Reference Design Properties

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Charge to Readout, Detectors, Telescopes, Cryostat and Cold Optics sessions

Goal: Determine as much of the CMB-S4 reference design as possible at this workshop.

The Reference design is ***"a design that has been worked all the way through, to understand repercussions and cost."*** We want a credible, detailed design that we think is "shovel ready" for the NSF A&A Decadal, but remember it is not the final design!

1. **Starting with major systems or components and work toward the details (e.g., type of detectors, then materials, …):**
    a. For what parts of the reference design do we have consensus?
    b. For which major parts of the reference design are you not able to reach consensus? Why?
    c. Keeping in mind that the reference design is not the final design, what information is needed so that a decision can be made by end of March.
2. **What are viable options that may be considered?** ("Viable" includes technology that will be ready when critical designs need to be made):
    a. Which do we want to mention in the decadal input and why?

CMB-S4 Properties to Discuss

https://docs.google.com/spreadsheets/d/1vulrDtktoweP96ceIK8lNZMWiyhTs9tOvlmepQgTH40/edit?usp=sharing

In linked spreadsheet, each sub-group should discuss properties under their WG responsibility (e.g., CryoOpt, DetRO, Telescope, Forecasting).

List viable options, and consensus choices. Indicate conclusions in spreadsheet.

We want as much detail as possible; feel free to add rows, listing new properties that are agreed to be important, or other properties where there is consensus.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	**CMB-S4 "Refe**	**rence Instrument" (for purposes of Decadal input)**		**Band center in GHz**													
2				20	30	40	85	145	95	145	95	155	220	280			
3	**WG responsib**	**Property**	**Options**	(color indicates dichroic grouping - feel free to change)											Notes (please comment, especially if you're ma		
4	CDT	Large aperture: Beam fwhm	arcmin	11	7	5.2	-	-	2.2	1.4	-	-	1	0.8	From CDT report		
5	CDT	Small aperture: Beam fwhm	arcmin	-	77	58	27	16	-	-	24	15	11	8.5	From CDT report		
6	CDT	Number of detectors													Clem: The CDT ndet comes from "scaling from		
7	CDT	NET_CMB (ideal, used for scaling achi	uK-rtsec, single detector	214	177	224	270	309	-	-	238	331	747	1281	Source: http://bicep.rc.fas.harvard.edu/CMB-S		
8																	
9	Tel/sim	Primary and tel. design - small aperture	Refractor/cross-dragone/?														
10	Tel/sim	Primary and tel. design - large aperture	Cross-dragone/TMA/?					*6m, Cross-dragone*							*Example of cell merging so one need not fill ou*		
11	Tel	Detectors per telescope - small aperture															
12	Tel	Detectors per telescope - large aperture															
13	Tel	Primary mirror type - large aperture	monolithic, segmented, ?														
14	Tel	Boresight rotation? - small aperture															
15	Tel	Boresight rotation? - large aperture															
16	Tel/CryoOpt	optics tubes per telescope - large aperture															
17	Tel/CryoOpt	optics tubes per telescope - small aperture															
18																	
19	DetRO	MUX type	tmux/fmux/mumux/etc														
20	DetRO	MUX factor	n_bolos per mux channel														
21	DetRO	Detector type	TES/MKID/etc	*TES*									*MKID*		*Example of cell merging so one need not fill ou*		
22	DetRO	Detector temperature	Kelvin														
23	DetRO	Coupling to free space	lenslets, corr. horn, profile horn, etc														
24																	
25	CryoOpt	FPU cooling technology	Dilution/ADR/He3														
26	CryoOpt	Lens material	silicon/alumina														
27	CryoOpt	AR coat technology	diced/plastic/spray/etc														
28	CryoOpt	4K filter type/tech	metal-mesh LPE/Shader/?														
29	CryoOpt	50K filter type/tech	alumina/shader/?														
30	CryoOpt	window type/tech	UHMWPE/Zotefoam/?														
31																	
32	CryoOpt	Pol mod: Chile large aperture	type/position/materials		det. differencing						HWP/4K/sapphire/plasticAR				*Just examples, feel free to modify*		
33	CryoOpt	Pol mod: Chile small aperture															
34	CryoOpt	Pol mod: S.Pole large aperture															
35	CryoOpt	Pol mod: S.Pole small aperture															
36																	
37	Forecasting	Survey Strategy: Chile															
38	Forecasting	Survey Strategy: S. Pole															