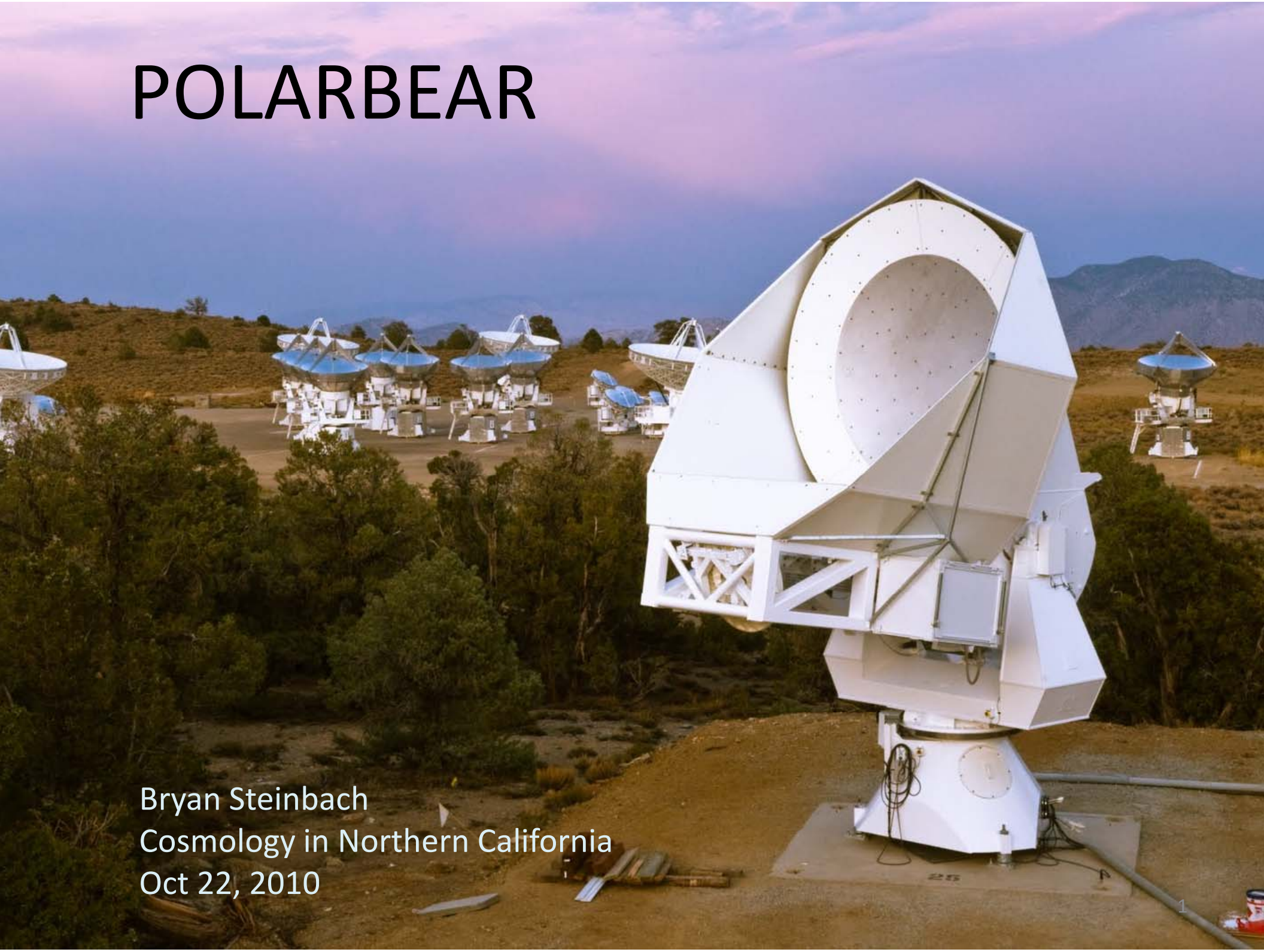
POLARBEAR



Bryan Steinbach
Cosmology in Northern California
Oct 22, 2010

