Probing Reionization with CIB Fluctuations

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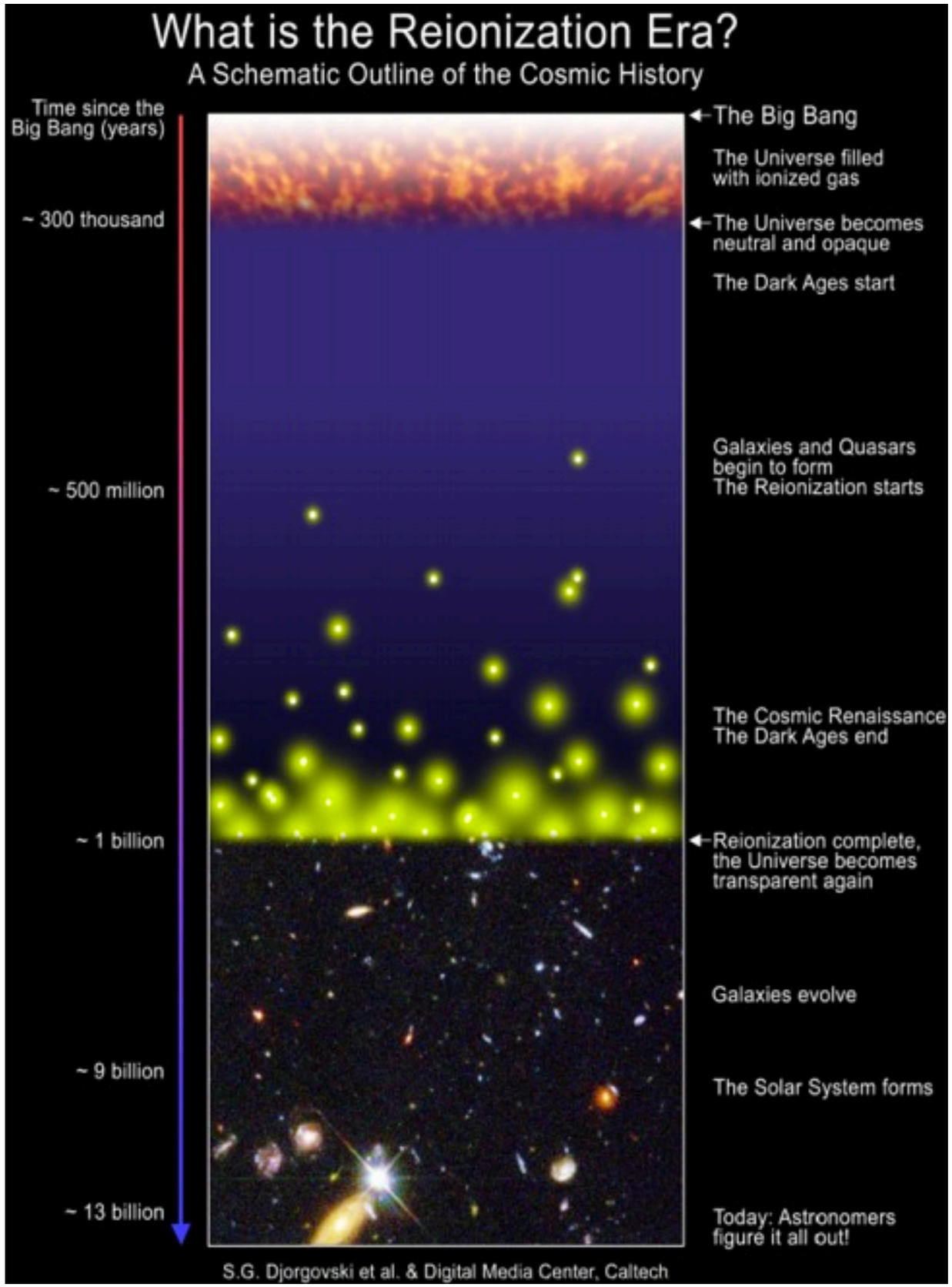
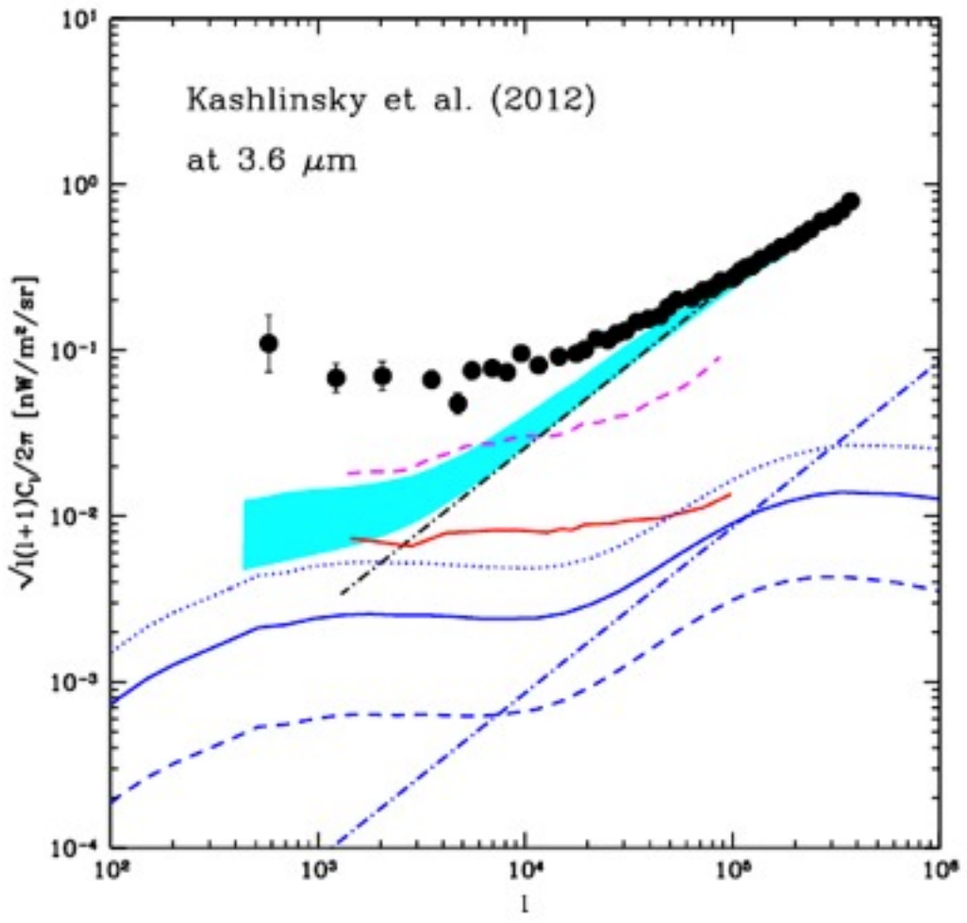
Why do we care?

