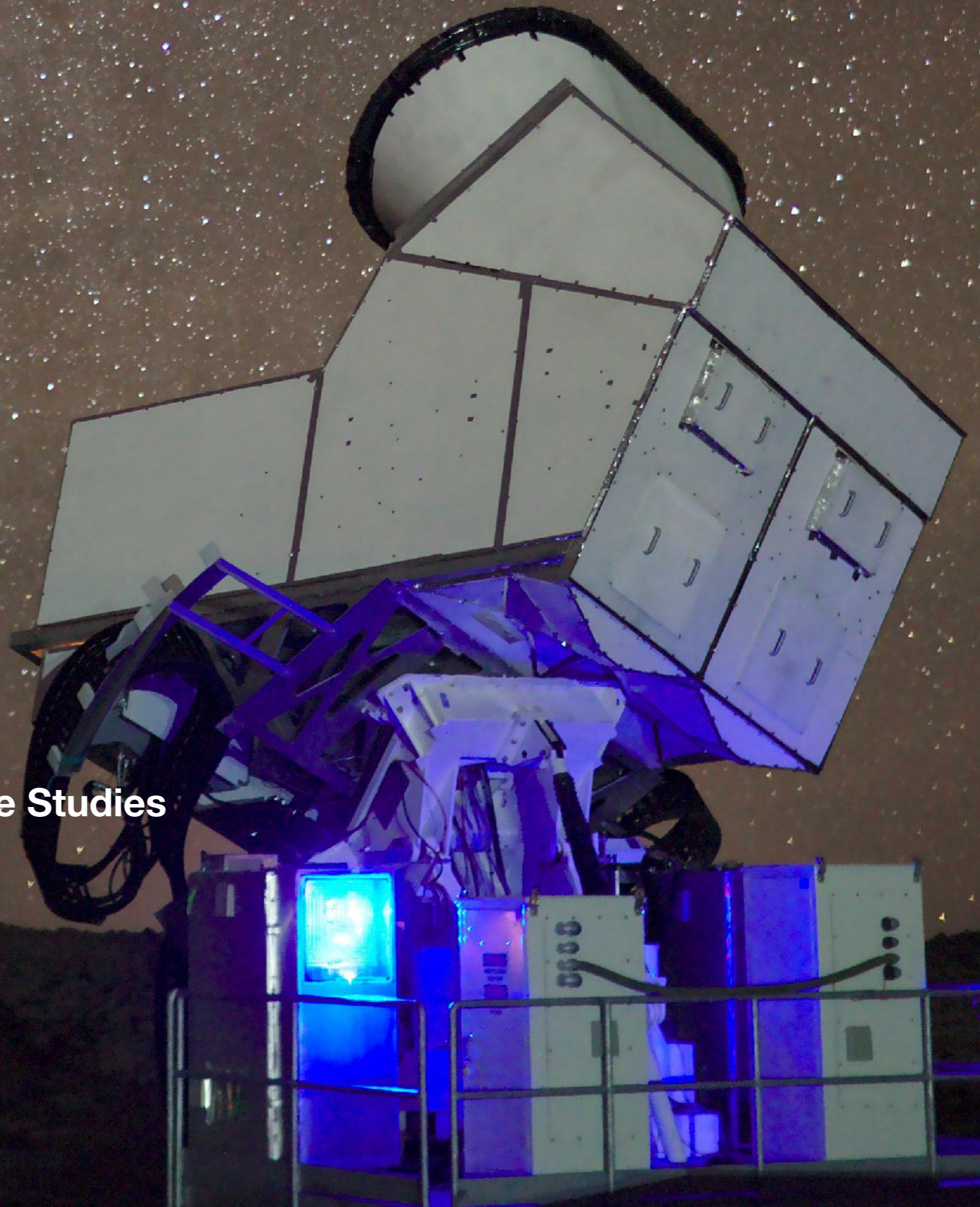


Cosmology Large Angular Scale Surveyor

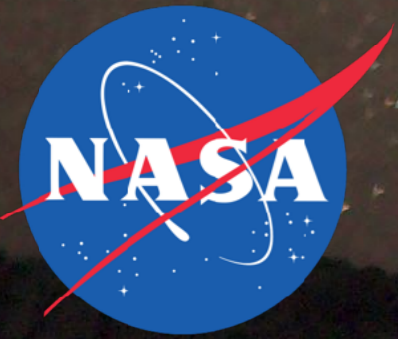
Tobias Marriage
CMB Foregrounds for B-mode Studies
Tenerife
October 2018



