Quick tour of main ACT Systematics

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Little Buddies

0.1% of beam peak, 1% of beam power, 100% polarized
Caused by interference/moiree pattern in optical filters
Handled by modeling as N displaced and scaled copies of main beam

arcminutes
Far sidelobes

-60dB compared to main beam
Phase varies rapidly across focal plane
Large-scale: Hard to measure in total intensity
Handled by cutting when Sun/Moon enters them

Contribution from an individual
telescope component

Qr Sun

Patricio Gallardo
Ground pickup

>2 mK amplitude, polarized
Primarily sourced by features in ground screen
Found and removed piece of rubber based on ground maps
Quite consistent, but not enough to just subtract
Example of ground in maps
Thermal/Magnetic/Etc. pickup

- Can be hard to disentangle from ground pickup
- Even harder to remove without biasing maps
- Together, ground/thermal/magnetic/etc. pickup are the most serious low-l systematic in ACT
Day-time beam issues

Hard to model and expensive to fully fix
Current approach: characterize season-average effect

Region Flux Relative Frac
1 83.5 100% 71%
2 8.5 10% 7%
3 8.6 10% 7%
4 16.9 20% 14%

So about 71% of the power is in the main beam.
Day-time pointing errors

- Up to 3 arcmin pointing error during day
- Caused by mirror deforming under Sun’s heat
- Easy to fix by measuring location of bright point sources
## Handling

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<th>ACT</th>
<th>S4</th>
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<tr>
<td><strong>Buddies</strong></td>
<td>Model and subtract</td>
<td>Keep moiré in mind when designing filters</td>
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<td><strong>Far sidelobes</strong></td>
<td>Cut Sun/Moon-contaminated samples</td>
<td>Raytrace whole telescope during design phase</td>
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<td><strong>Day-time beams and pointing</strong></td>
<td>Measure pointing with ptsrcs, eat the beam</td>
<td>Build less floppy telescopes</td>
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<tr>
<td><strong>Ground(+) pickup</strong></td>
<td>Currently filtering. Not ideal</td>
<td>Avoid sharp corners in ground screen. Stable thermal and magnetic environment</td>
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