

# Systematics studies and coordination with Technical Working Groups

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# Systematics studies to date

- r forecasting group has worked with high level descriptions of systematics to determine benchmark corresponding to  $1e-4$  bias on r
  - Additive systematics with map-based simulations ([2017 Jul 10](#), [2017 Aug 31](#))
  - Band center errors in component separation ([2017 Sep 13](#))

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  - Additive systematics with map-based simulations ([2017 Jul 10](#), [2017 Aug 31](#))
  - Band center errors in component separation ([2017 Sep 13](#))
- Technical working groups have been thinking about systematics in the context of technical development projects to retire risk. [Spreadsheet here](#).
  - Divided into Data Management (DM), Telescope / Site (TS), Detector / Readout (DR), and Cryogenics, Cryostat, Optics (CCO) sections.
  - Example: ground pickup could be mitigated by comoving baffle. Systematics impact is rated 4 (out of 5) = “Mitigation for known important systematics. TD addresses most effective way to remove this systematic.”

## [PESSIMISTIC VERSION]

# How big of a forecasting / simulation job is it?

- Long list of potential systematics multiplied by large parameter space for each individual systematic (i.e. what form do you assume for ground pickup?).
- For many instrumental systematics, the most convenient description is in the time domain and averaging-down effects from map making can be important.
- While past / current experiments have done great work (thanks to heroic efforts!) on systematics estimation and control, sensitivity thresholds are much higher than CMB-S4 target (i.e. BICEP2 III constrained systematics to  $r = (3-6)e-3$ ).

# How big of a forecasting / simulation job is it?

- As much as possible, try to map instrumental effects onto additive systematics / multiplicative systematics description.
- Many effects average down with increasing number of detectors.
- Potential role for a limited “reference set” TOD simulation to determine detector coverage patterns; use this to develop map-based simulations for various detector non-idealities.
- Tap into energy from technical working groups.