POLARBEAR Collaboration

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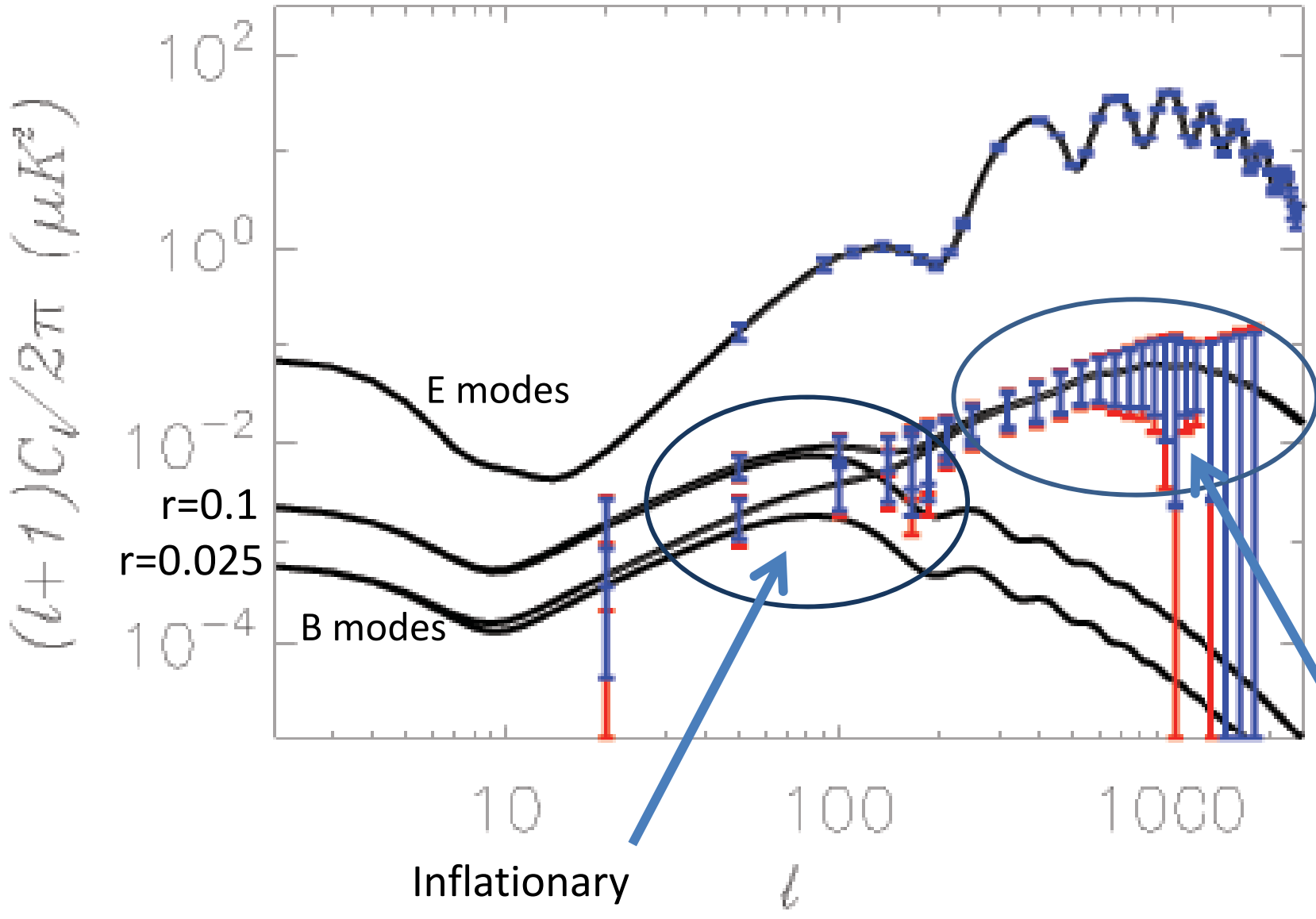
Science Target

