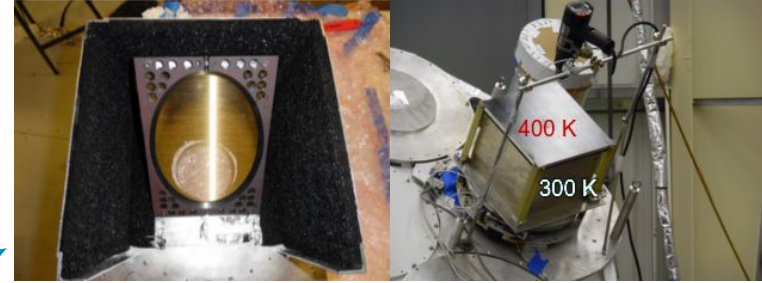
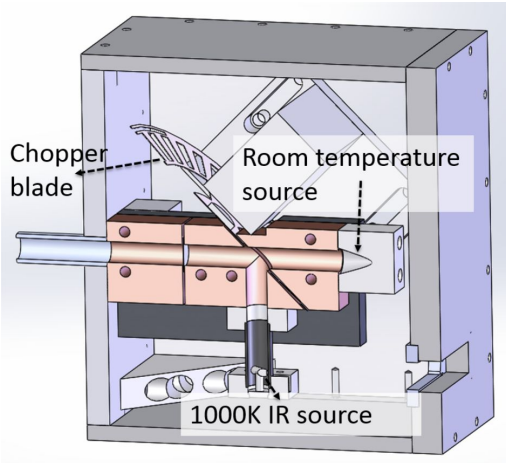


Photo from K. Harrington

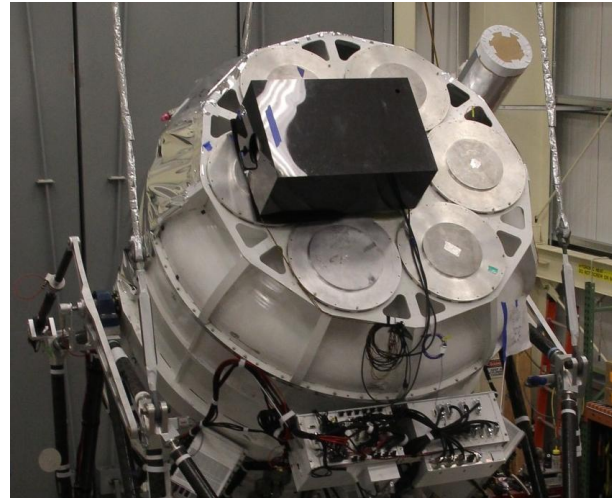
Planned LAT Calibration Hardware (Site)

Time Constants + Gain



Example from SPT

Observing Frequency Bands



Example from SPIDER

Beam Sidelobes



Example from SPT

Also laser trackers + holography for mirror characterization and telescope alignment;
Optical star cameras for pointing

Other Planned LAT Calibration Measurements

- Main beams from celestial sources
- Polarization angle from celestial sources (possibly combined with SAT info)

Caveat: To be confirmed by systematics flowdown
On-going work described in LAT systematics talk by Jeff McMahon

Complementary On-Going Work

- Systematics studies are developing tools and setting calibration requirements for various telescope configurations
- Shared data & experiences from current generation experiments are informing calibration plan and hardware designs
- Observation strategy studies considering time needed for calibration measurements
- LAT I&C plan being developed (Tyler Natoli's talk tomorrow)
- Relevant hardware prototyping for detector module tests