CLASS

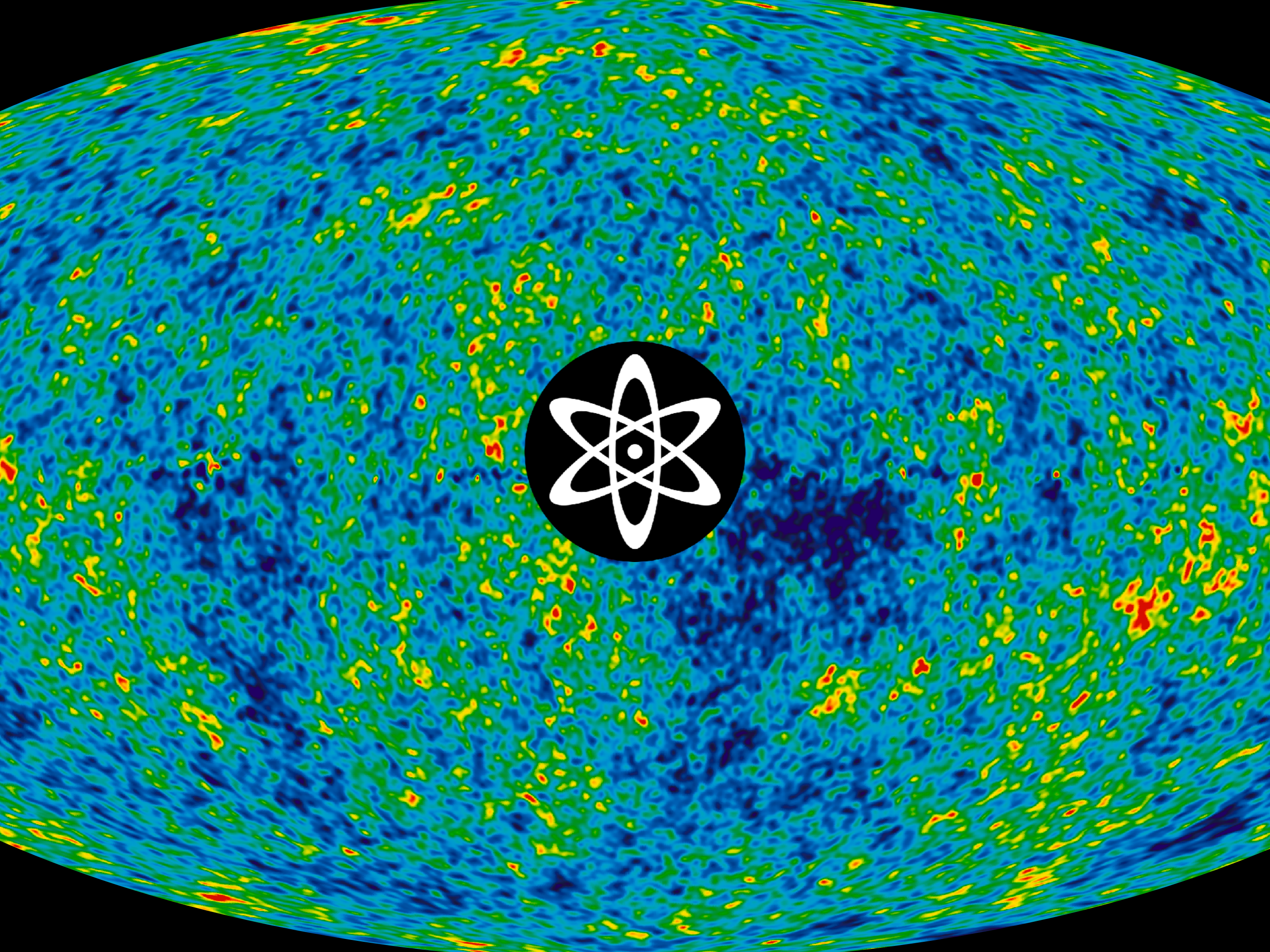


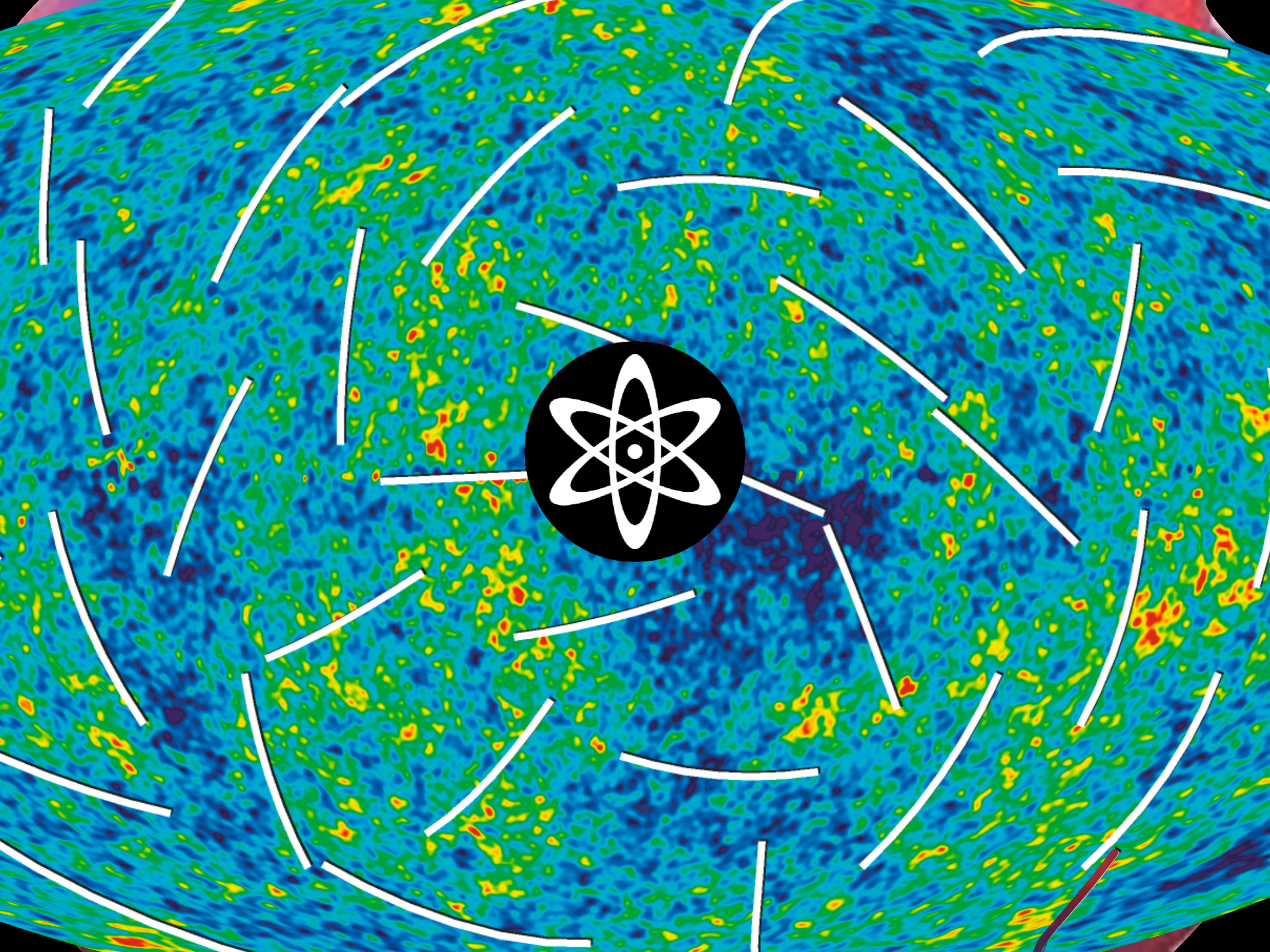
JOHNS HOPKINS
UNIVERSITY

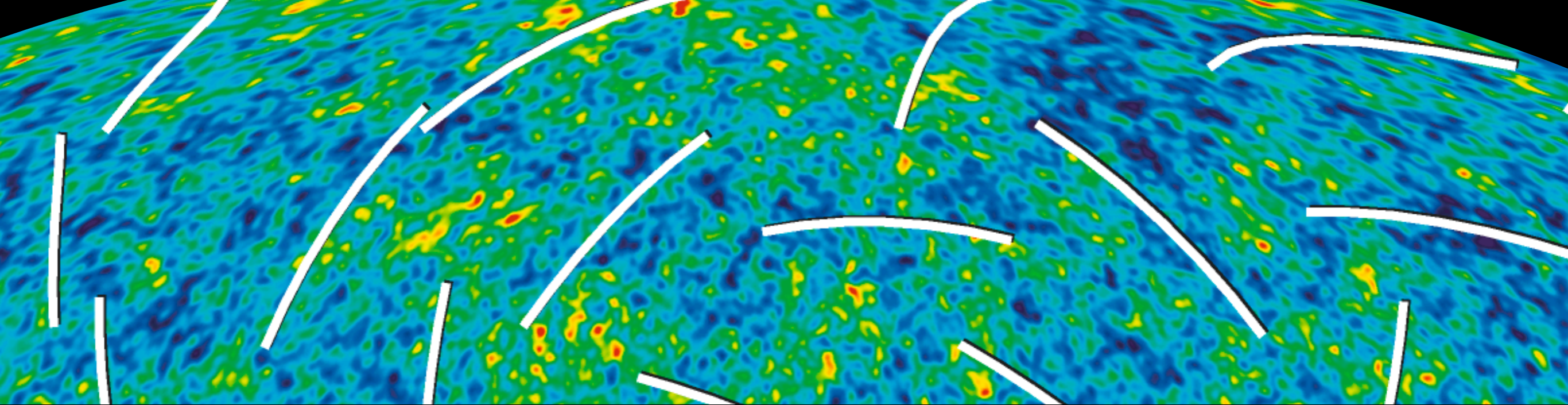


NLST

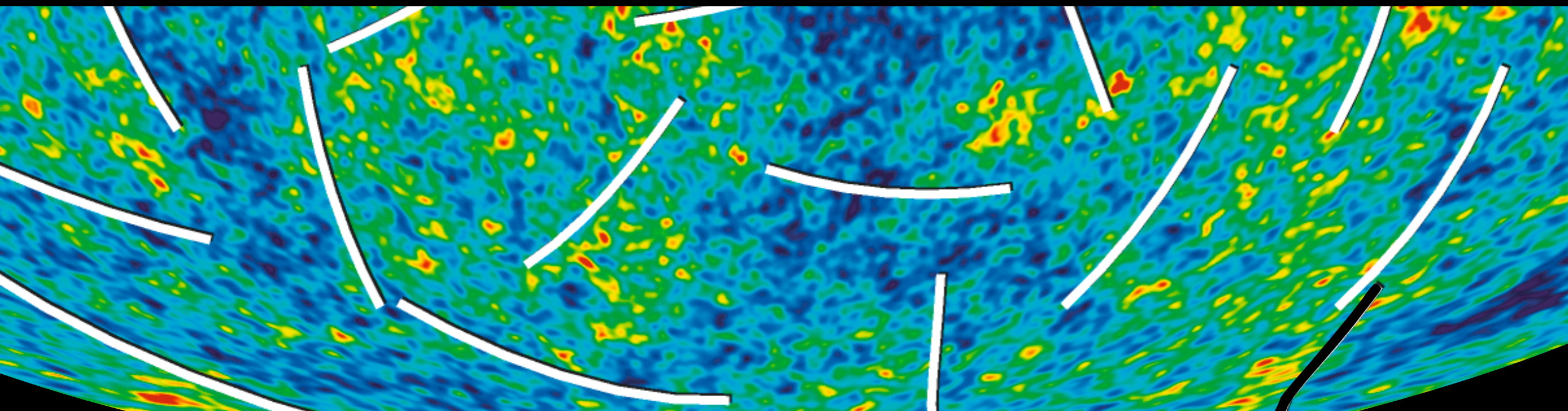


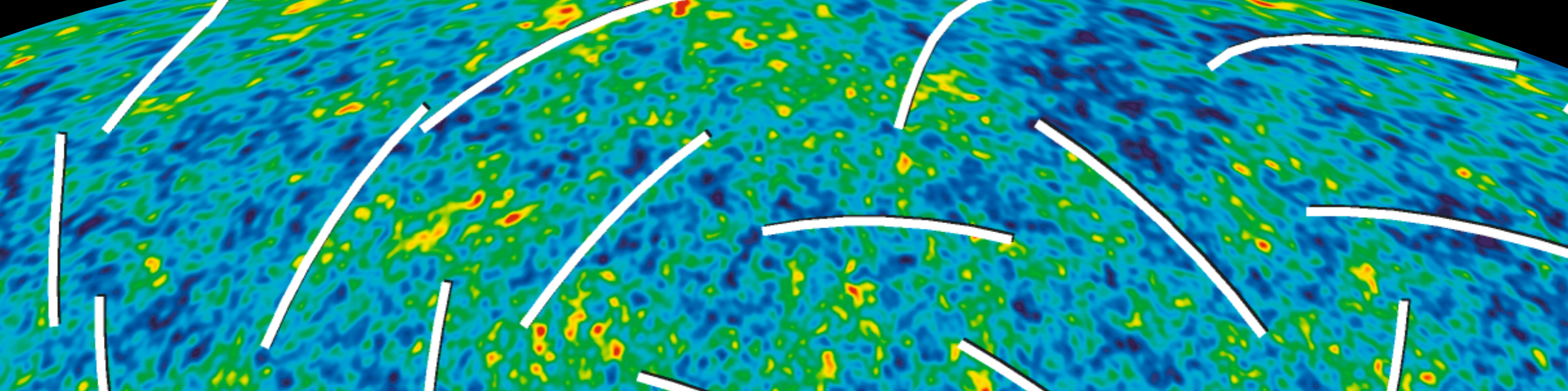




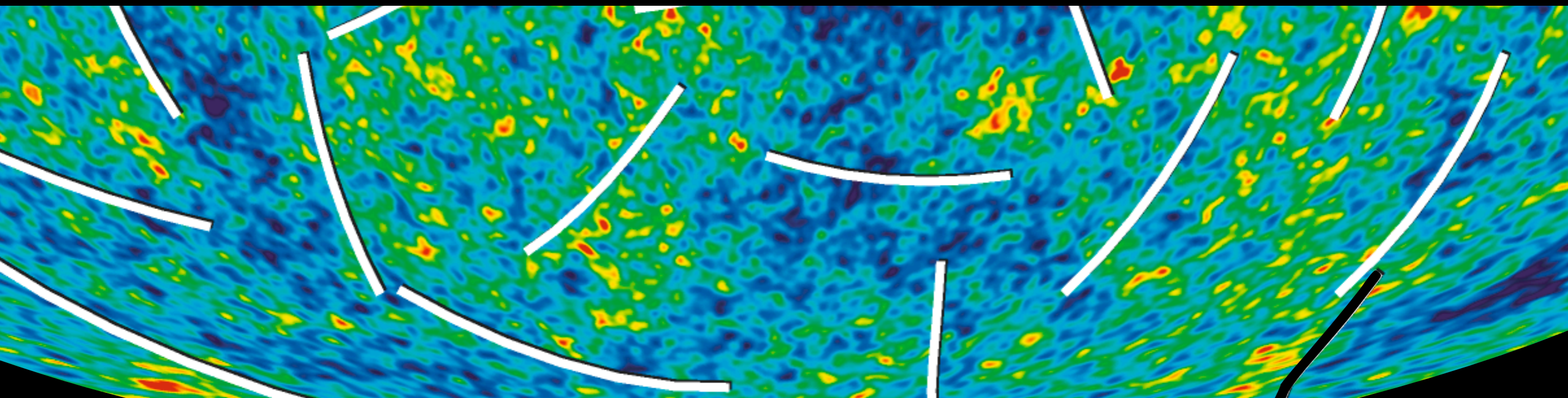


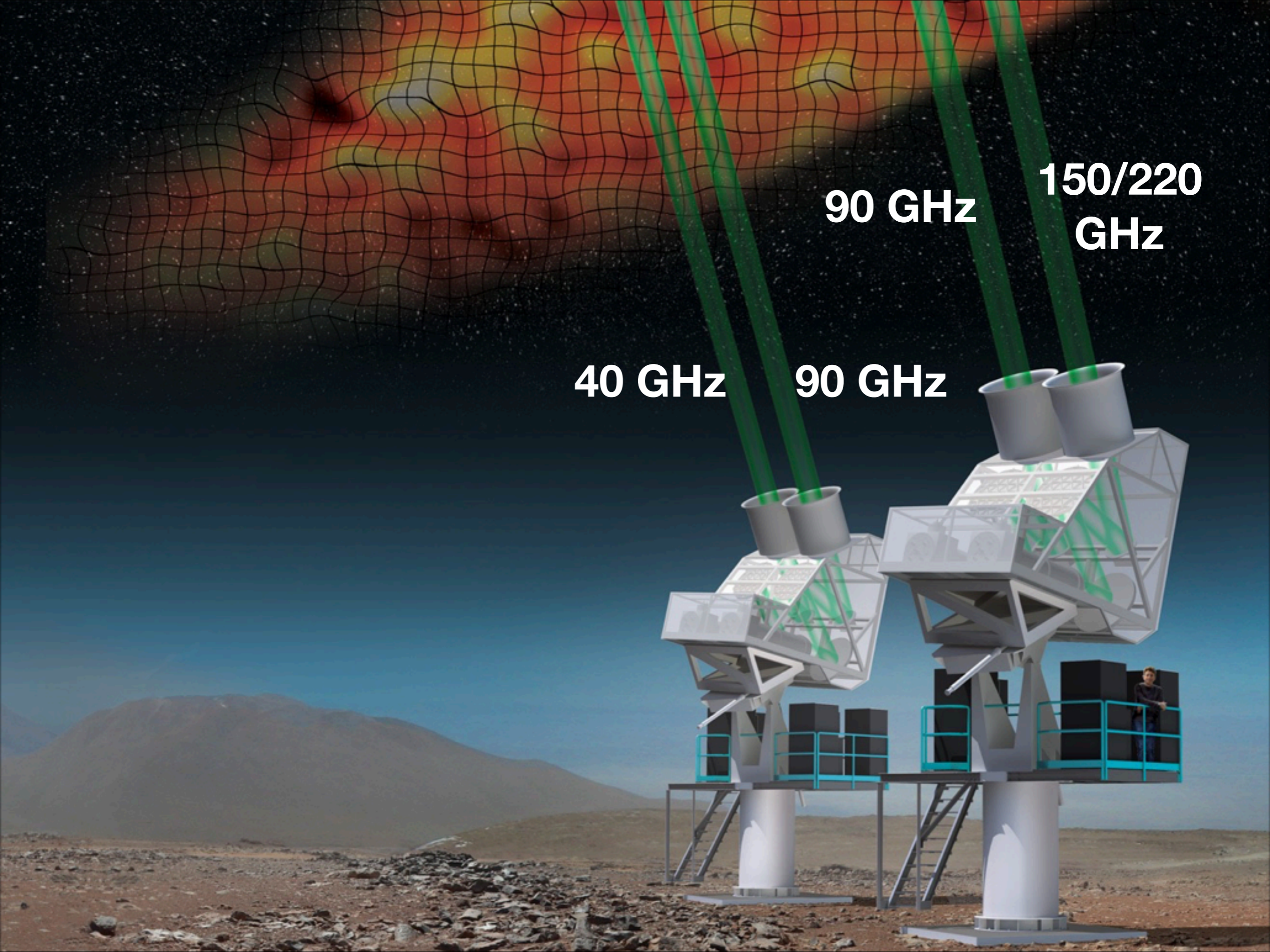
**Science Goal #1:
Quantum Gravitational Waves
(B-modes)**