1 year 150GHz, 6 months 220GHz, 6 hours/day



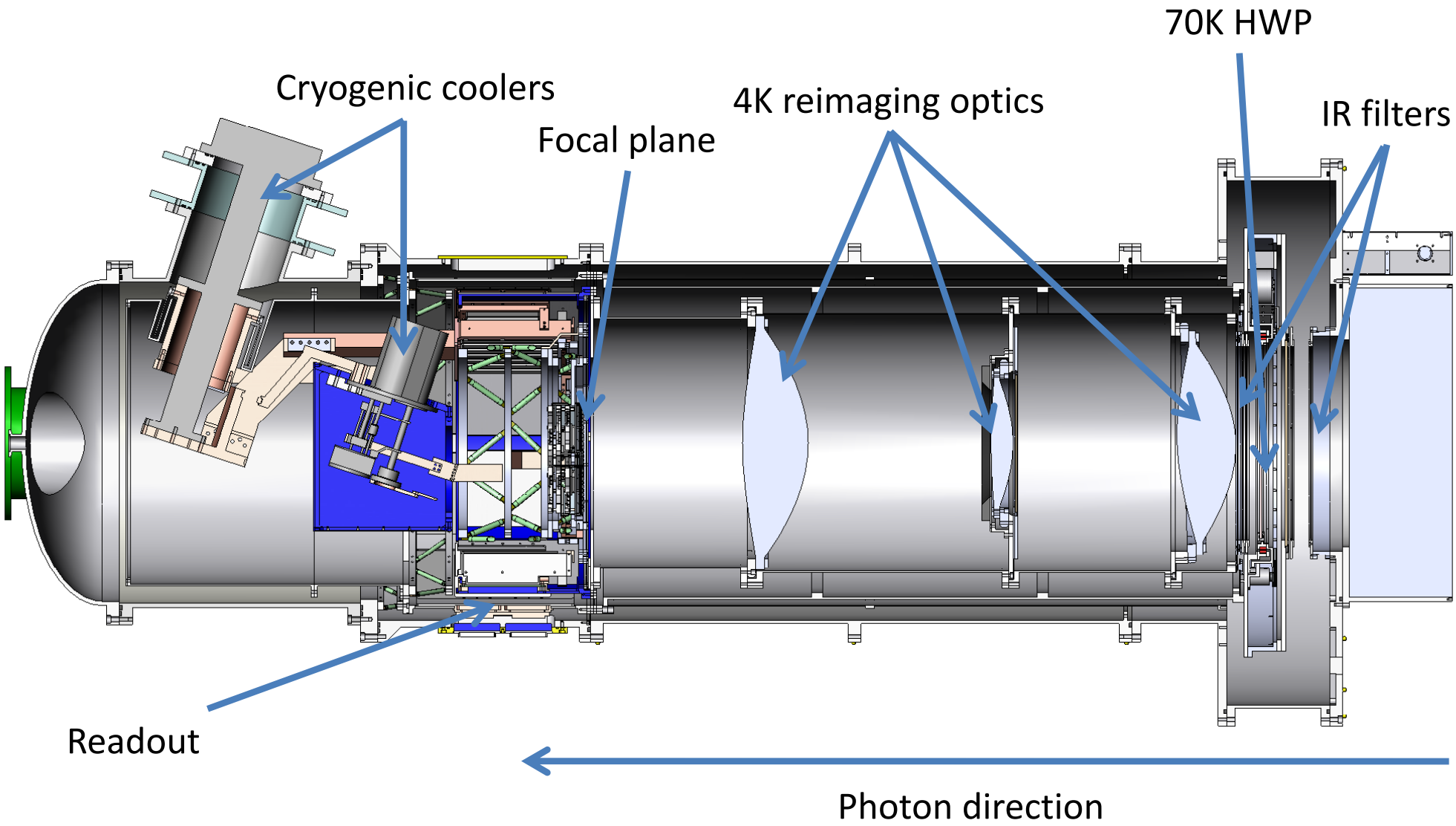
Inflationary Gravity Waves

Gravitational Lensing of E modes to B modes

Timeline

- Past: Full test over summer in Cedar Flat, California.
- Present: On boat.
- Future: Science observations 2011 in Chile

