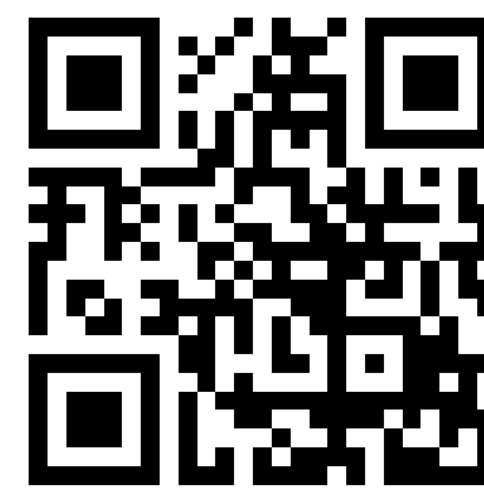


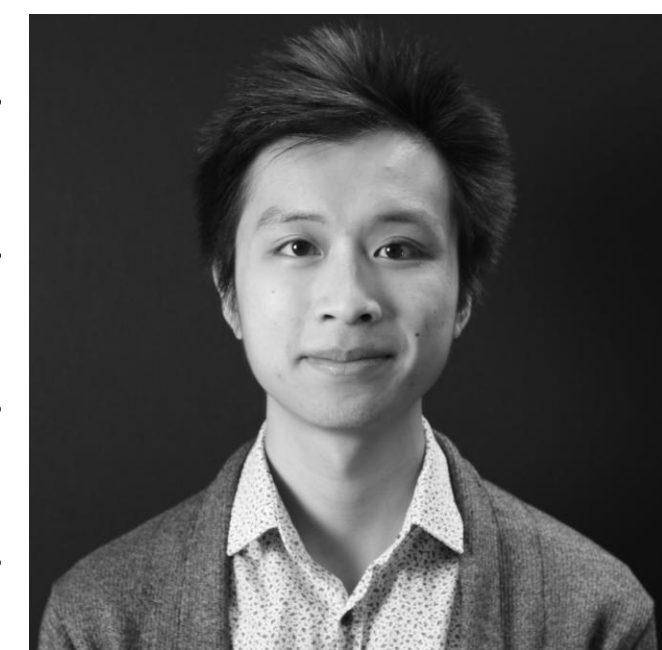
# Determining the Observational Effects of Detector Crosstalk through Simulation