**Science Goal #2:
Optical Depth to Reionization (τ)
(E-modes)**



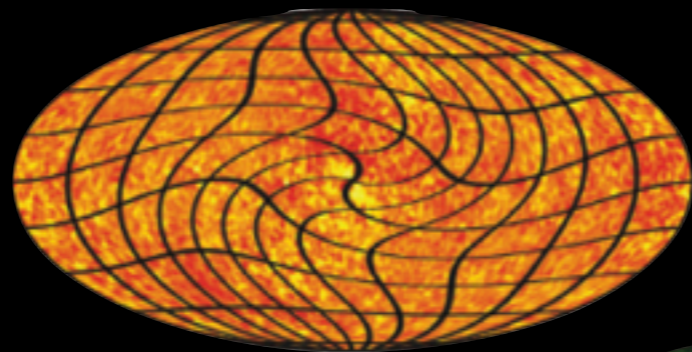


40 GHz

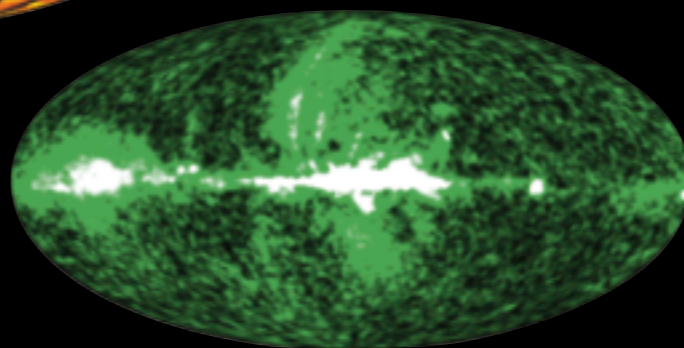
90 GHz

90 GHz

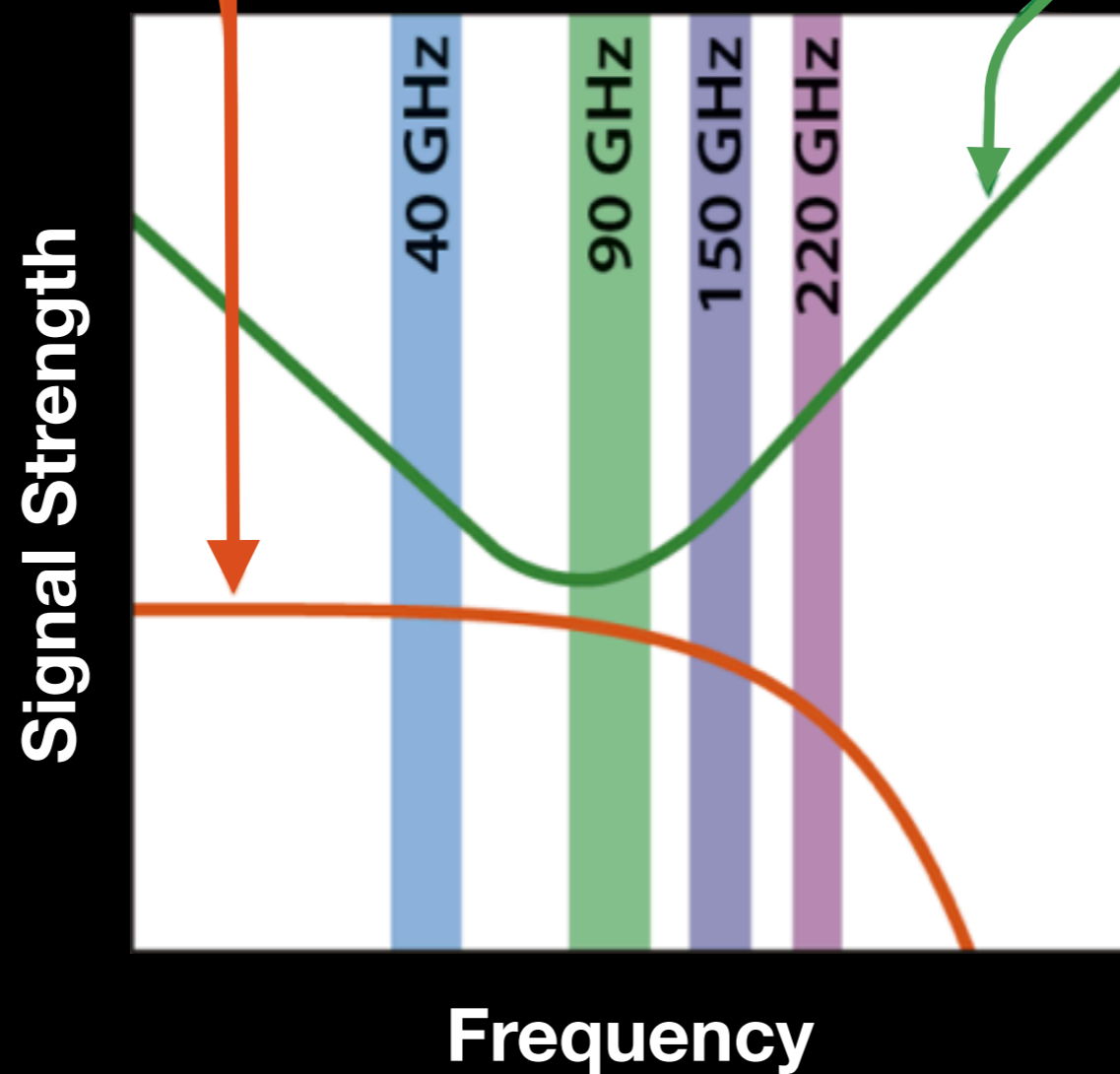
**150/220
GHz**



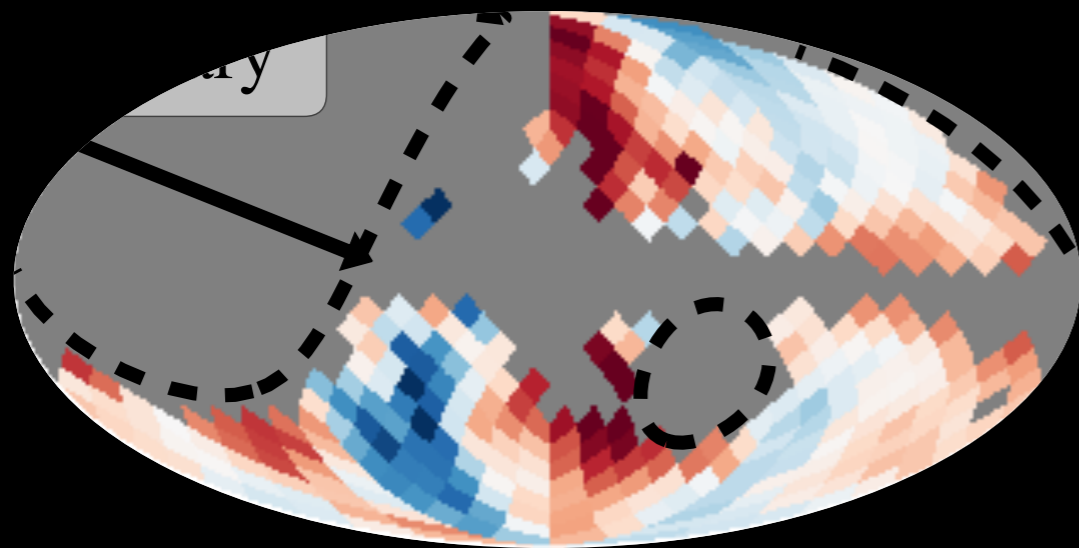
**Primordial
E-modes and
B-modes**