POLARBEAR Receiver



Focal Plane

Previous generation: <50 pixels

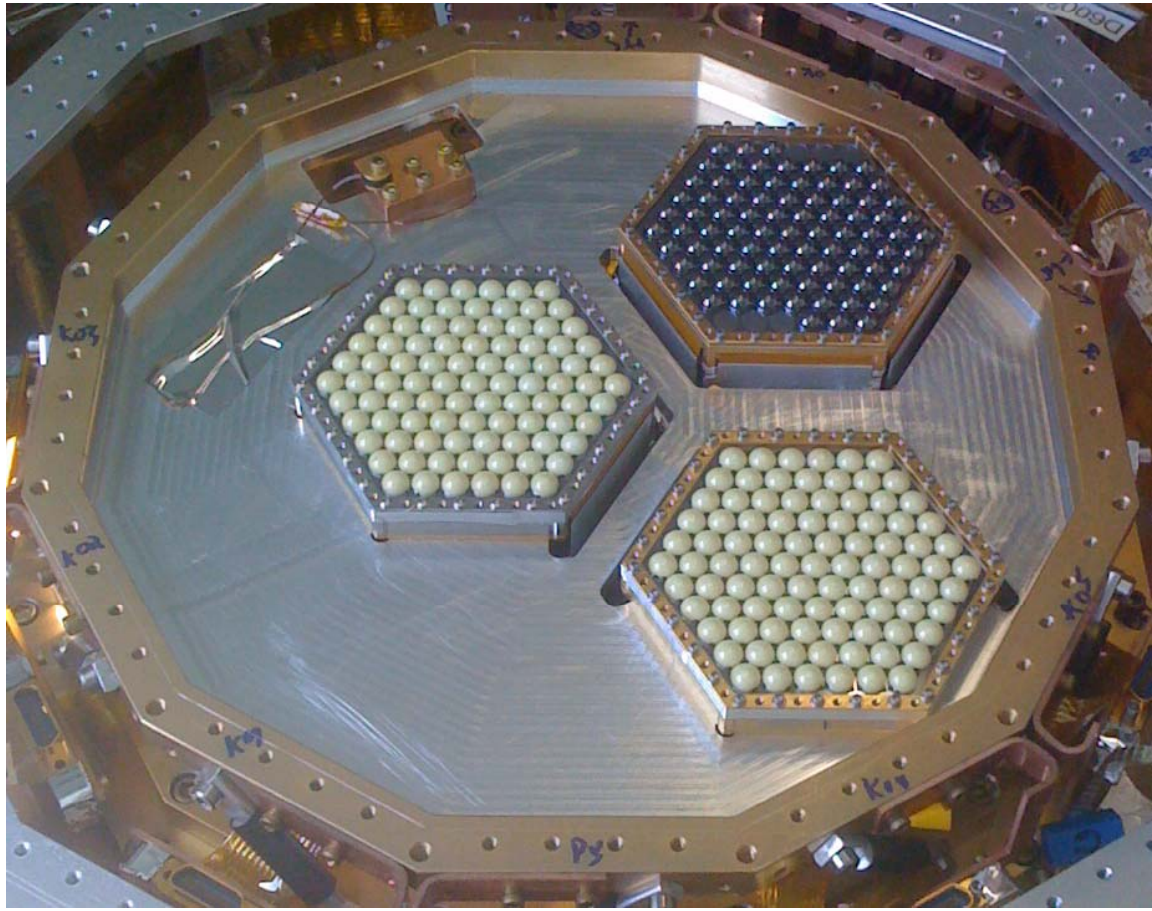
Novel, large densely packed focal plane necessary for detecting weak B modes