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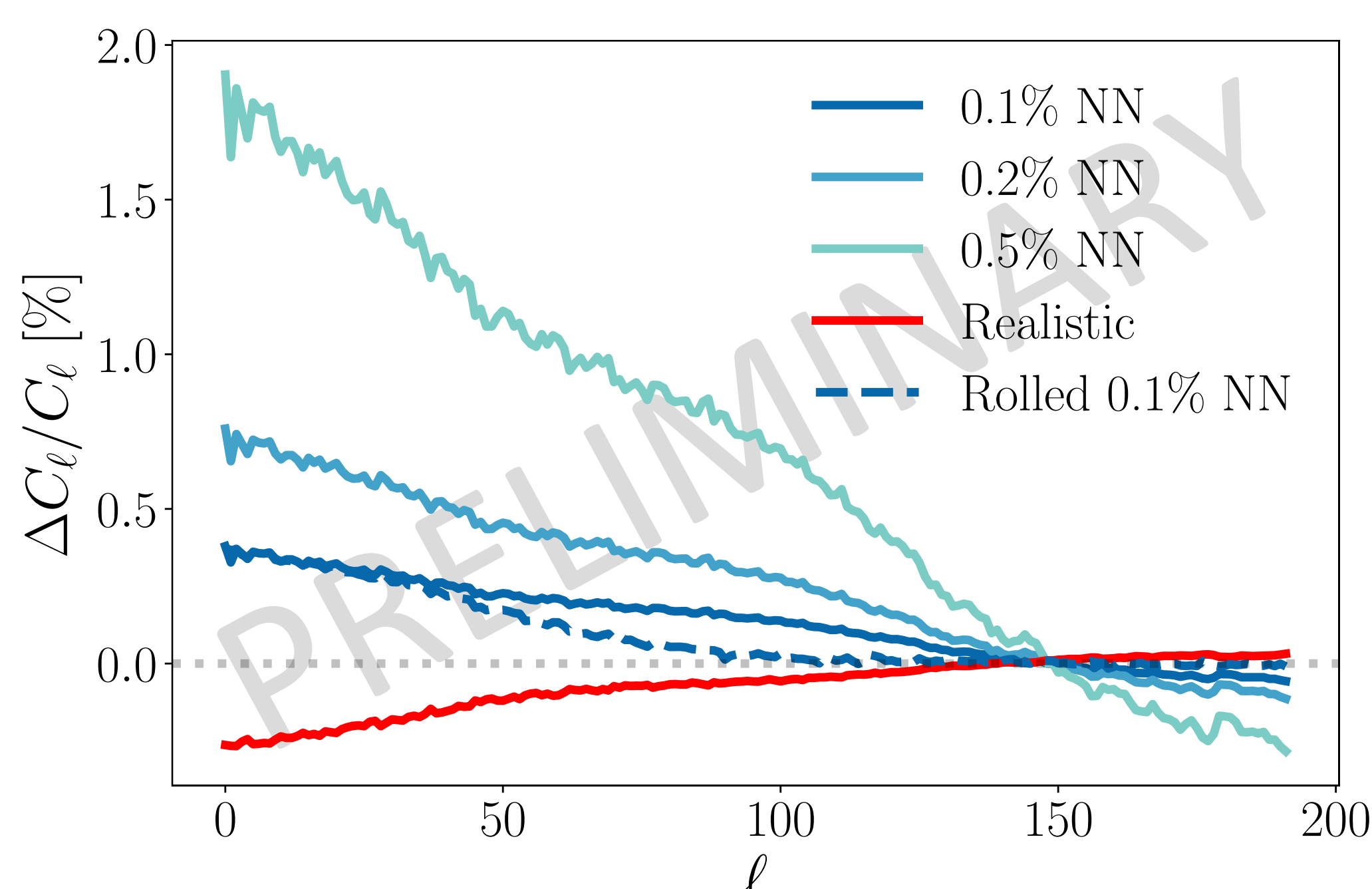
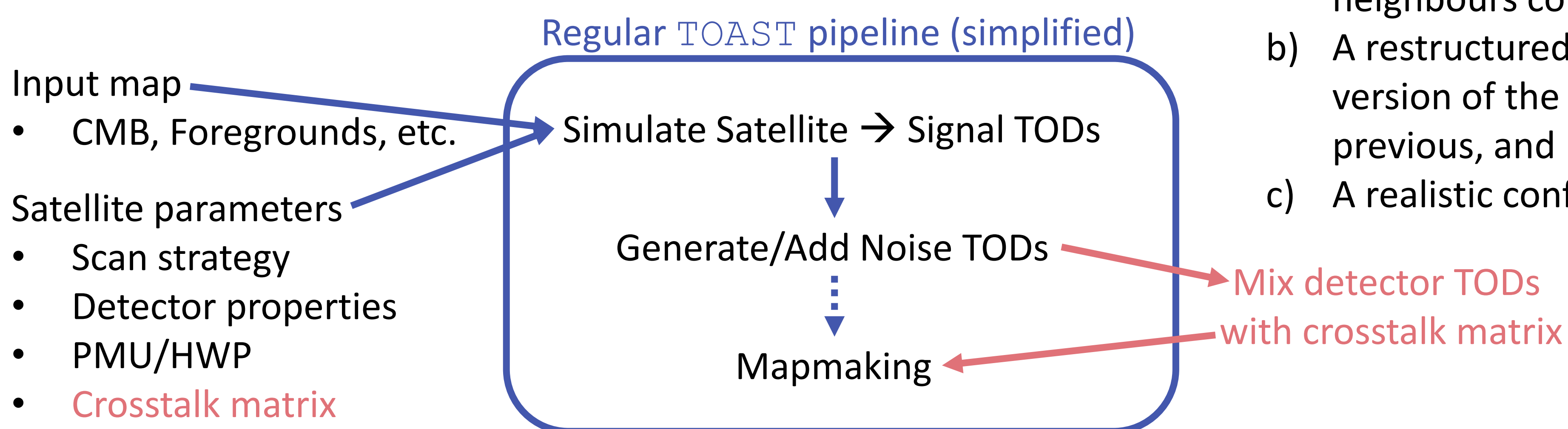
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## What is crosstalk?