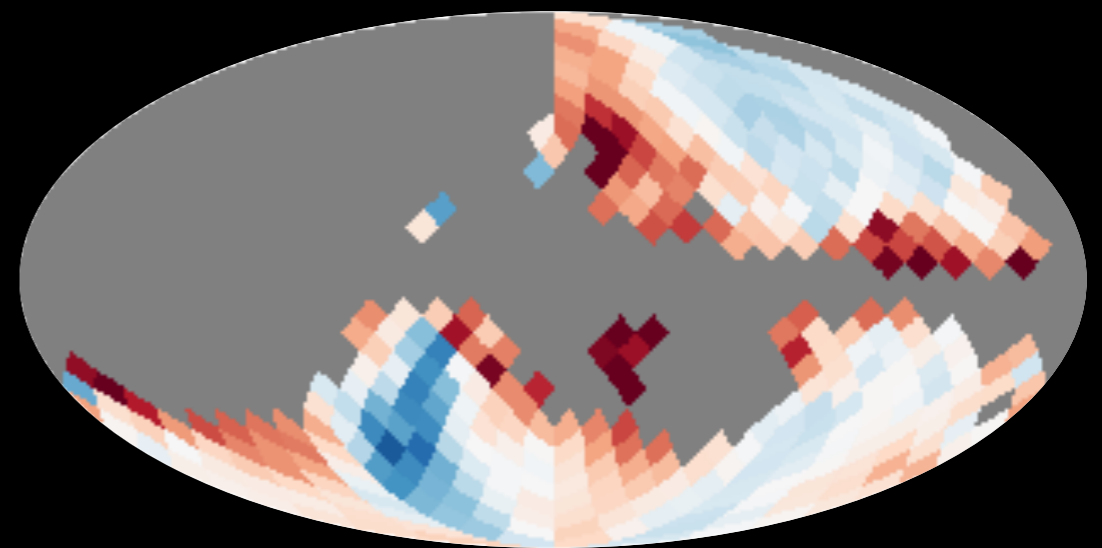
**Galactic
Foregrounds**



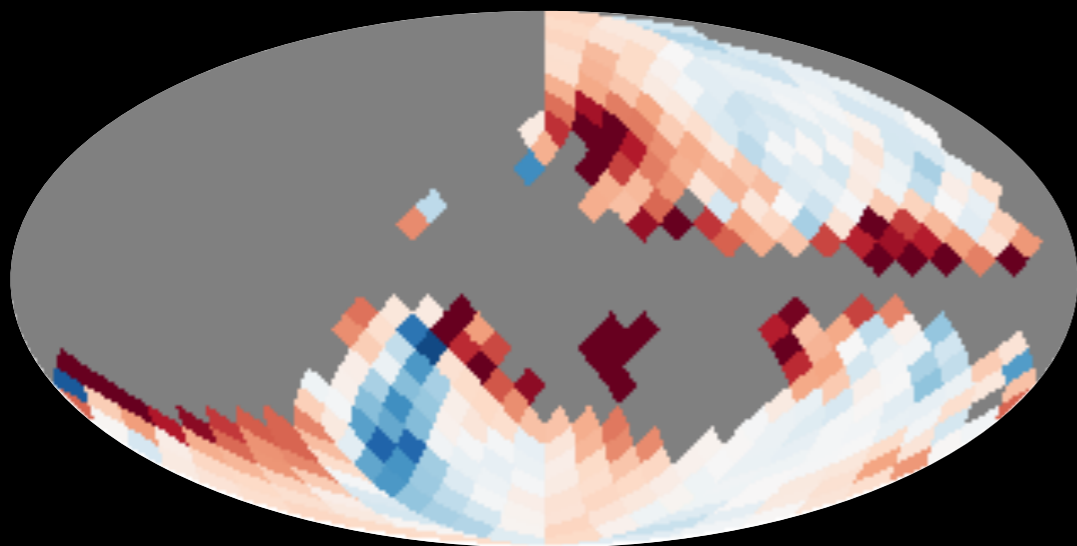
40 GHz



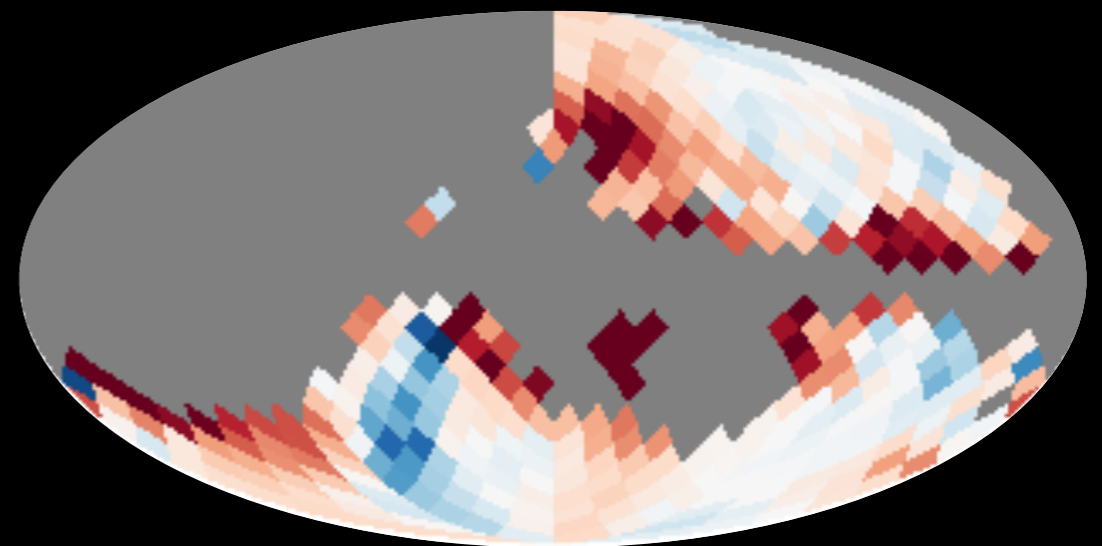
90 GHz

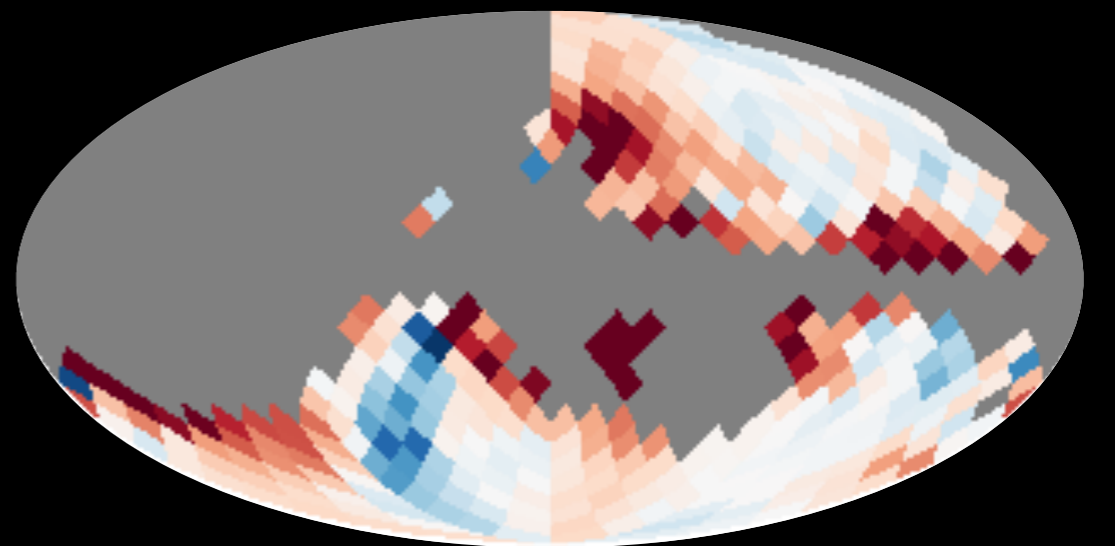
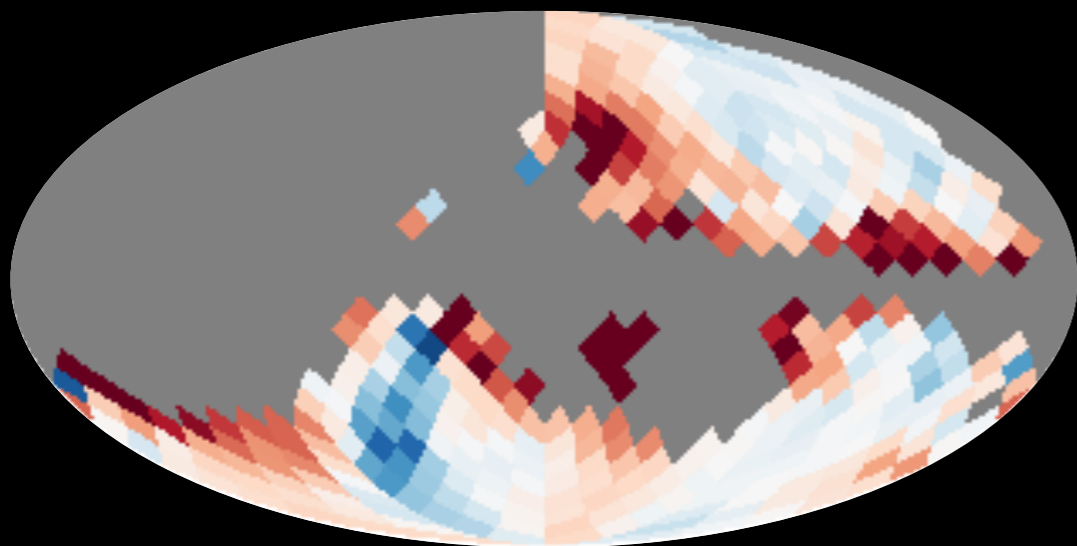
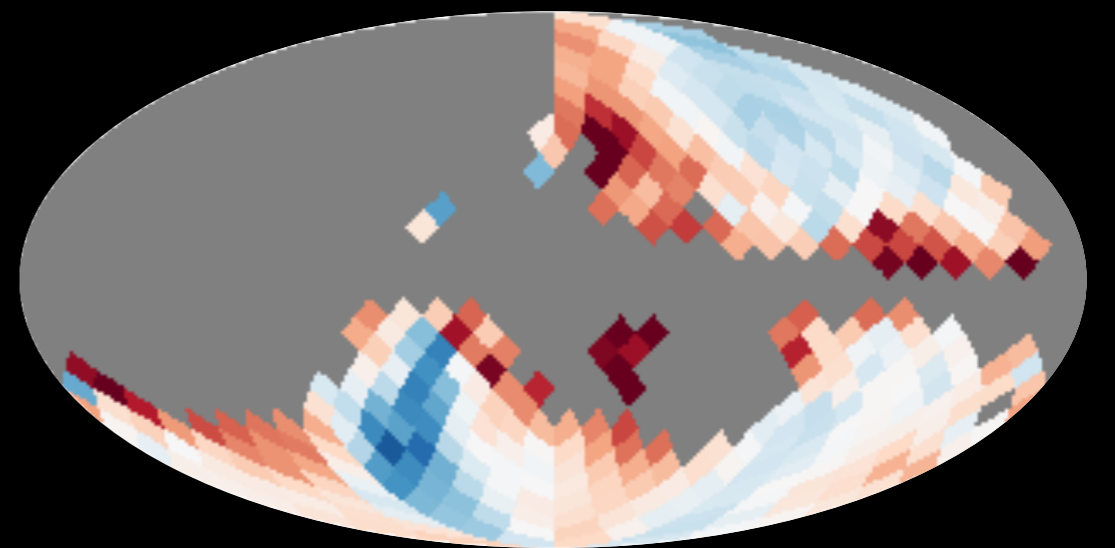
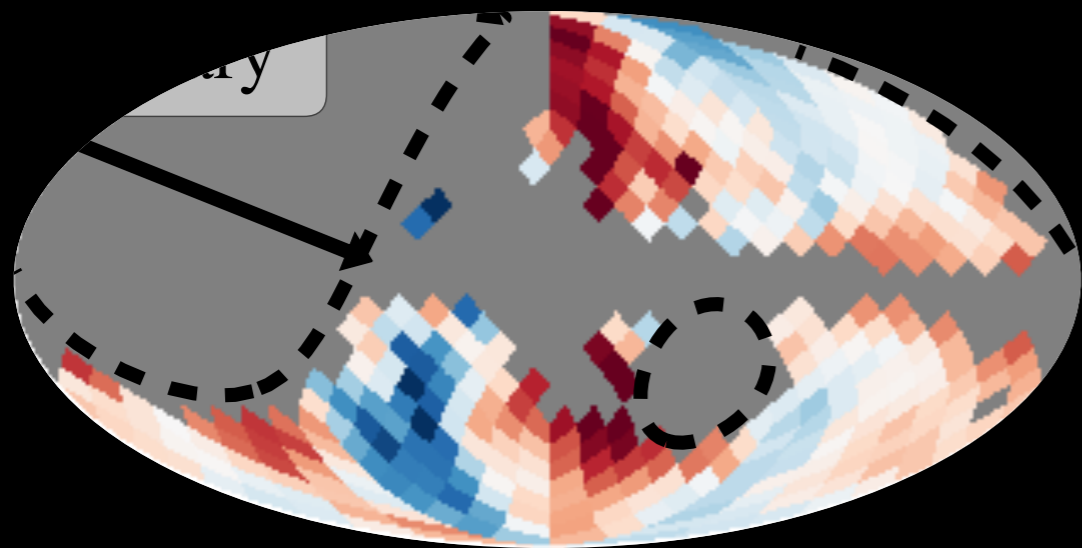