2 wafers during engineering run

109/160 active pixels = 68% yield

Demonstrated photon noise limited sensitivity

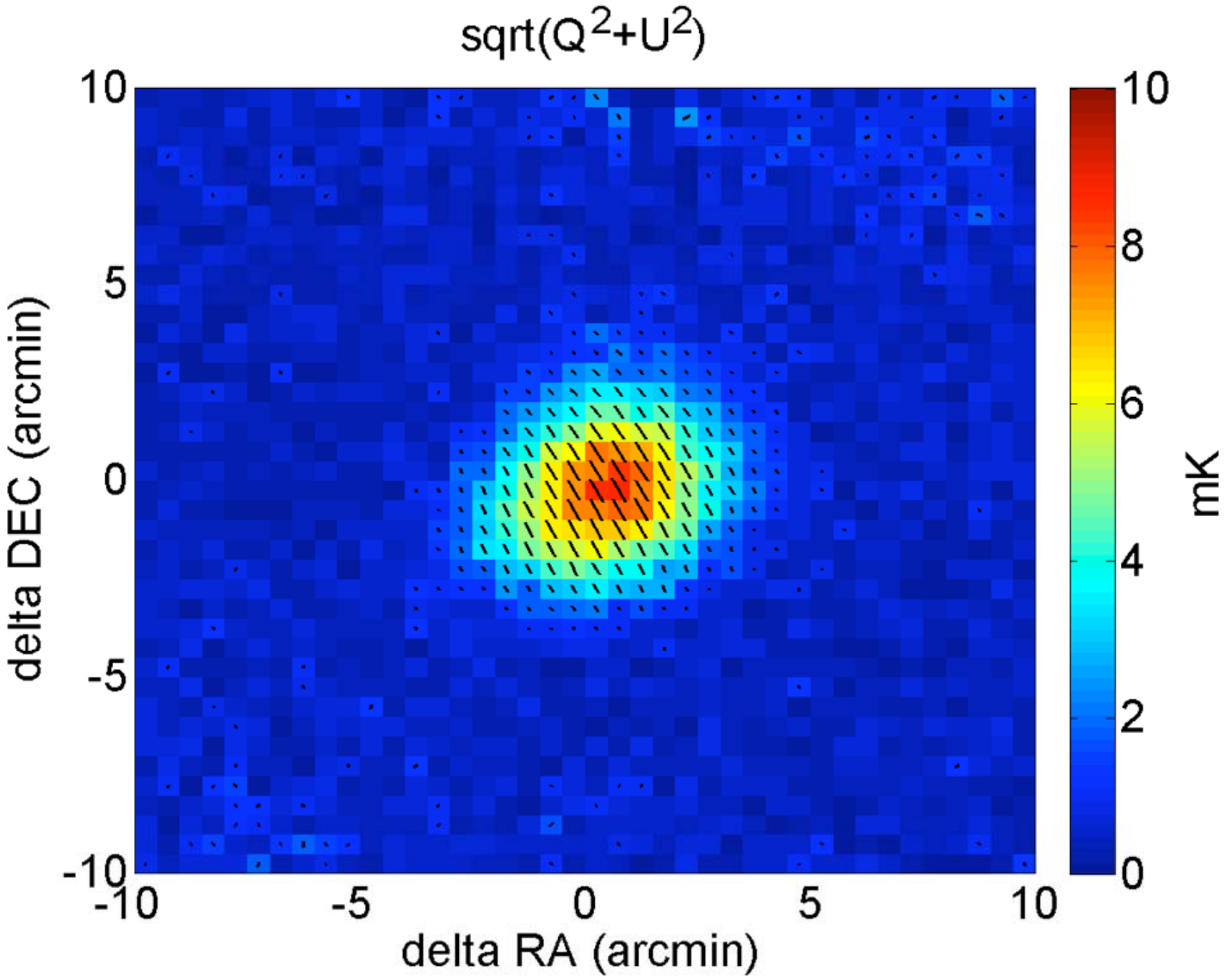
Chile: 7 wafer, 637 pixel, NET=340μK rts



Systematic error control

- Sky rotation at mid latitude site
- Stepped, cold half wave plate
- Small 4’ beams
- Foreground subtraction through multifrequency observation (POLARBEAR 150, 220; QUIET 40, 90GHz)

