Detector "Options and Decisions" **

(Detector Parallel Session)

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3/9/2021

*** But not dark detectors (see Lorenzo's talk), or rhomb/hex (see Brenna's talk)*

Detector Wafer Types

DSR: 11 types

SATs

Tube name	LF		MF1		MF2		UHF	
Band Centers (GHz)	30	40	85	145	95	155	220	270
Lenses	~60cm HDPE		~60cm HDPE		~60cm HDPE		~45cm Silicon	
Wafers/Tube	12		12		12		6 + 0.5*6	
Pixels/Wafer	12		147		147		469	
Tubes	2		6		6		4	

LATs

Tube name	ULF	LF		MF		UHF	
Band Centers (GHz)	20	27	39	93	145	225	278
Lenses	20cm Si	20cm Si		20cm Si		20cm Si	
Pixels/Wafer	27	48		432		432	
Tubes in SPLAT	4	9		54		18	
Tubes in two CHLATs	0	16		108		46	

Detector Wafer Types

PBD: 8 types

SATs

Tube name	LF		MF1		MF2		UHF	
Band Centers (GHz)	27	39	85	145	95	155	225	278
Lenses	~60cm HDPE		~60cm HDPE		~60cm HDPE		~45cm Silicon	
Wafers/Tube	12		12		12		6 + 0.5*6	
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Detector Wafer Types

PBD: SAT MF wafers (shifted bands) have same Psats

SATs

Tube name	LF		MF1		MF2		UHF	
Band Centers (GHz)	27	39	85	145	95	155	225	278
Lenses	~60cm HDPE		~60cm HDPE		~60cm HDPE		~45cm Silicon	
Wafers/Tube	12		12		12		6 + 0.5*6	
Pixels/Wafer	12		147		147		469	
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LATs

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Lenses	20cm Si	20cm Si		20cm Si		20cm Si	
Pixels/Wafer	27	48		432		432	
Tubes in SPLAT	4	9		54		18	
Tubes in two CHLATs	0	16		108		46	

Questions and Options

Q1: Should there be only one type of SAT MF wafer, with mixed bands on it?

SATs

Tube name	LF		MF1		MF2		UHF	
Band Centers (GHz)	27	39	85	145	95	155	225	278
Lenses	~60cm HDPE		~60cm HDPE		~60cm HDPE		~45cm Silicon	
Wafers/Tube	12		12		12		6 + 0.5*6	
Pixels/Wafer	12		147		147		469	
Tubes	2		6		6		4	

LATs

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Band Centers (GHz)	20	27	39	93	145	225	278
Lenses	20cm Si	20cm Si		20cm Si		20cm Si	
Pixels/Wafer	27	48		432		432	
Tubes in SPLAT	4	9		54		18	
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Q1: Should there be only one type of SAT MF wafer, with mixed bands on it?

Pros:

- Only one wafer type!
- ?

Cons:

- Keeping test data straight is more difficult.
- Potential biasing issue, different required P_electricals for 85/95 or 145/155.

Q2: Three high-density wafers have very similar pixel counts: can they, should they, be the same?

(UHF's could have same horn array)

SATs

Tube name	LF		MF1		MF2		UHF	
Band Centers (GHz)	27	39	85	145	95	155	225	278
Lenses	~60cm HDPE		~60cm HDPE		~60cm HDPE		~45cm Silicon	
Wafers/Tube	12		12		12		6 + 0.5*6	
Pixels/Wafer	12		147		147		469	
Tubes	2		6		6		1	

LATs

Tube name	ULF	LF		MF		UHF	
Band Centers (GHz)	20	27	39	93	145	225	278
Lenses	20cm Si	20cm Si		20cm Si		20cm Si	
Pixels/Wafer	27	48		432		432	
Tubes in SPLAT	4	9		54		18	
Tubes in two CHLATs	0	16		108		46	

Q2: Three high-density wafers have very similar pixel counts: can they, should they, be the same?

Pros:

- If they're all the same,
  - easier for fabs to move from one to the other.
  - homogenizes readout
- If UHF's are the same, they could share the same horn array, interface wafers, etc. (Q: MF's different?)
- ?

Cons:

- Rhomb/hex: could affect what fabs can make what, and/or how.
- ?

(Any changes have sensitivity implications that need to be weighed.)

Q3: Is it okay for SATs to adopt LAT frequency bands at 30/40 and 220/270 GHz?

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Q3: Is it okay for SATs to adopt LAT frequency bands at 30/40 and 220/270 GHz?

Pros:

- easier for fabs to move from one wafer to the other.
- makes testing somewhat easier to follow/analyze.
- ?

Cons:

- Need to validate SAT foreground subtraction… ie it's a change.
- ?

Q4: Are "low density" wafers wired out using only one side?

Extreme Example: SAT 30/40 has only 48 detectors. That is less than one MUX column, ideally read out to one side. (LAT 30/40 is ~3 columns)

Pros:

- Easier readout: fewer flexis, mux columns, boxes etc.
- ?

Cons:

- Large wafer area on one bias. (SAT 30/40 would have same bias for all detectors of a given color). Is Pelectrical spread (driven by Psat and optical efficiency homogeneity) okay with that?
- Incompatible with NIST-style stepper wiring?
- ?

Things to keep in mind

(may or may not be real issues)

- **Detector stability**
  - "Science TES" : readout bandwidth, taus, tau requirements
  - "High-Tc TEs" : taus via fab choices about C, n, Tc, etc

- **Variations in P_electrical** across wafer, and bias groupings
  - f/# variation. Order(20% Poptical issue)
    - SAT: higher near edge of focal plane, so Popt varies from wafer to wafer and a little across wafers.
    - LAT: higher near edge of each wafer.
- **Can we "flash" detectors to unlatch?**