- Sources of reionization create anisotropies in the neutral background.
- They cannot individually be resolved currently.
- Could make detectable contribution to fluctuations in the near-infrared background.
- Will be constrained with datasets: CIBER, Spitzer, HST CANDELS.



Kashlinsky Reports Detection in 2005.



Cooray et al. 2012

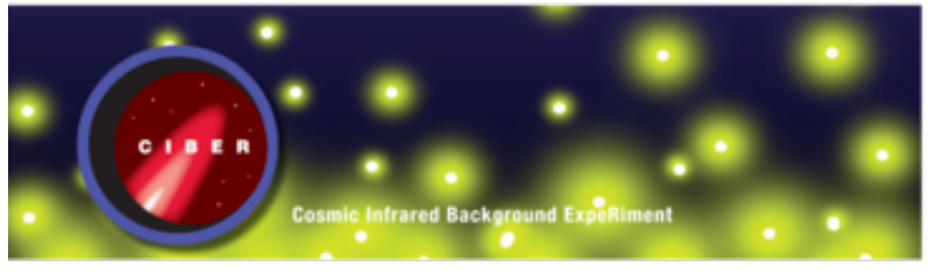
Upcoming measurements will:

* allow us to confirm or deny these findings.

* Cross-correlate to rule out systematics.

* test for fluctuations at several new wavelengths.

Three Experiments



- Preforming fluctuation measurements with three datasets:
  CIBER,
  SDWFS Spitzer,
  and HST CANDELS
- Fill out E&M spectrum shown on right
- Will discuss them now.