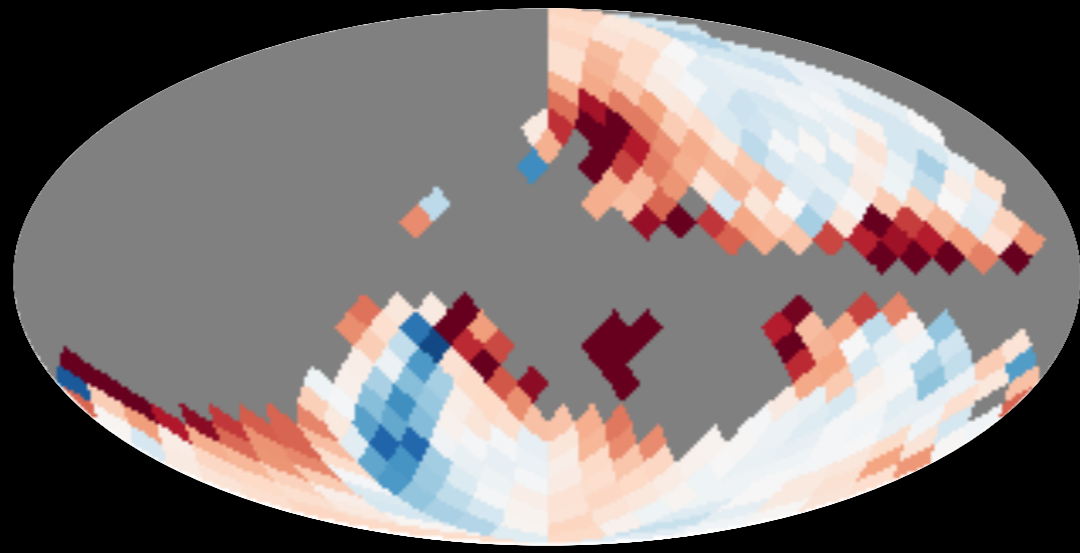
150 GHz

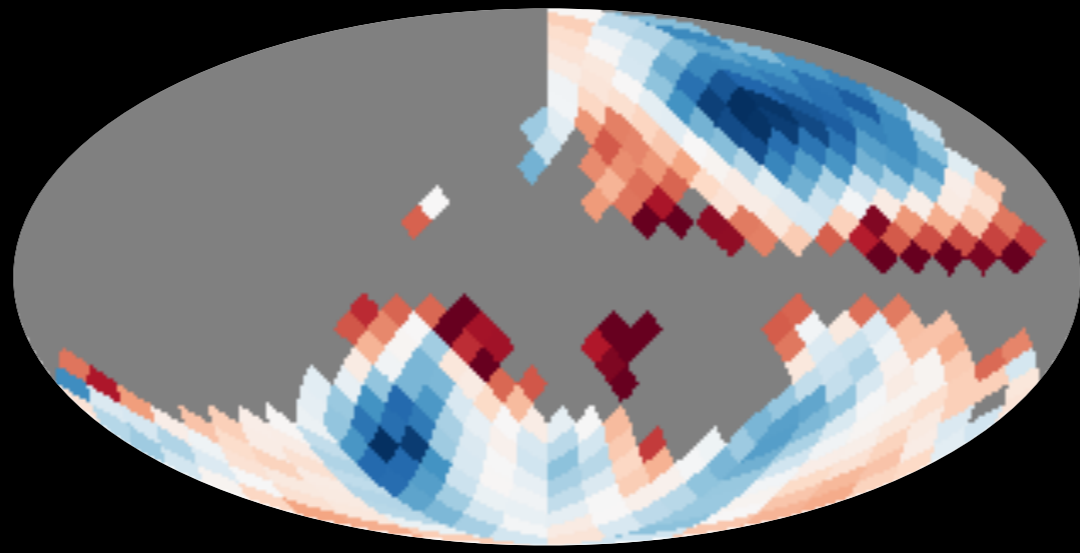


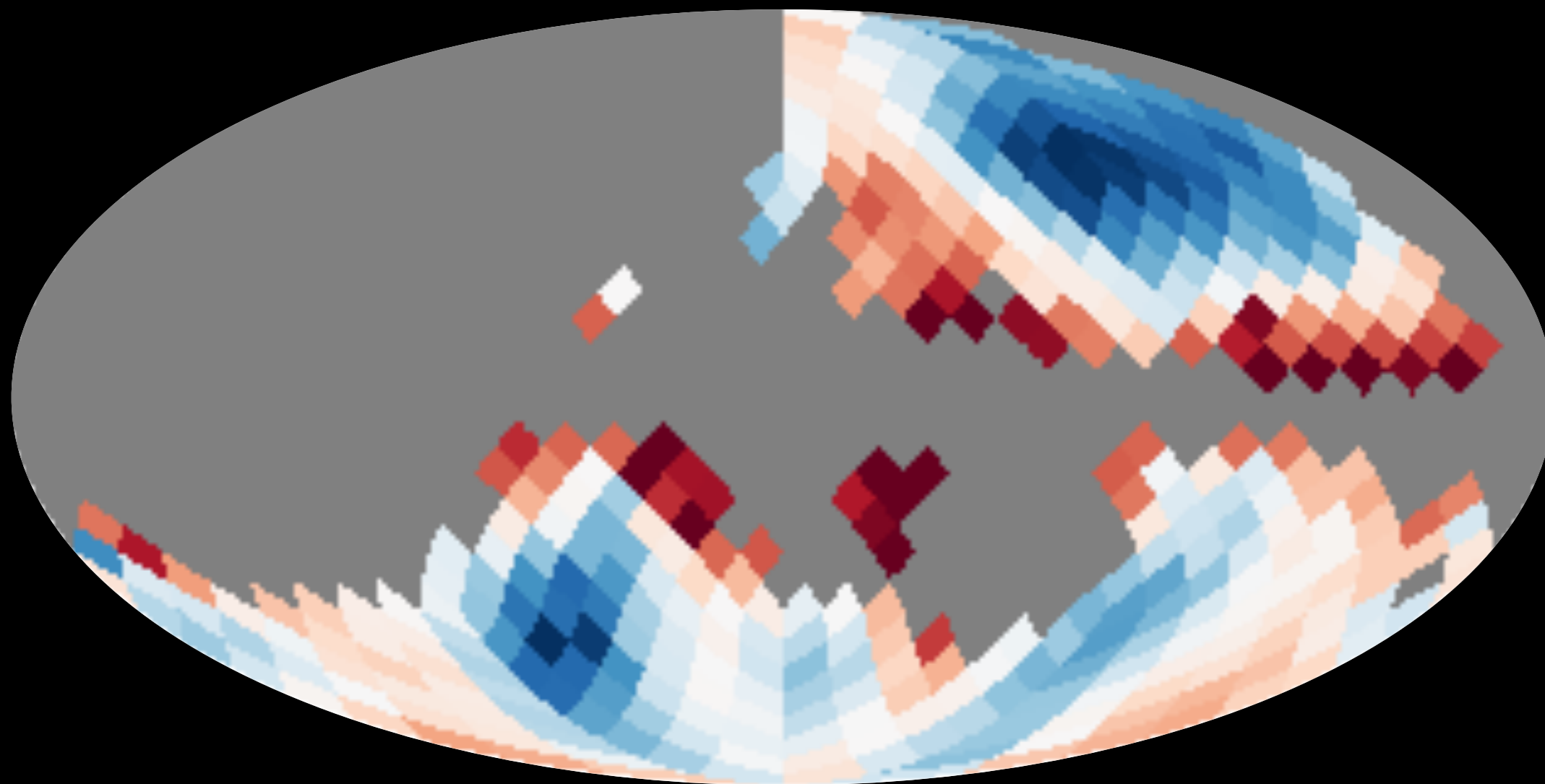
220 GHz

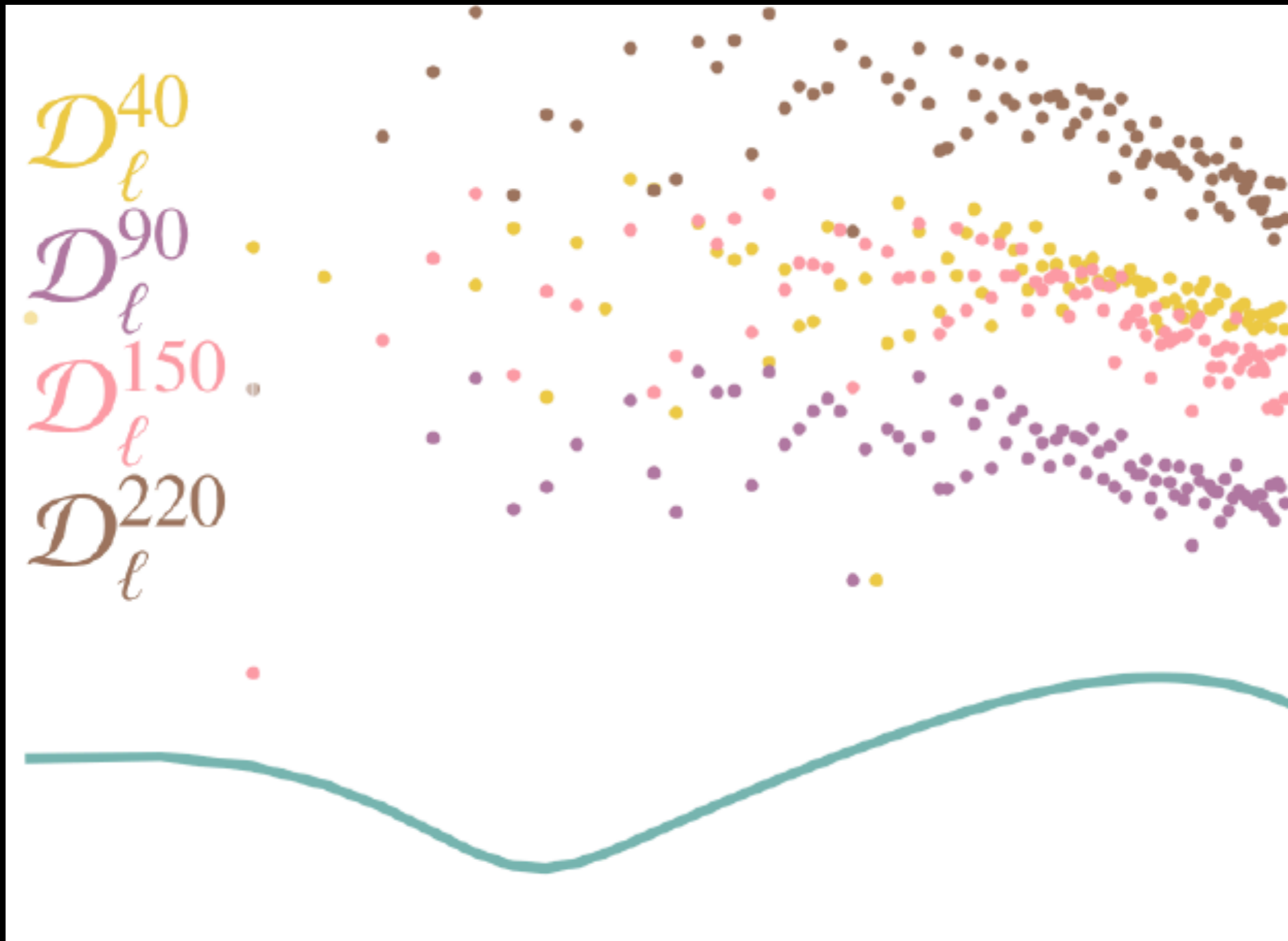




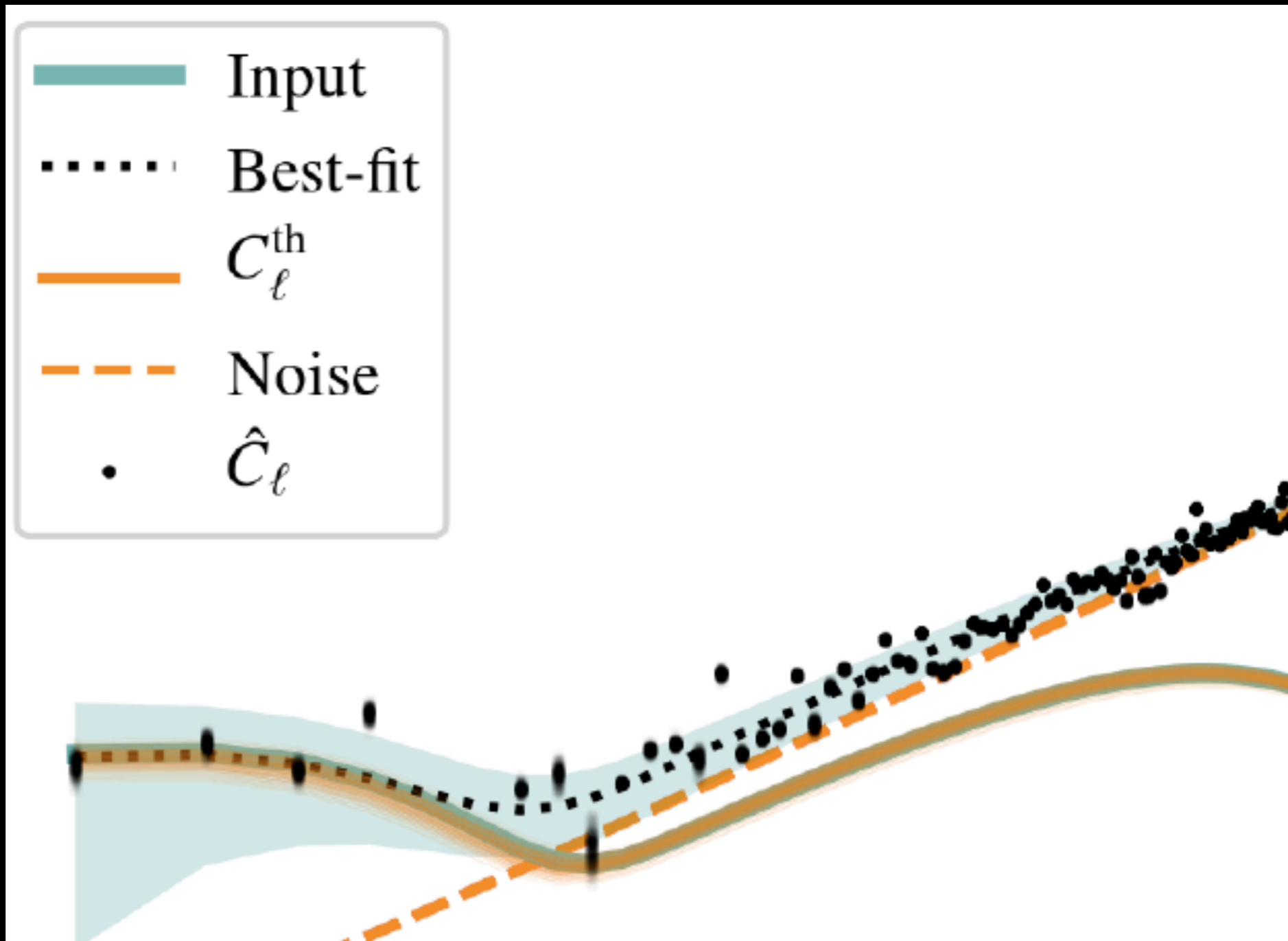






