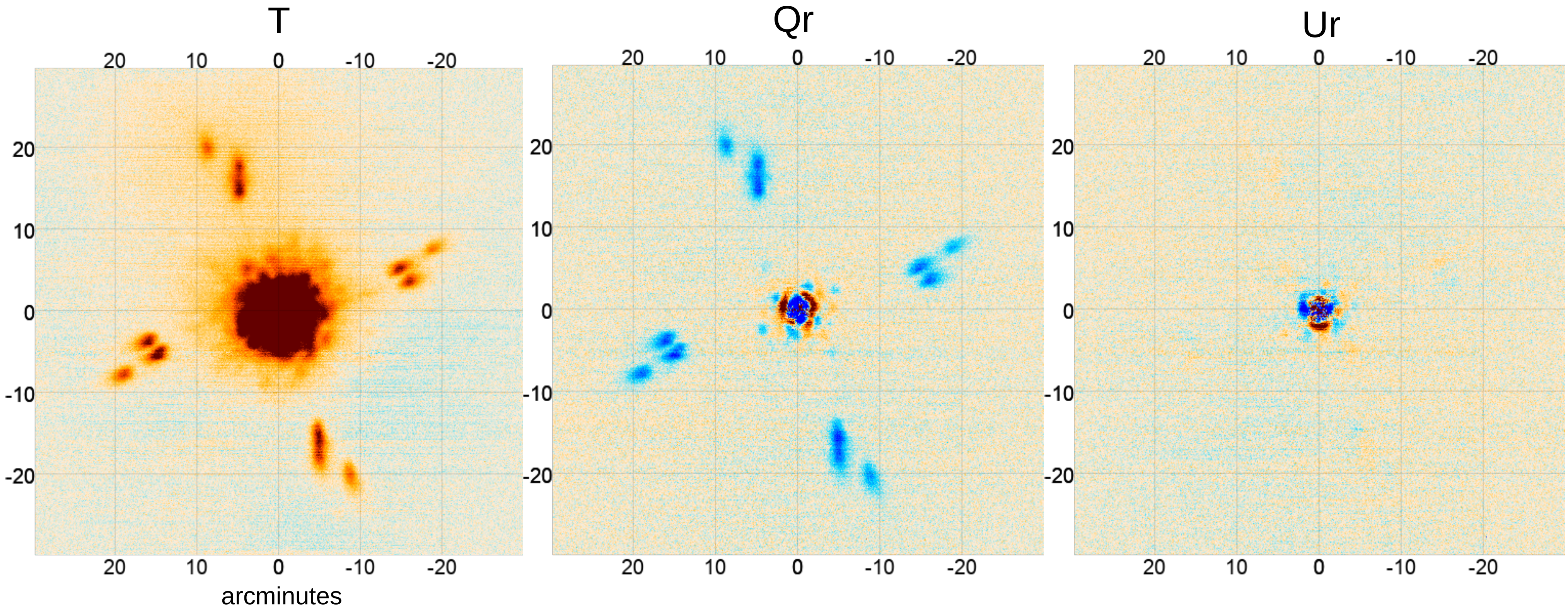
Quick tour of main ACT Systematics

Sigurd Næss

Little Buddies

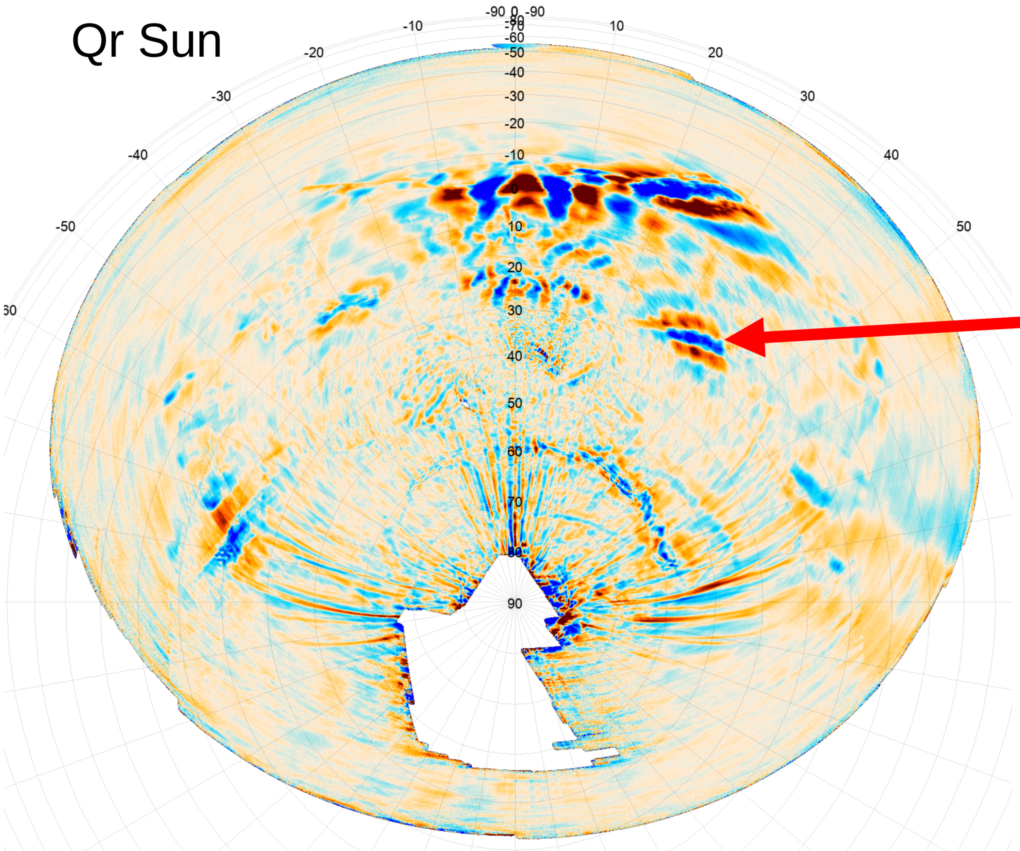
0.1% of beam peak, 1% of beam power, 100% polarized
Caused by interference/moiree pattern in optical filters
Handled by modeling as N displaced and scaled copies of main beam