Tau A

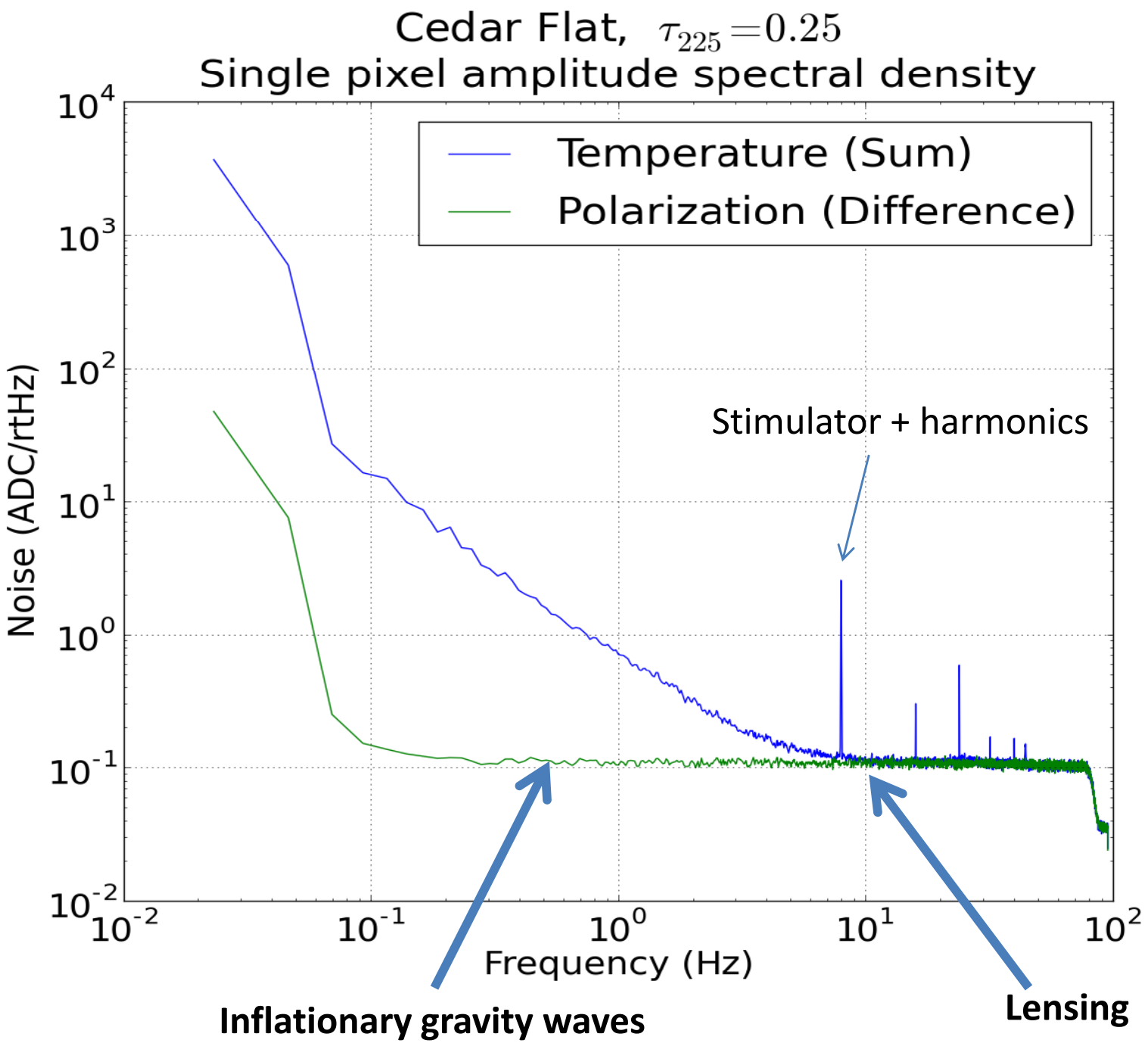


POLARBEAR Measured

Polarization Fraction:
8.3 +- 0.1%
Polarization Angle:
152.0 +- 0.2 degrees

Compare to Aumont et al
Measured at 90GHz on
30m IRAM telescope

Polarization Fraction:
8.8 +- 0.2%
Polarization Angle:
149.9 +- 0.2 degrees


Cedar Flat, $\tau_{225}=0.25$
Single pixel amplitude spectral density
Temperature (Sum)
Polarization (Difference)
Noise (ADC/rtHz)
Frequency (Hz)
Stimulator + harmonics
Inflationary gravity waves
Lensing

End


IN MEMORY OF TWO VISIONARY SCIENTISTS
THE HUAN TRAN TELESCOPE AT THE JAMES AX OBSERVATORY
Dr. Huan Tran
(1974–2009)
Who was the principal
architect of this telescope
Professor James Ax
(1937–2006)
Whose generosity
enabled its construction