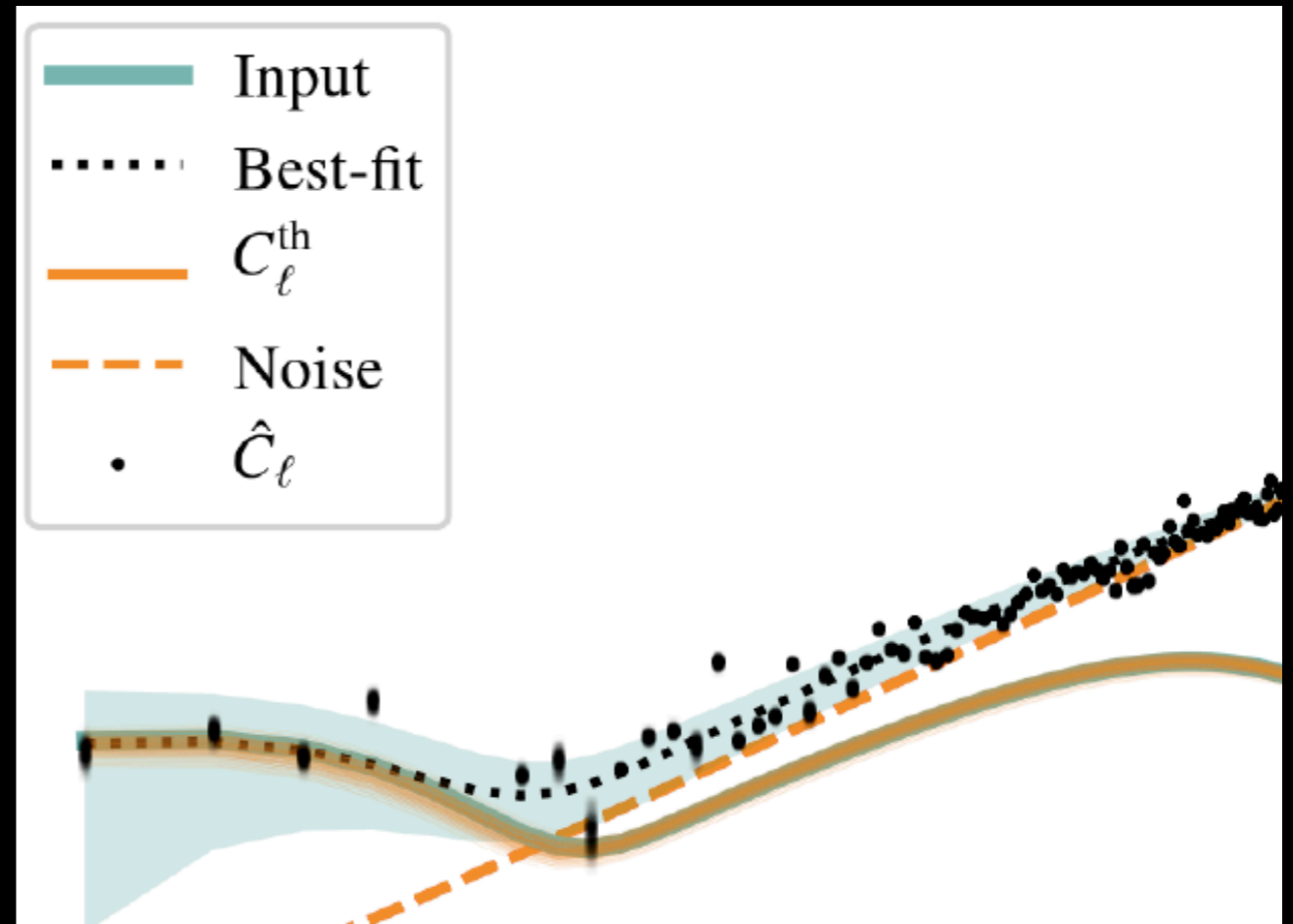
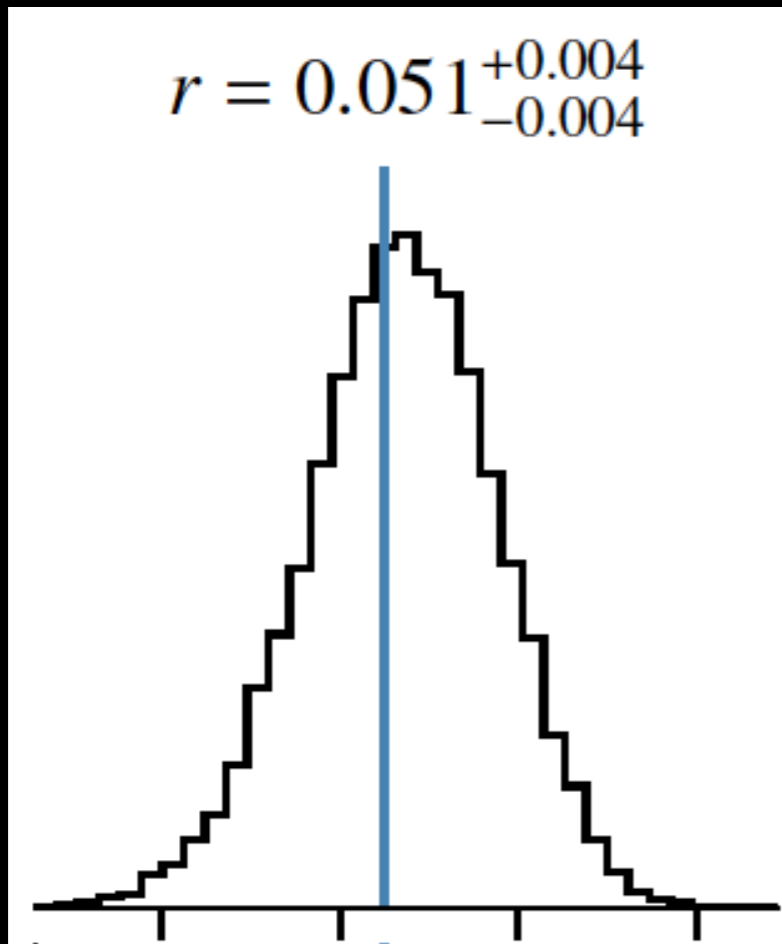


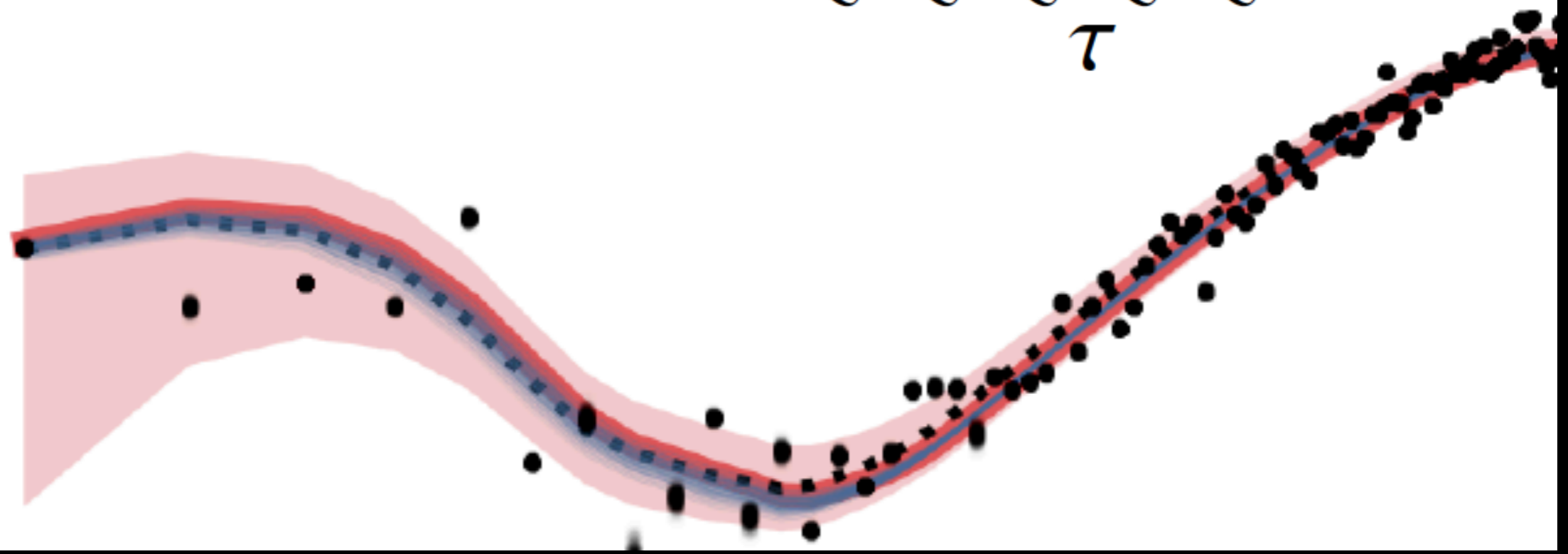
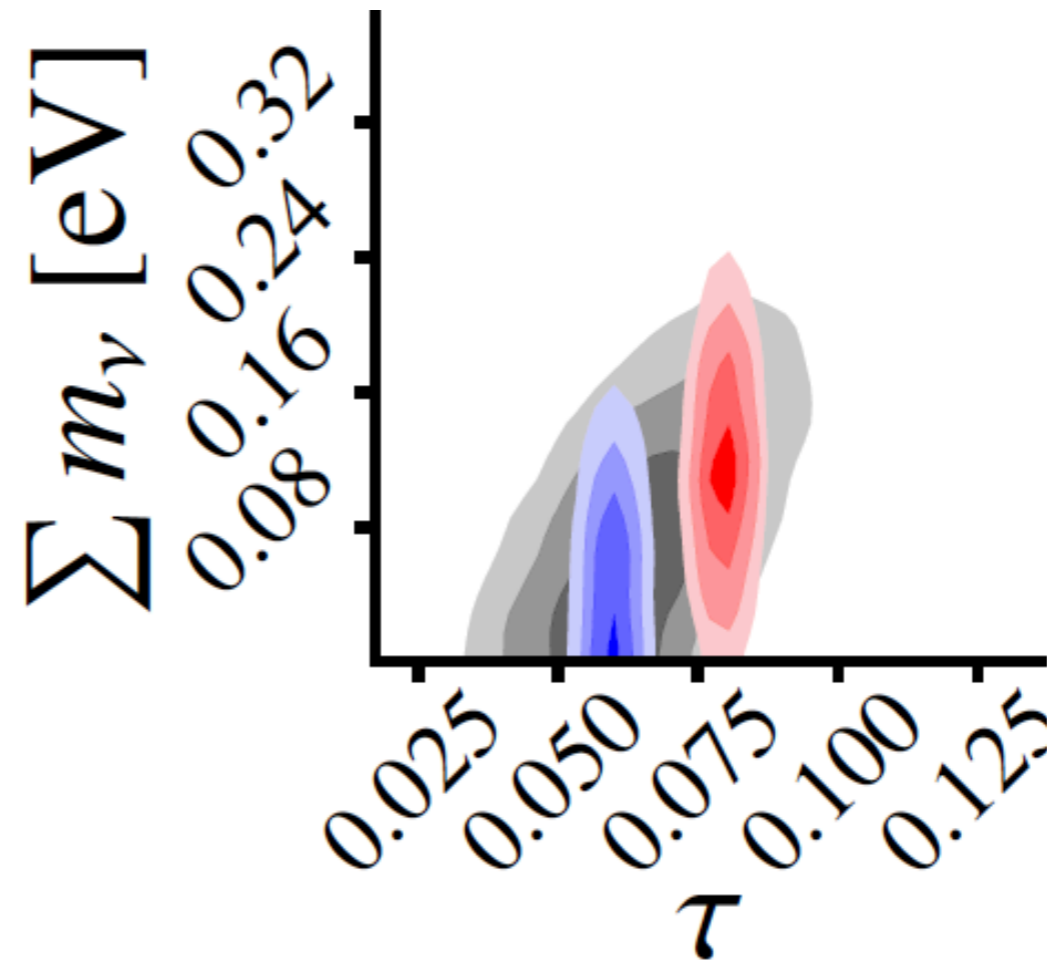
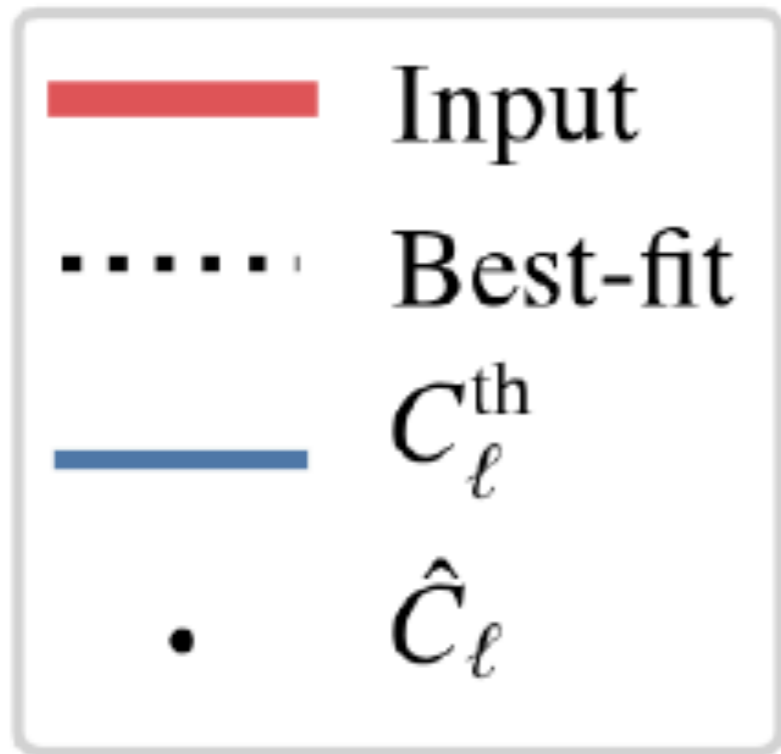
Watts, Wang et al (ApJ, arXiv:1801.01481)