HST CANDELS

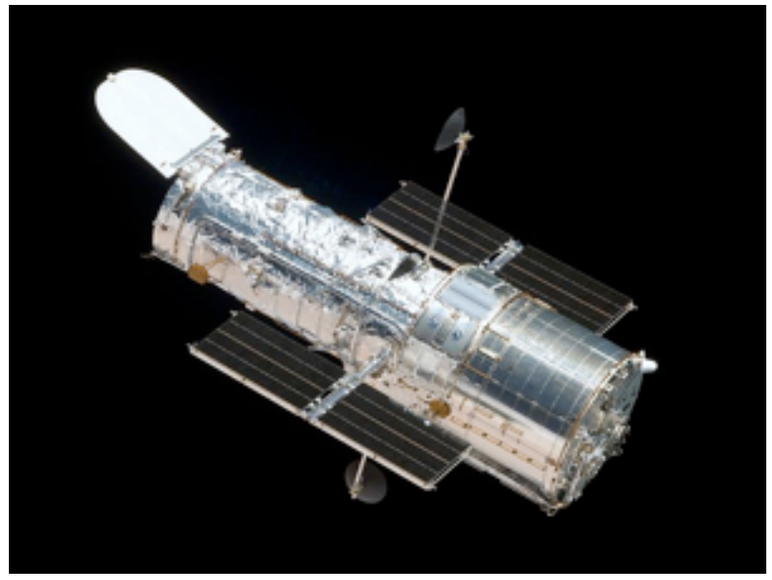
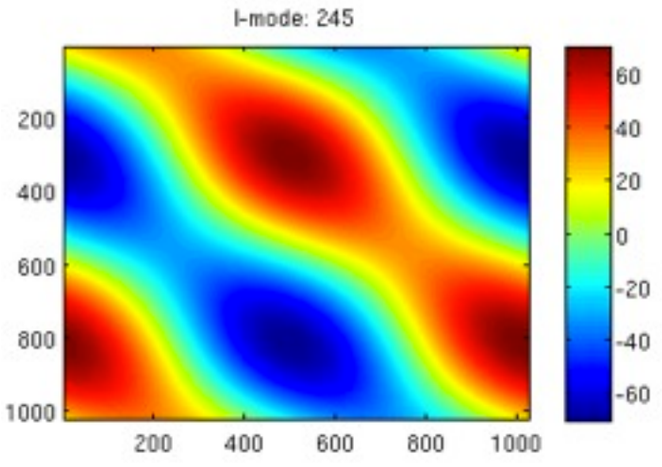
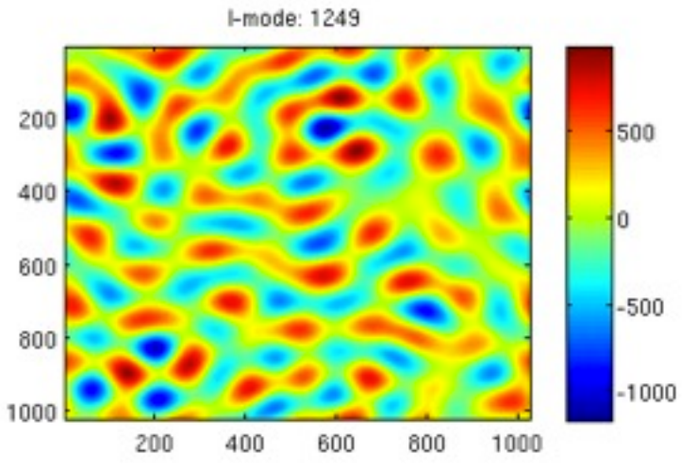


