The POLARBEAR-2 and Simons Array Focal Plane Fabrication Status

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Poster PC-7

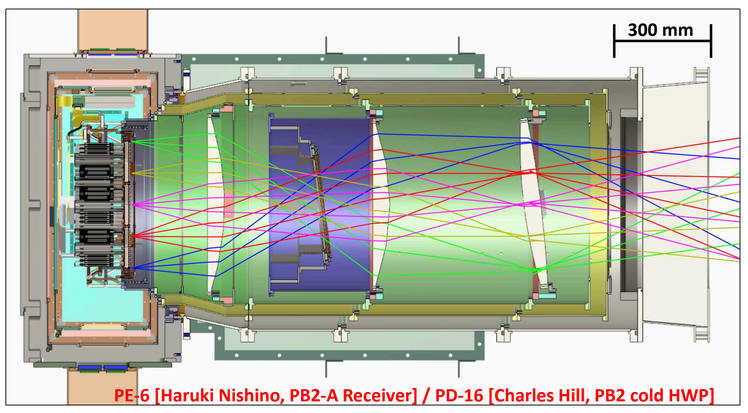
SIMONS ARRAY POLARBEAR 2017

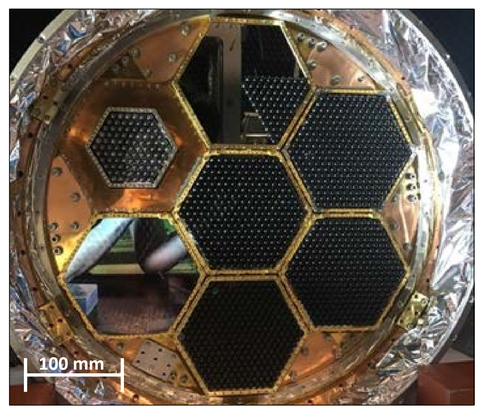
Simons Array

- Located at the POLARBEAR Site; 5200 m in the Andes and the Atacama Desert of Northern Chile
- 3 polarization-sensitive, multi-chroic receivers
- PB2- A and B (95+150 GHz); PB2-C (220+270 GHz)
- Entire array will deploy ~23,000 bolometers
- Will observe the CMB and cosmic foreground to constrain cosmological parameters
- **Please see the many other PB2/SA presentations**

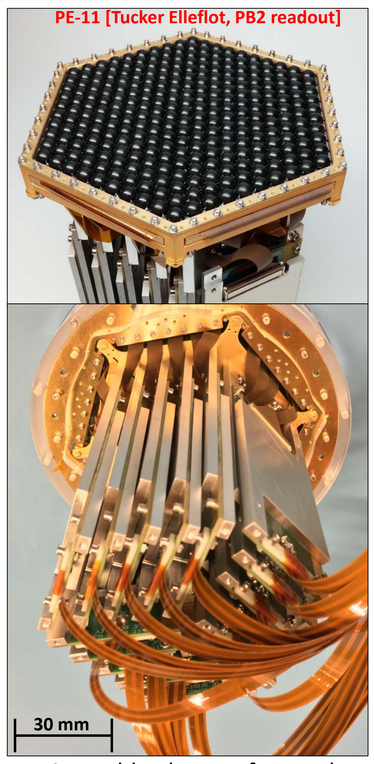
• PE-8 [Adrian Lee, PB/SA overview]	• PE-6 [Haruki Nishino, PB2-A Receiver]
• PE-11 [Tucker Elleflot, PB2 readout]	• PD-16 [Charles Hill, PB2 cold HWP]

Receiver & Focal Planes



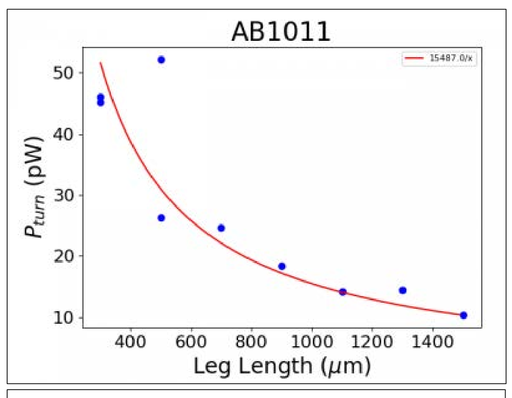


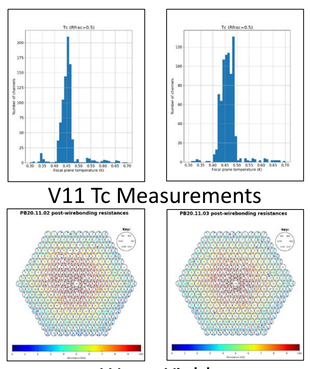
- Each receiver houses a 7 sub-array focal plane assembled in closed-hex pattern
- Each sub-arrays has 271 pixels for a total of 1897 optical pixels in each focal plane
- Each pixel has two colors and two polarization for a total of 7,588 transition edge sensor bolometers
- Bolometers are read out using 40X digital frequency domain multiplexing