Inflation

The measurement is more than r...





To the

Site!



WCM 4001755
4261

MAX WEIGHT
47,000 LBS
36,000 LBS
7,700 LBS
28,000 LBS
14,000 LBS

CY TRAILER

FLEX1

FLEX1
VAN

Lull



CLASS





CLASS Site

Crane



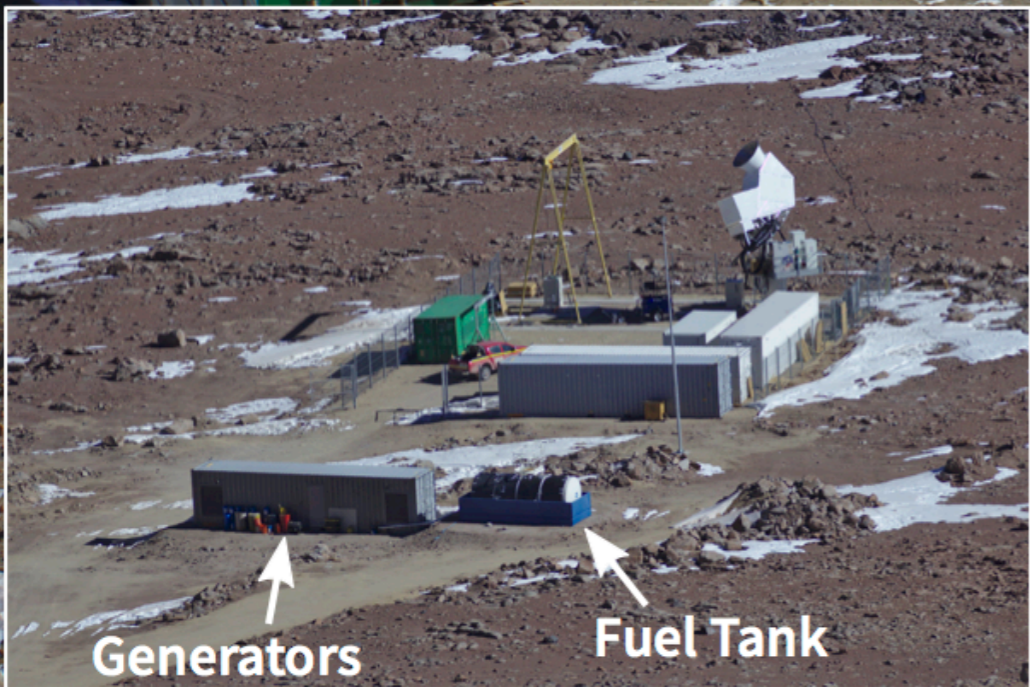
Storage

Machine Shop

Laboratory

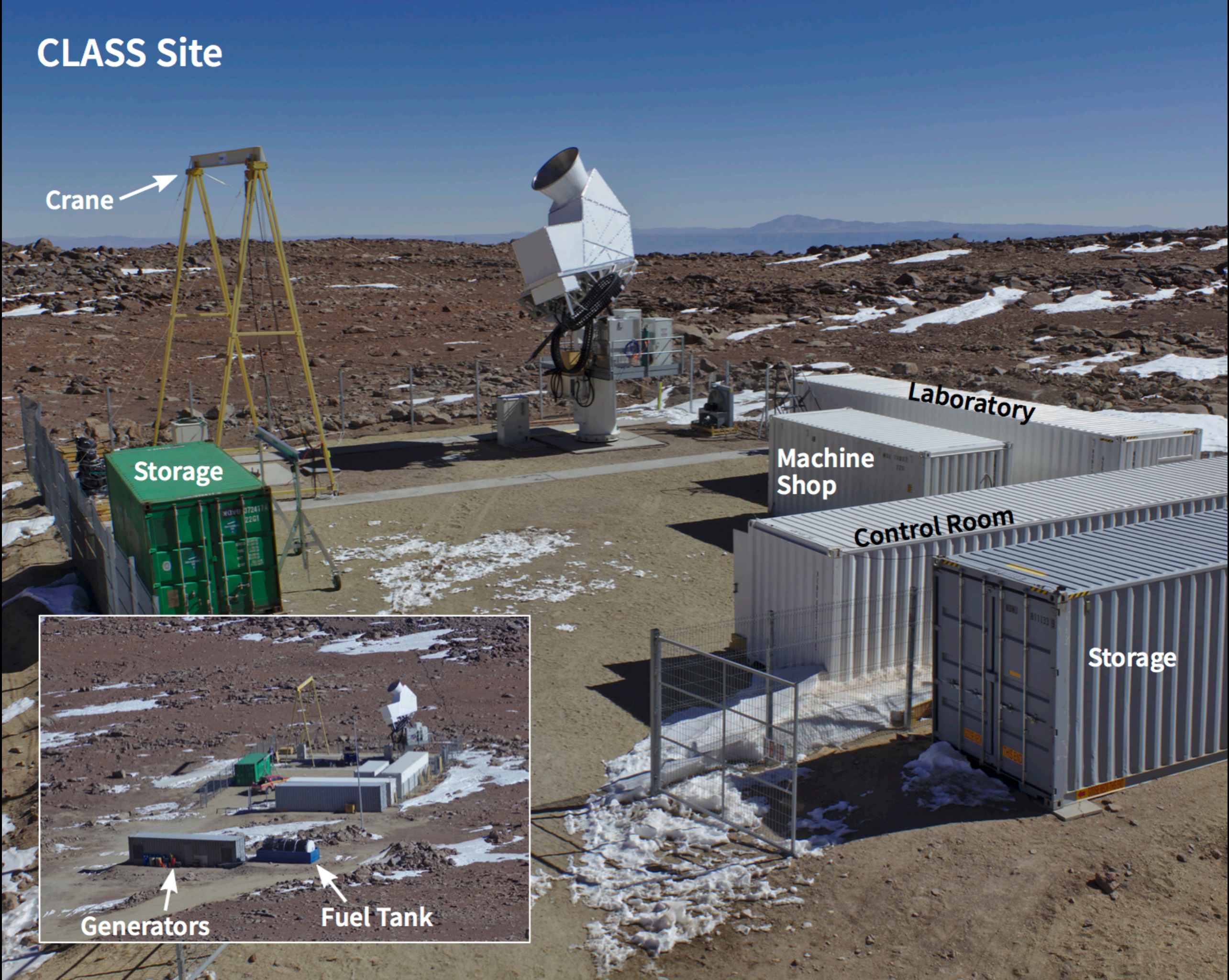