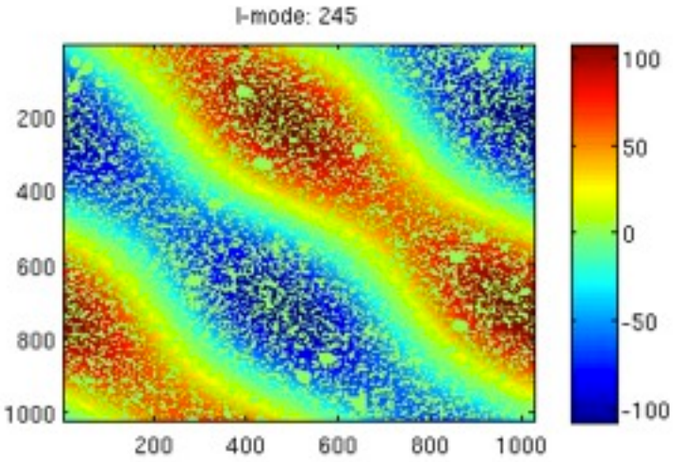
Image Credit: NASA

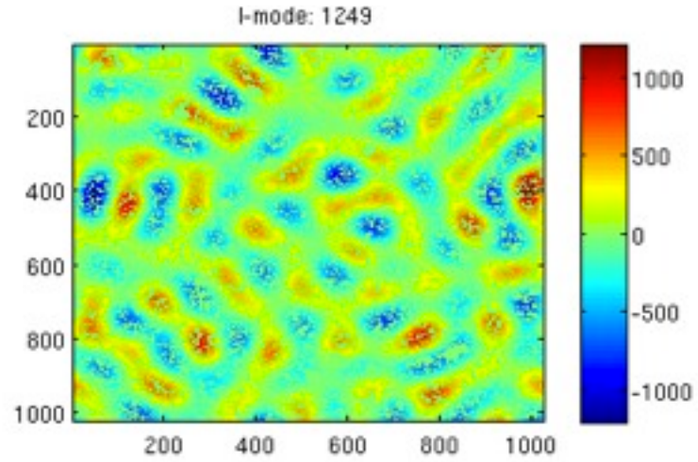
- Fluctuations between 0.1 arcseconds to 20 arcminutes.
- Two epochs and fields for cross-correlation for the 1.25 and 1.6 micron wavelengths. One field for ACS 0.606 and 0.814 microns.
- WFC3 camera very good giving a lot of confidence the faint galaxies are being removed.

