

Instrumental systematics forecasting

Colin Bischoff

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Forecasting efforts so far...

- Mostly focused on r (and delensing, to some extent)
- Instrument sensitivity scaled from achieved performance (BICEP/Keck)
- Questions that have been addressed:
 - a. How many detectors are needed at how many observing frequencies to achieve science target?
 - b. What is optimal fsky for deep survey?
 - c. Are forecasts robust against more complicated foregrounds?
 - d. Can we produce simple benchmarks for various classes of instrumental systematics?
- We have tried to minimize the number of choices that make assumptions about the instrument and/or survey

Example: additive systematics

- Represents *any* effect that adds power to B-mode map.
- Map-based simulations contain various forms of the additive systematic
- Target bias on $r < 1e-4$

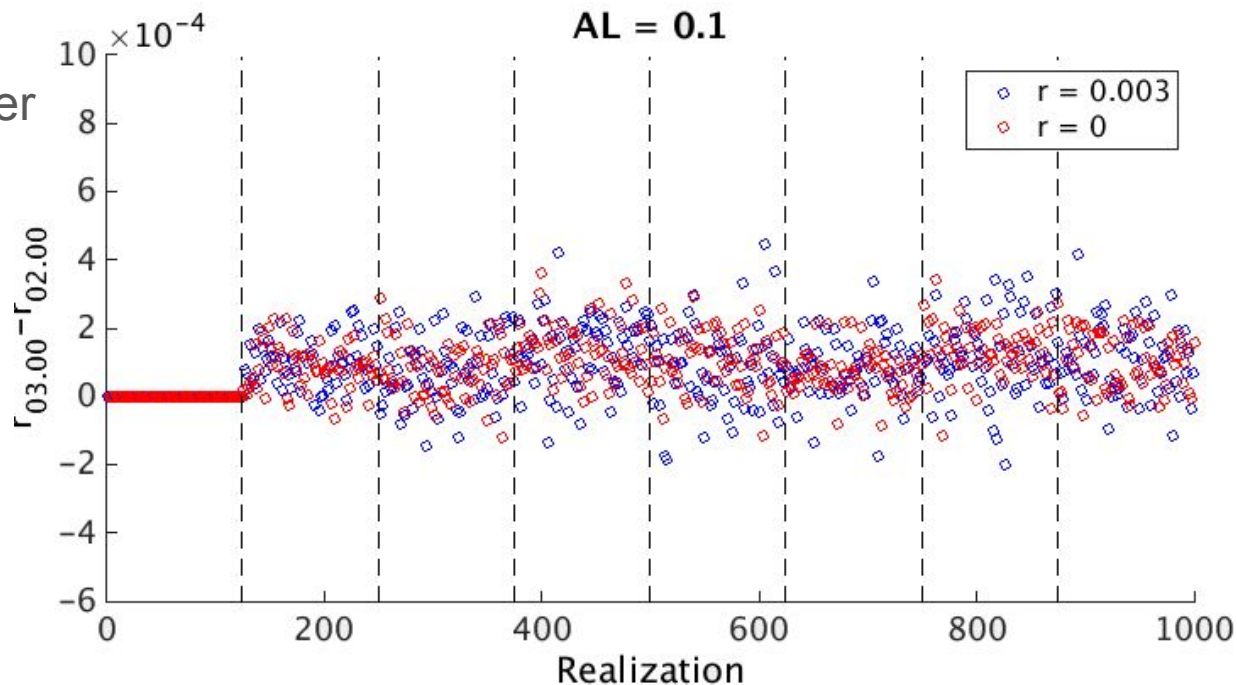


Figure: Steve Palladino

Example: band center errors

- Analyze standard sims, but assume incorrect band center
- Also considered the case of band center error that is common-mode across observing frequencies

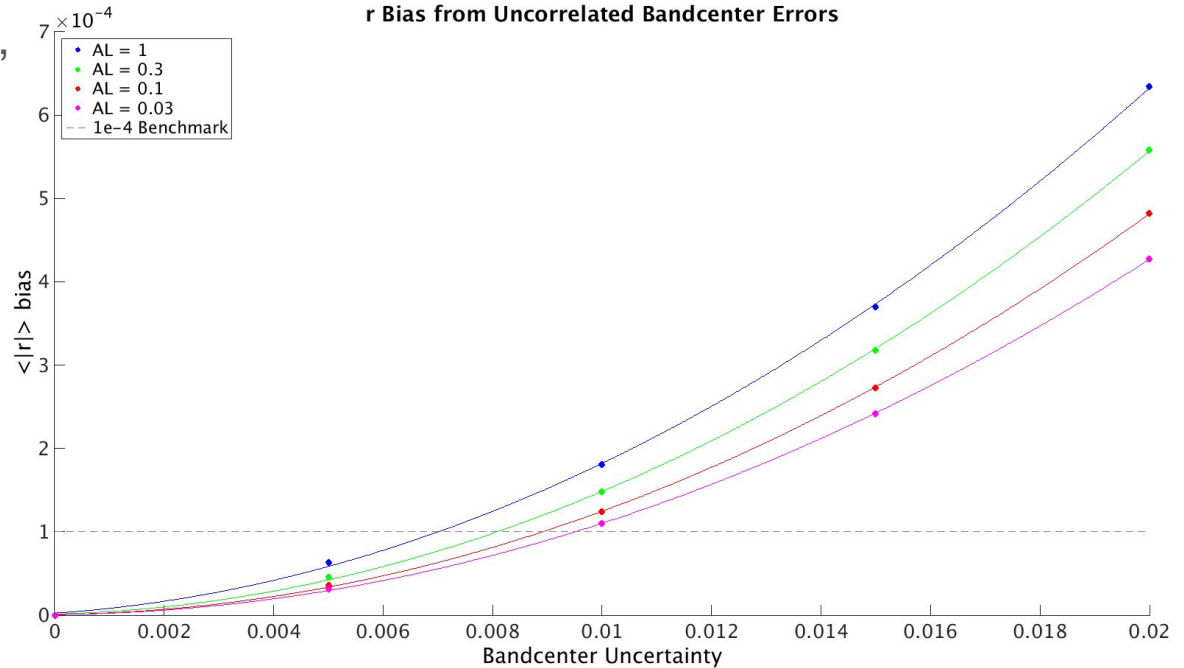


Figure: Steve Palladino

Challenges for next round of forecasting

- Reference instrument design provides some answers to uncertainty about instrument, survey, etc.
- But with limited time and person-power, we still anticipate focusing on map-based simulations, not full blown TOD sims.
- Wherever possible, try to design calculations and simulations that give insight into the harmful effects of specific systematics without devoting massive effort to “kitchen sink” simulations.
 - Important to consider questions like “Does this effect integrate down as we increase the number of detectors or observing time?”
 - For some effects, it might be necessary to do some amount of TOD simulation
- Forecasting group is eager to get help and input from all CMB-S4 members!