- Crosstalk is a process by which signals destined for a certain detector are received/recorded by another
- The effects are very **dependent on the focal plane layout**
- There are two types of crosstalk:
  1. Optical crosstalk
    - Arises from detectors with overlapping sidelobes.
  2. **Electrical crosstalk**
    - Depends on the infrastructure of the readout electronics

## LiteBIRD-like simulations with TOAST

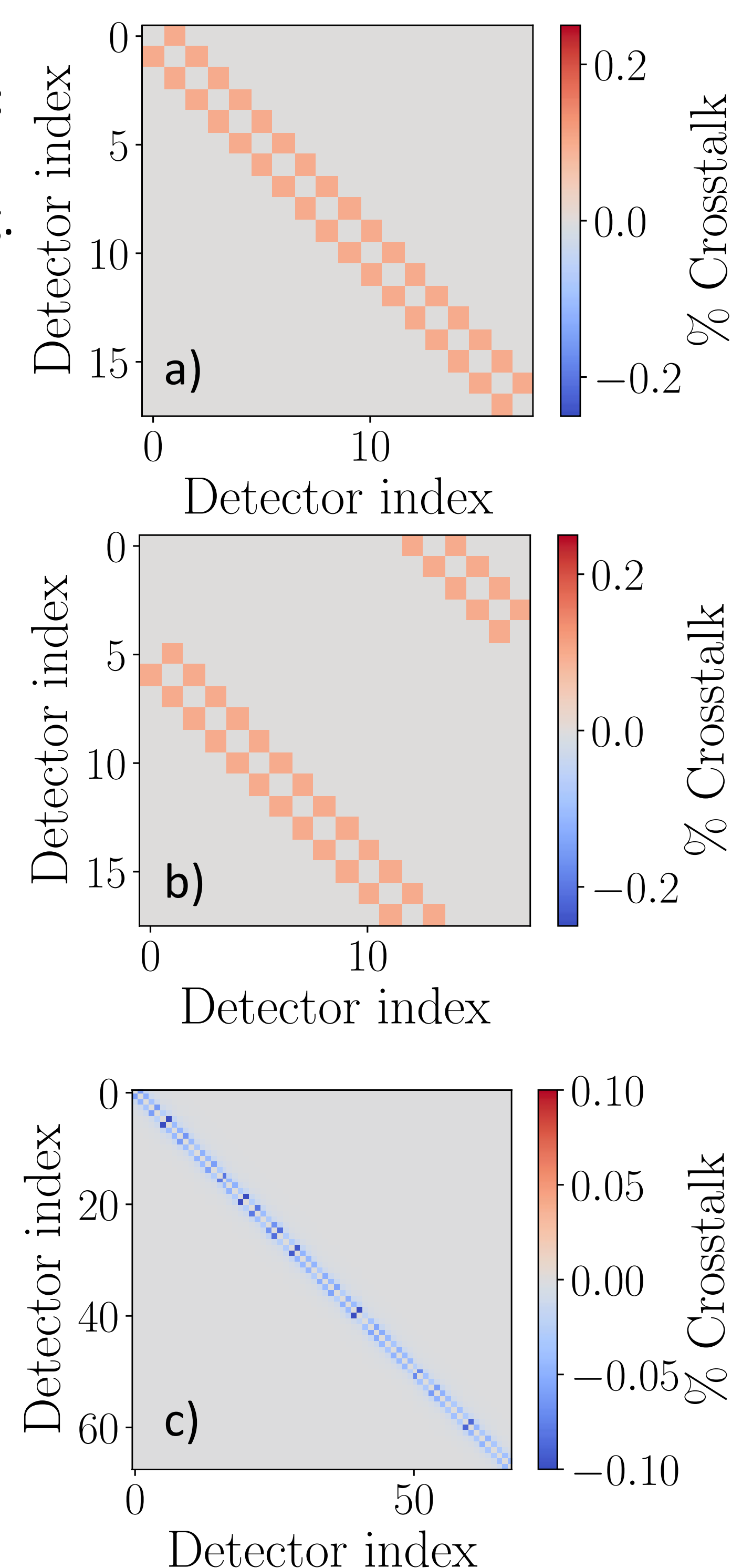


*Above:* The fractional change in power spectra of output T maps for various realizations of crosstalk.

The crosstalk matrix 
$$d_i(t) = \sum_j W_{ij} [s_j(t) + n_j(t)]$$

- Crosstalk effectively mixes detector timestreams together
- Electrical crosstalk mixes readout signals for detectors with adjacent frequency biases (generally negative xtalk)
  - **Detectors crosstalk with their nearest neighbours**
- There is some freedom for reconfiguring the structure of readout electronics → Different crosstalk configurations

*Right:* Examples of crosstalk matrices for:  
 a) A simple nearest neighbours config.  
 b) A restructured version of the previous, and  
 c) A realistic config.



## Observational effects of crosstalk

- Changing the **crosstalk config. affects the shape of effects** in observed CIs in T
- Increasing crosstalk amplitude with the same config. preserves shape of effects
- Pipeline in place for simulations of long-term observations
- Effects on polarization ready to be investigated
- Predicted constraints on  $r$  to **inform the production/configuration of readout electronics** for future experiments



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