Mode-Coupling Matrix



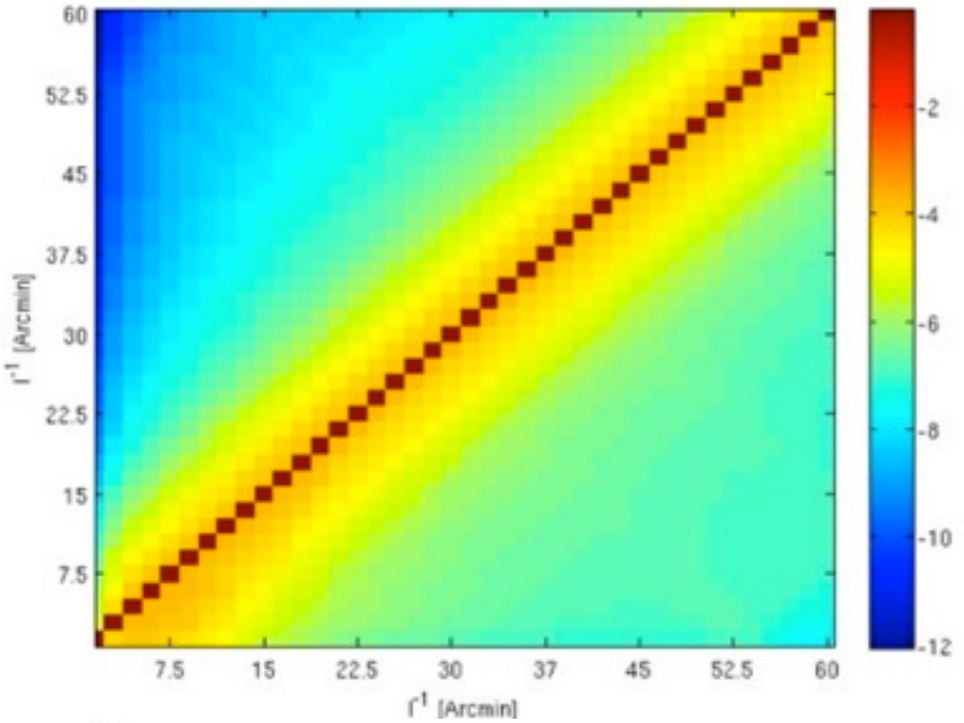


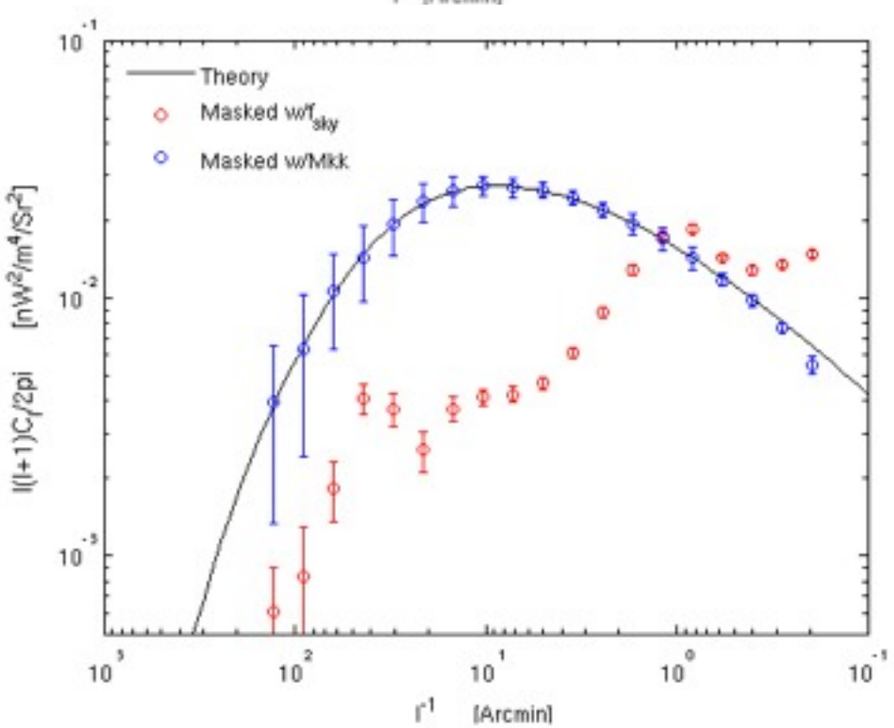




Note how masks affects each mode.

<u>The Matrix itself.</u>



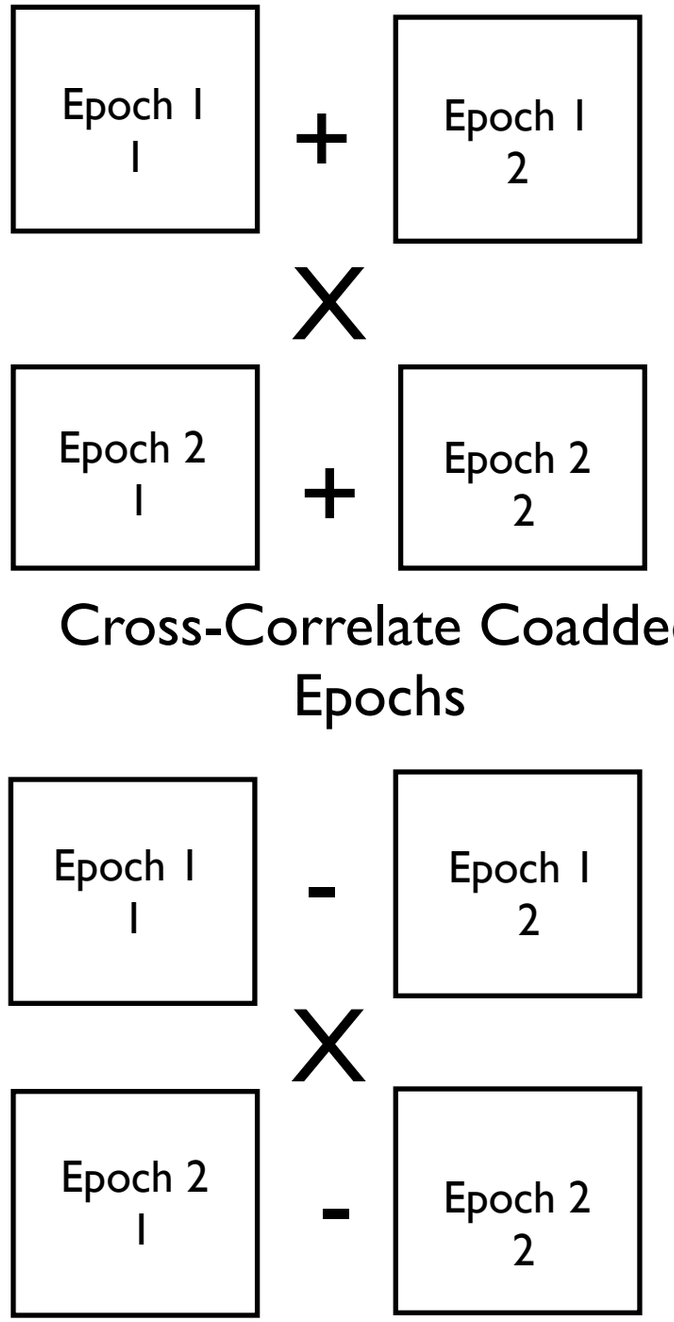


Smidt et al. 2012 (In Prep.)