Assembly photos of recently produced wafers

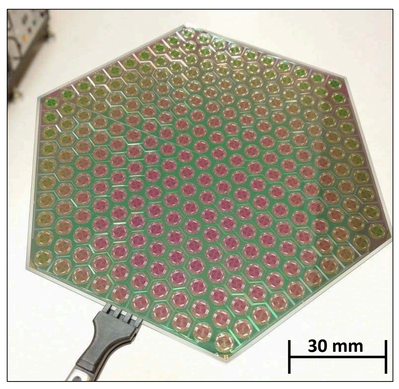
PB2-A Arrays

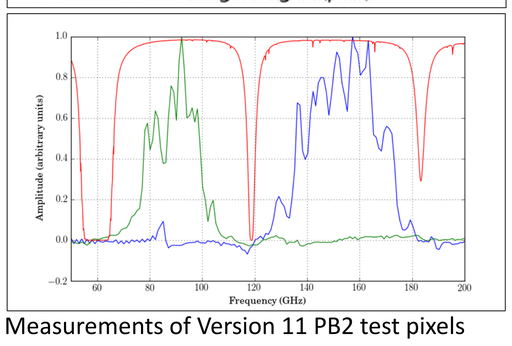




V11 Tc Measurements

Warm Yield

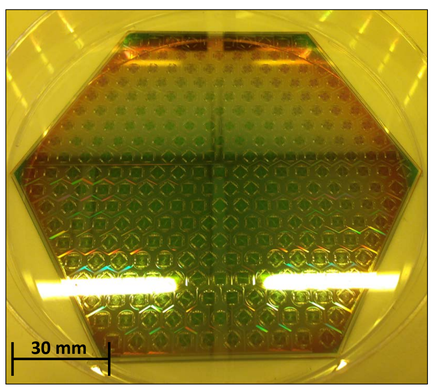


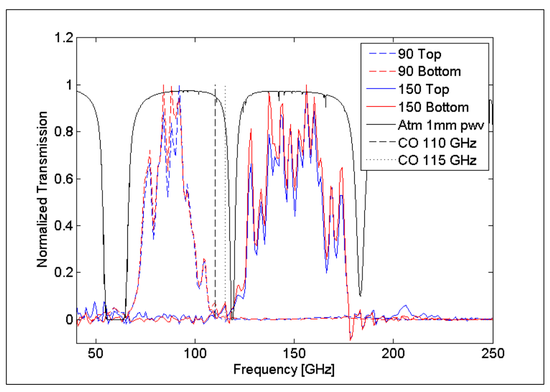


Measurements of Version 11 PB2 test pixels

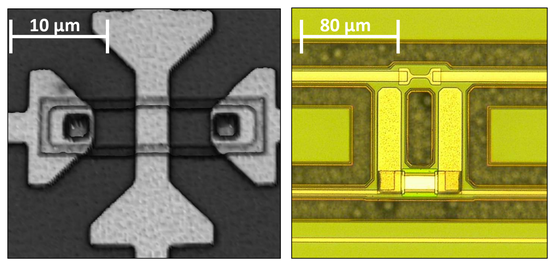
- SiOx as dielectric for the μ-strip
- Band position and shape are good
- P_{sat} is with in our spec for leg lengths between 900 and 1400 um
- We have produced 7-arrays with an average warm TES yield of ≈ 93%

PB2-B Arrays





- 85% and 60% (for 90 and 150 Ghz) pixel efficiency using SiN as dielectric for the μ-strip
- Band position and shape are good
- Cross-under design works well



Measurements and photos Version 12 PB2 devices

Production Status

PB2-A Candidate Wafers:

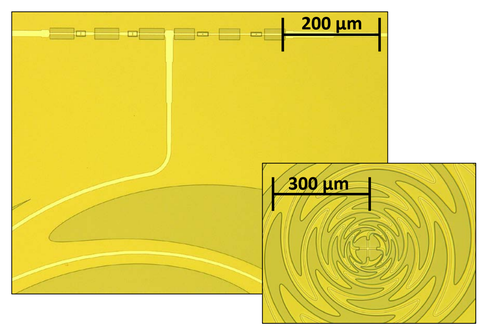
Wafer	11.01	11.02	11.03	11.04	11.05	11.06	11.08
TES Warm Yield (%)	92.5	95.7	93.5	88.2	95.0	90.2	94.0

PB2-B Wafer Production Status:

- Two prototype nitride arrays fabricated
- Production batch of 6 ready early August

PB2-C Wafer Production Status:

- Prototype 220/270 GHz pixels fabricated
- Characterization on going



The POLARBEAR Collaboration

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