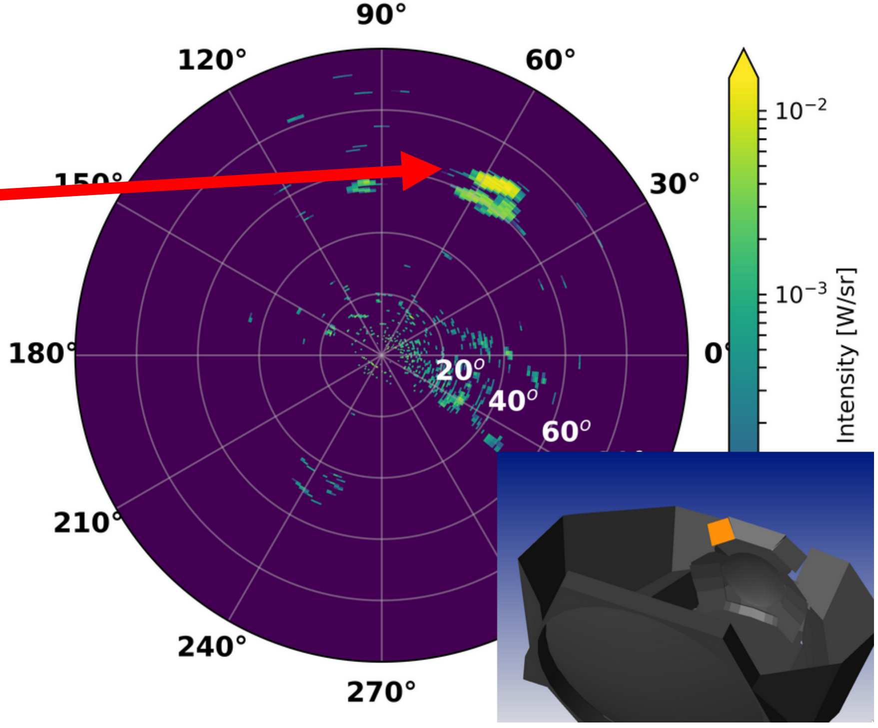
Far sidelobes

-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

Qr Sun



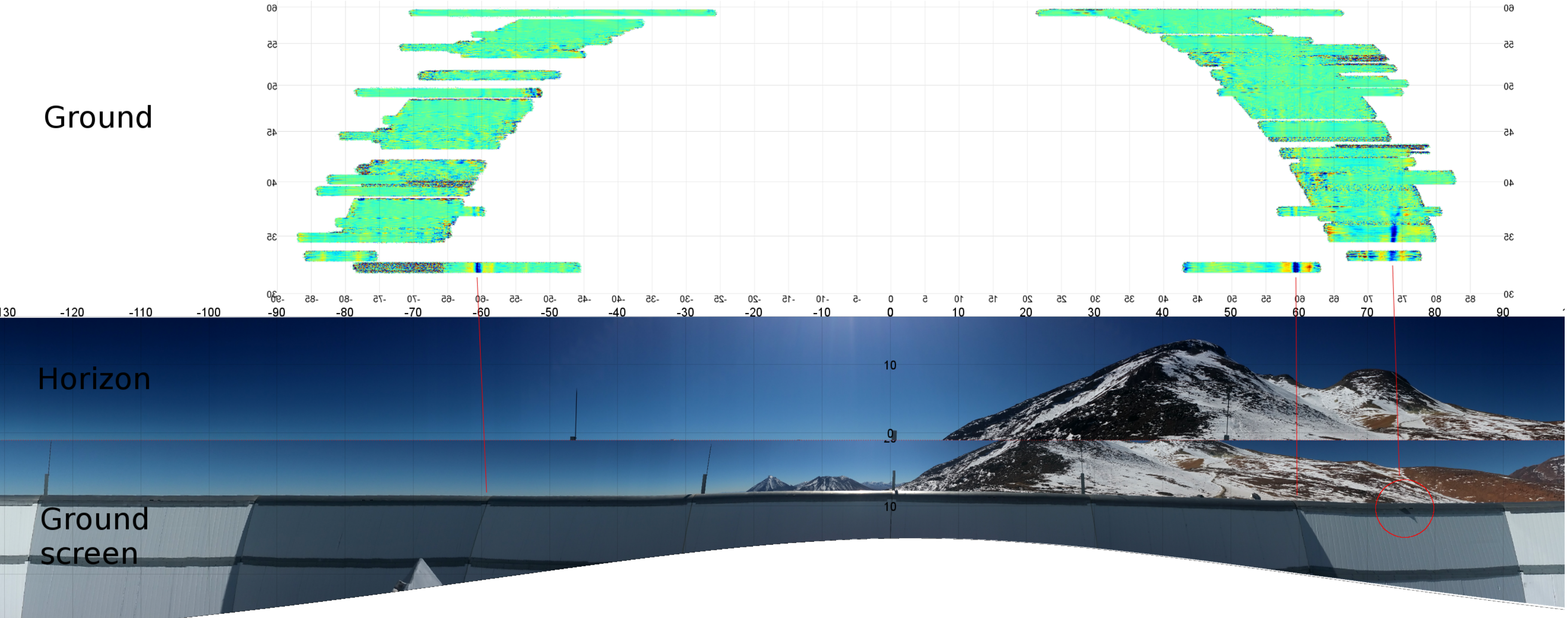
Contribution from an individual telescope component