Cross-correlate Epochs

Choose only CANDELS fields and wavebands (in microns) with separate epochs to cross-correlate:

* UDS (0.606, 0.814, 1.25 & 1.6)
* Cosmos (1.25 & 1.6)

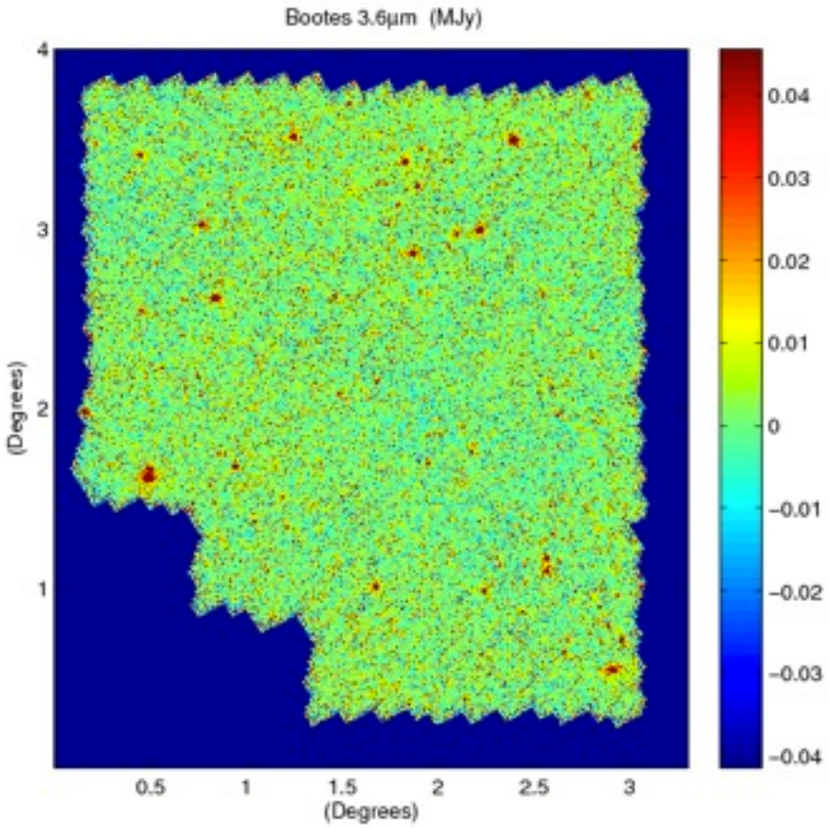


Importance of cross-correlation.

Smidt et al. 2012 (In Prep.)

SDWFS Spitzer

- Can measure fluctuations from a couple arcseconds to a few degrees.
- Focusing on fluctuations at 3.6 and 4.5 microns.
- Little noise bias as there are 4 epochs we can cross-correlate.



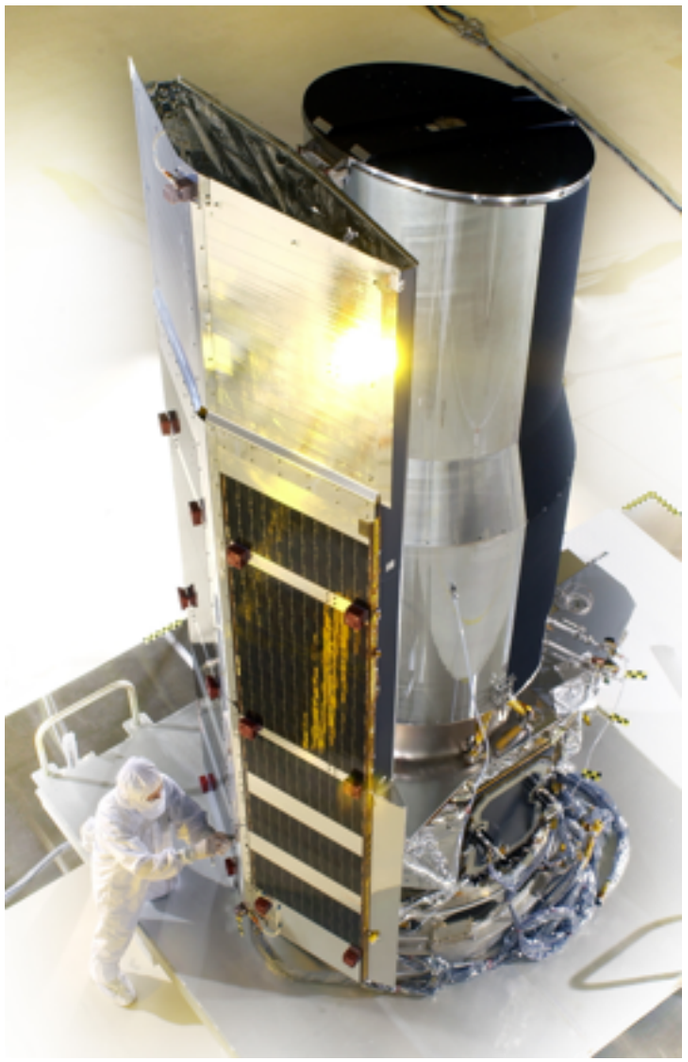
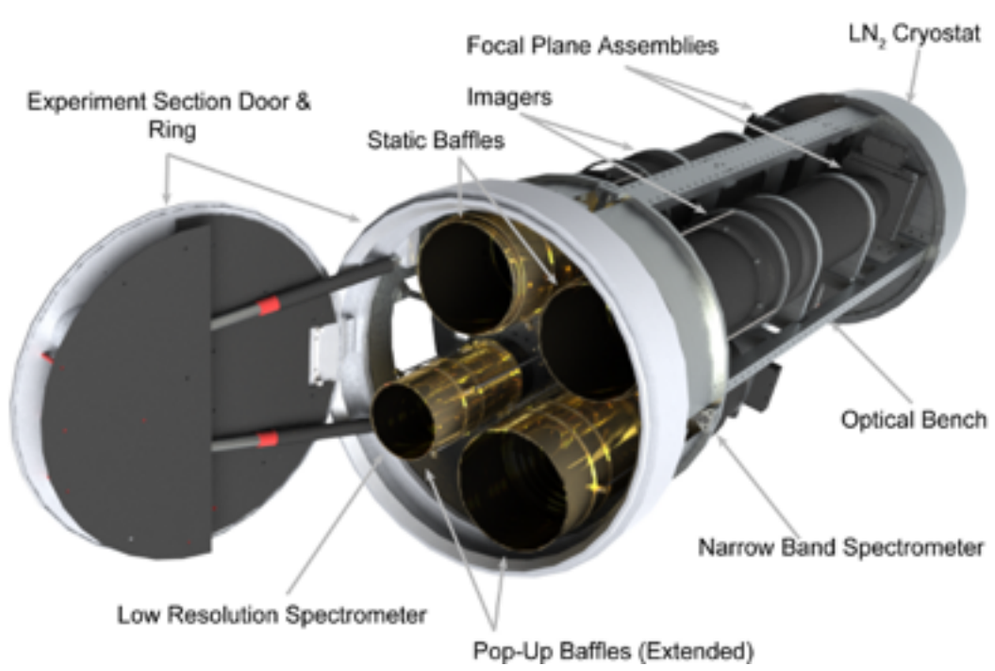


