Spectrometer + Imager Science Matrix (In Construction)

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Spectrometer Science Matrix

Science Goal	Parameter	Measurement	MiniPixie Capability	PIXIE	SuperPIXIE
Feedback Processes in Groups and Clusters	Mean electron pressure	Y distortion in the spectrum	high s/n > 10 sigma	high s/n =200 sigma	high s/n > 200 sigma
Feedback Processes in Groups and Clusters	Mean electron temperature	Relativistic thermal SZ signature in spectrum	low/marginal s/n Detection: 5-15 ~3 sigma sigma		Detection: >5-15 sigma
Constraints on models of Inflation	magnitude of mu- distortion due to silk damping of acoustic oscillations	mu-distortion in the spectrum	s/n<1	s/n<1	s/n=1 (?)
		Intensity mapping of the CIB			
Properties of Galactic Dust	Dust Temperature and emissivity distribution	Spectrum up to 2 THz	high s/n	high s/n	high s/n

Imager Science Matrix

Science Goal	Parameter	Measurement	Large aperture imager	small aperture imager	notes
Distinguish between models of inflation	r	E+B	r=?	r=?	Does the imager require the spectrometer? What does lower sensitivity do? What about delensing the recombination peak?
Determine the number of light relics in the Early Universe	Neff	E+B (full sky)	Neff </td <td>Neff<?</td><td></td></td>	Neff </td <td></td>	
Determine the ionization history of the Universe	Tau	EE (full sky)	sigma(tau) =0.002	sigma(tau) =0.002	independent of spectrometer (?)

Imager Science Matrix

Science Goal	Parameter	Measurement	Large aperture imager	small aperture imager	notes
Test models of Galaxy Formation	Number of bright galaxies	Detection of highly magnified dusty galaxies	3000	Worse than Planck below 600 GHz	T measurements, resolution is critical
Determine polarization of radio and dusty galaxies (foregrounds for r)	Polarization level of point sources	Q, U of sources	"spectacular improvement over planck" (need number)	New information relative to Planck only above 353 GHz	S3/S4 will give constraints on polarization of radio sources. Large PICO will give the information on polarization of dusty galaxies
Galaxy Formation (through identification of porto-clusters)	?	Detection of individual proto- clusters	>1000	< handful	(Science deliverable to be better formulated)