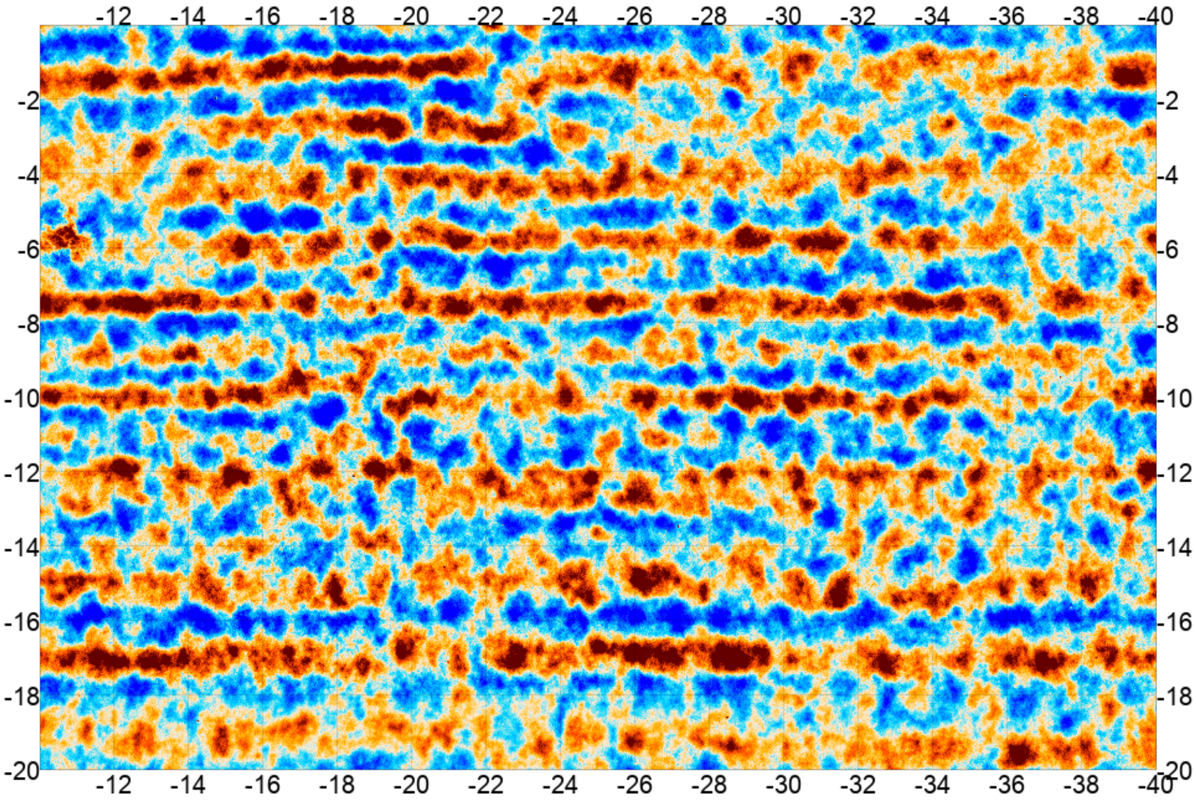
Patrico Gallardo

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



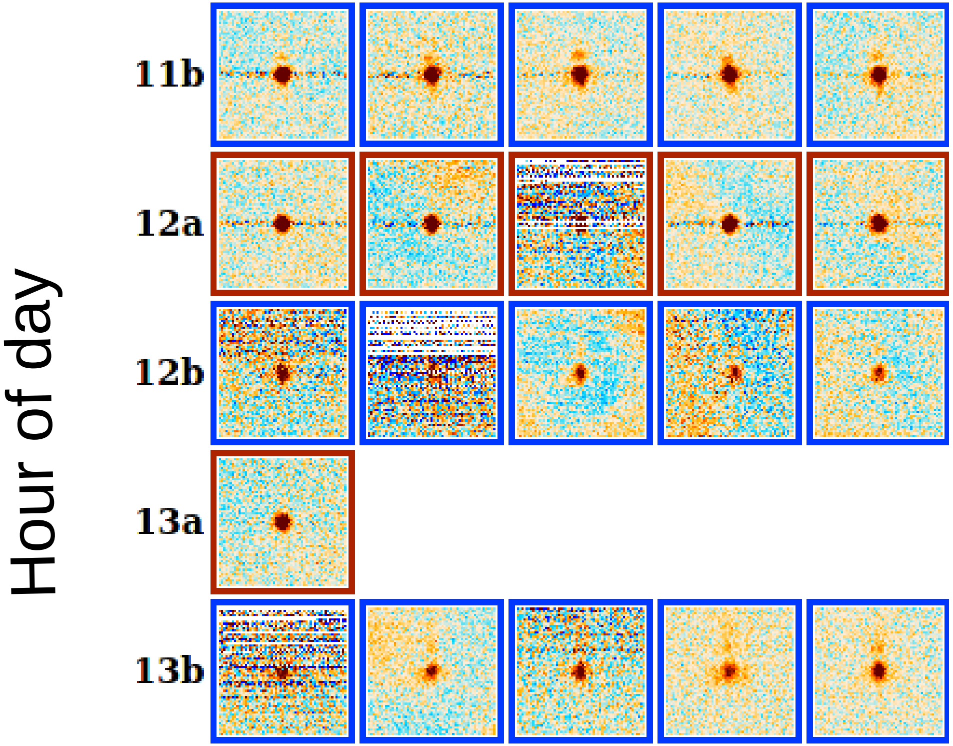
Example of ground in maps

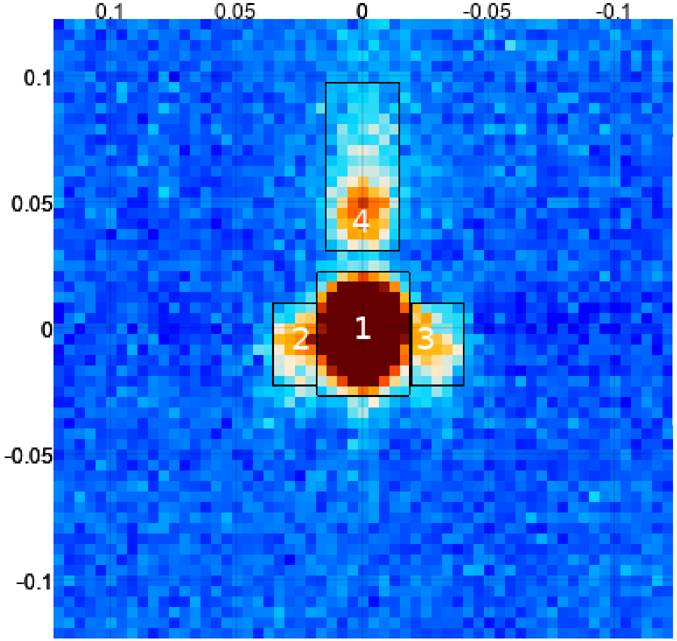