Image Credit: NASA

CIBER

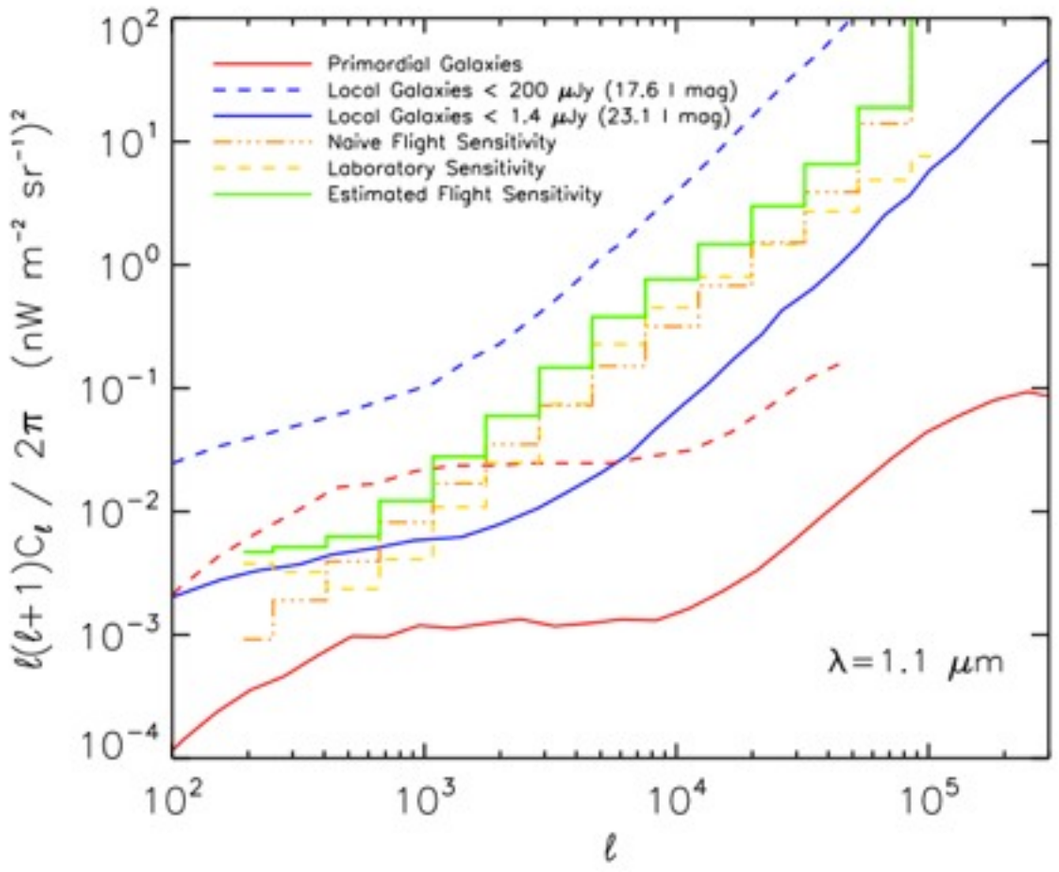
- Measures fluctuations between 0.2 and 120 arcminutes.
- Operates at 1.1 and 1.6 microns.
- Four first generation launches. Three launches thus far.