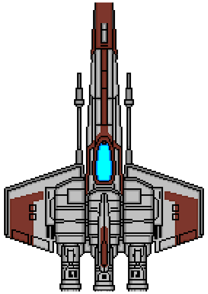
Thermal/Magnetic/Etc. pickup

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

Day-time beam issues







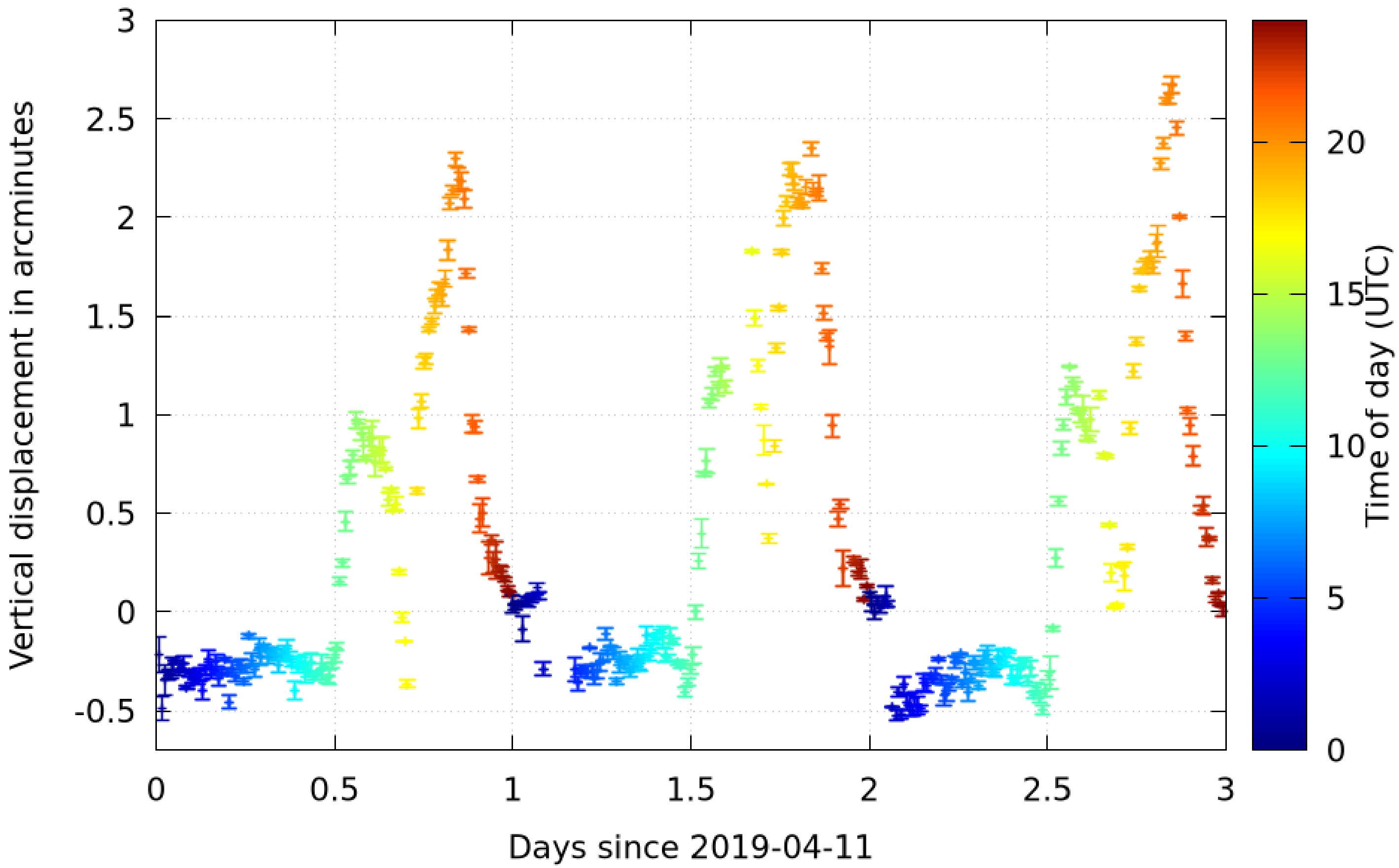
"Spaceship beam"

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.

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

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

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