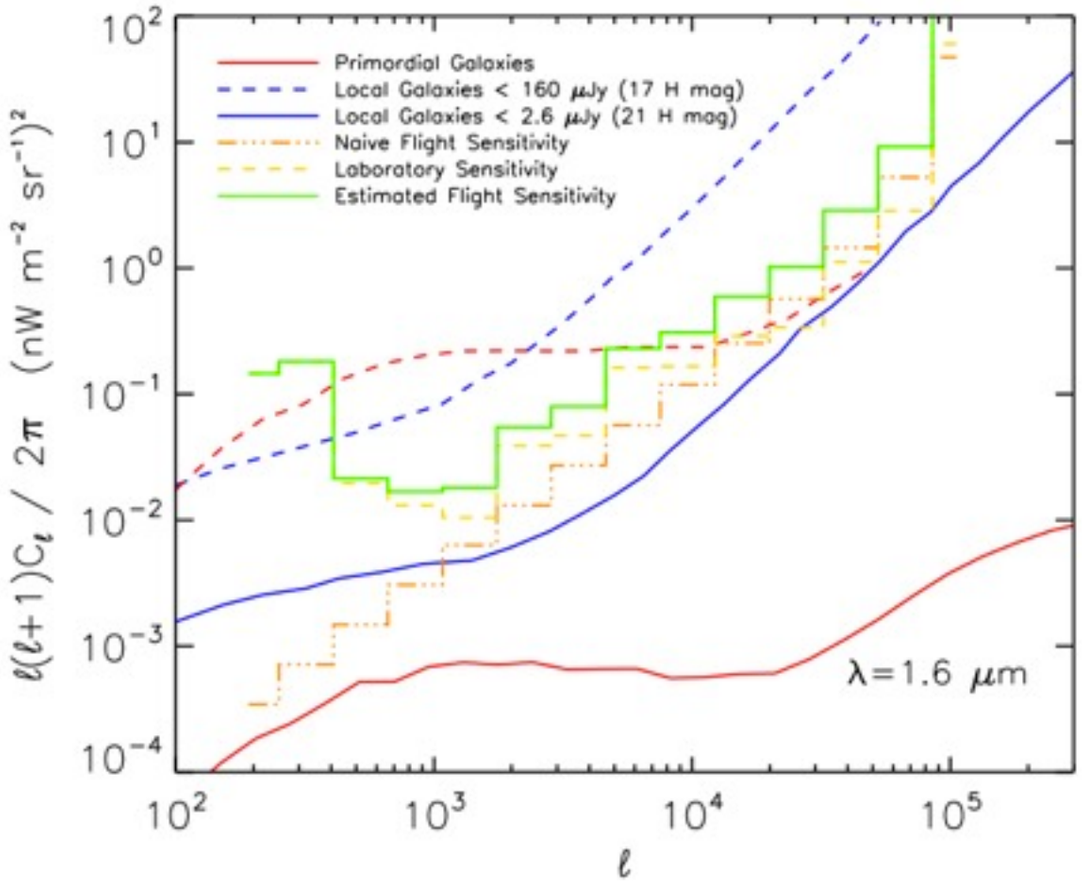
Zemcov et al. 2012

- Launched at different times in the year which can rule out zodiacal dust light.
- 4 different science fields.
- One of the fields is Bootes to cross with Spitzer. Another NEP to cross with AKARI.
- No mosaicing!

CIBER Instrument Sensitivity



1.1 microns



1.6 microns

Bock et al. 2012 (In Prep.)

Results expected in the coming months.

Summary

- We have preliminary measurements with CANDELS and Spitzer data.
- Upcoming CIBER data will confirm or deny. Especially with cross-correlations.
- CIBER will be test independent of mosaicing.