Control Room

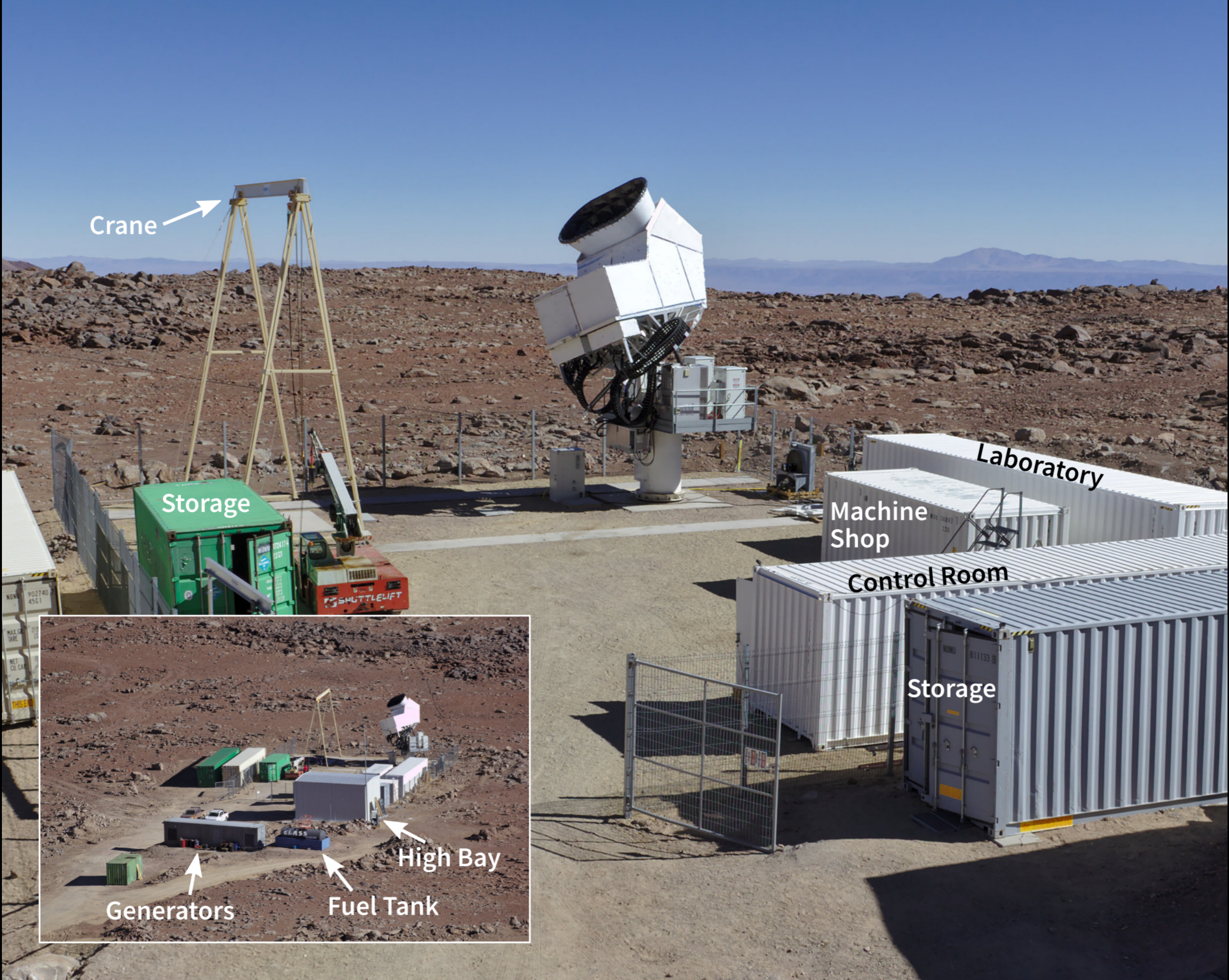
Storage



Generators

Fuel Tank





Crane



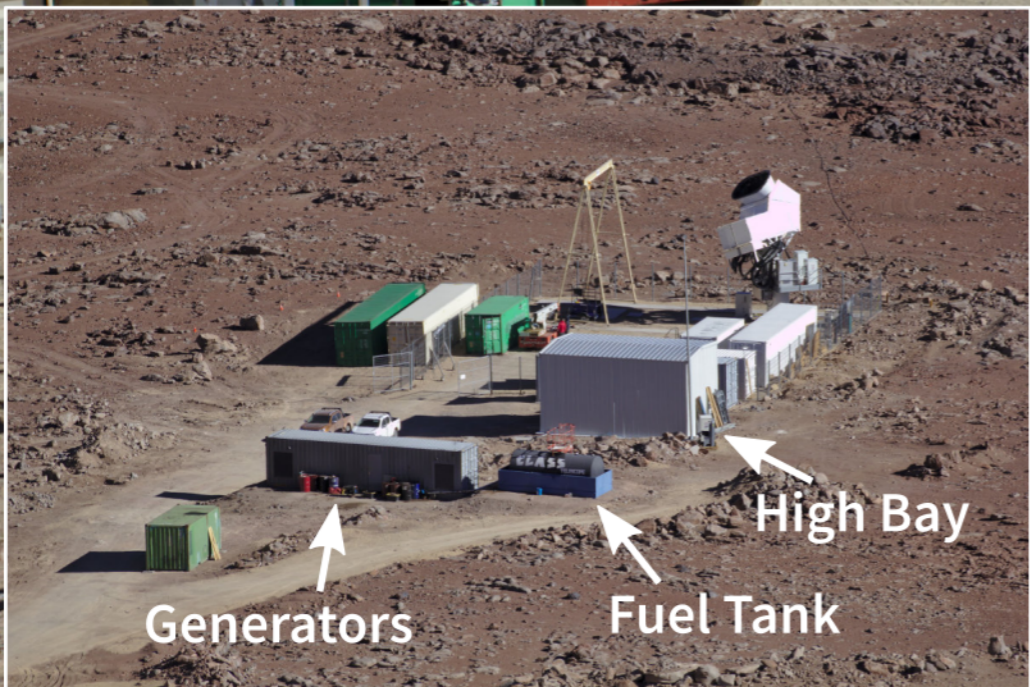
Storage

Laboratory

Machine Shop

Control Room

Storage



Generators

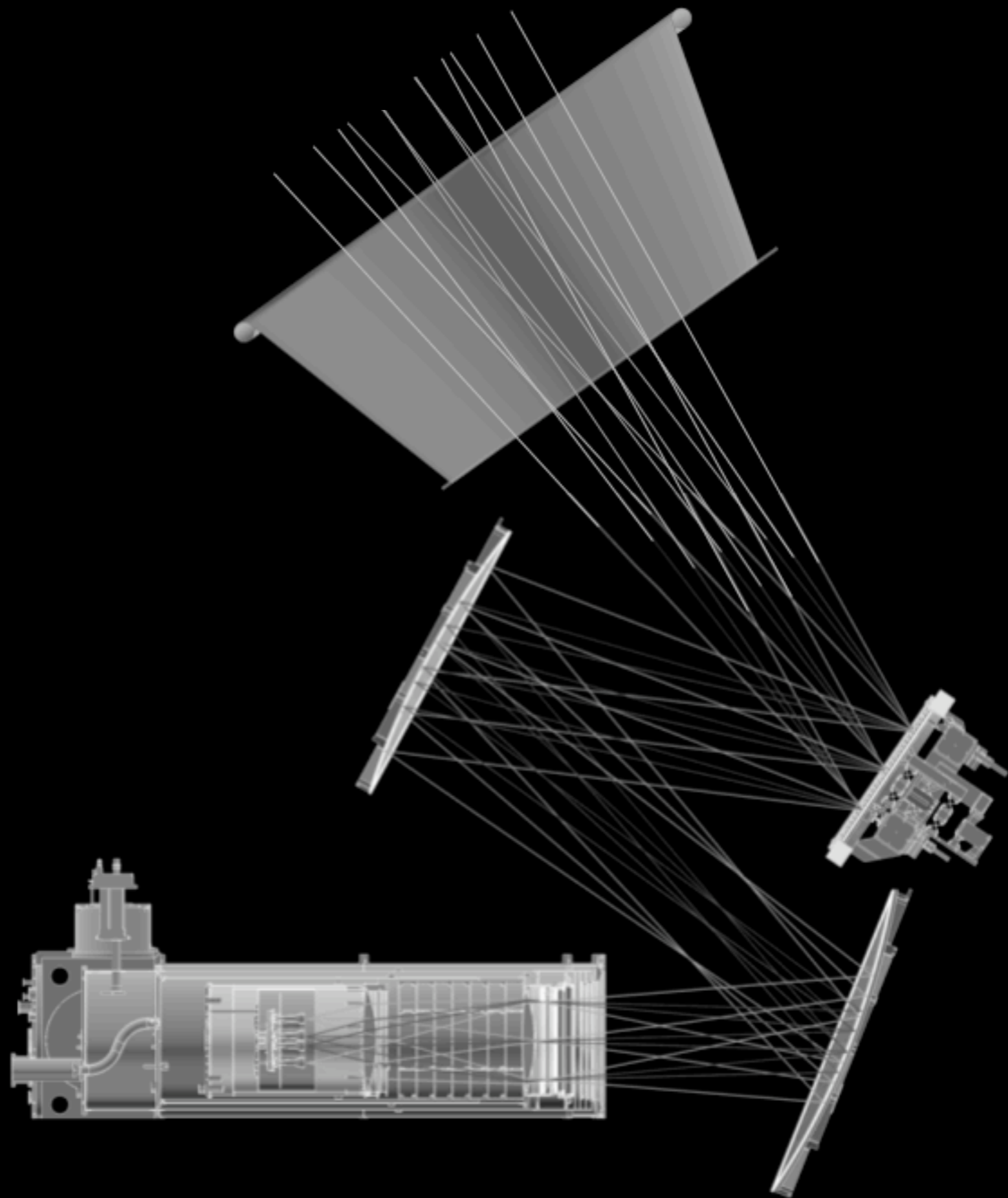
Fuel Tank

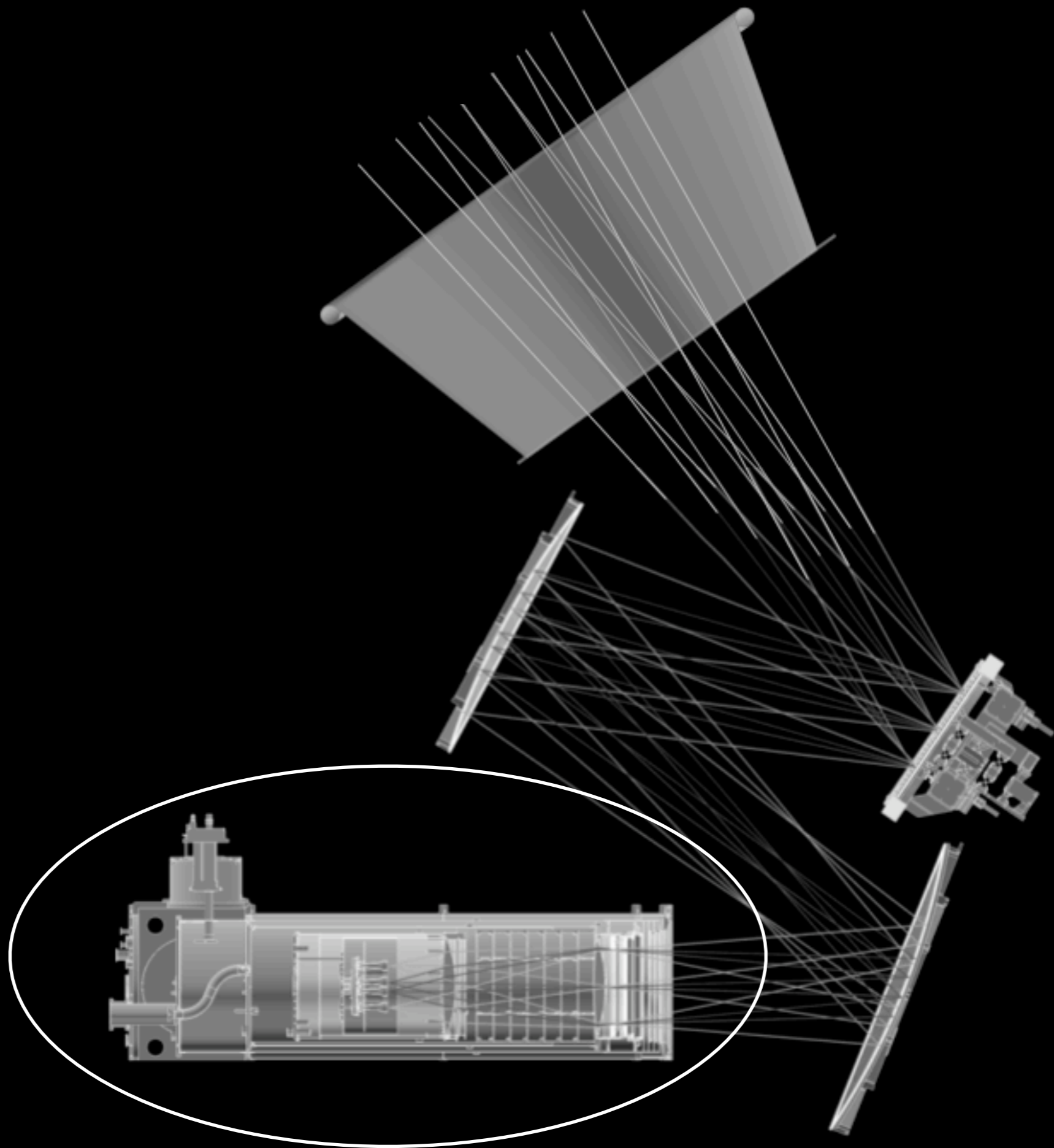
High Bay

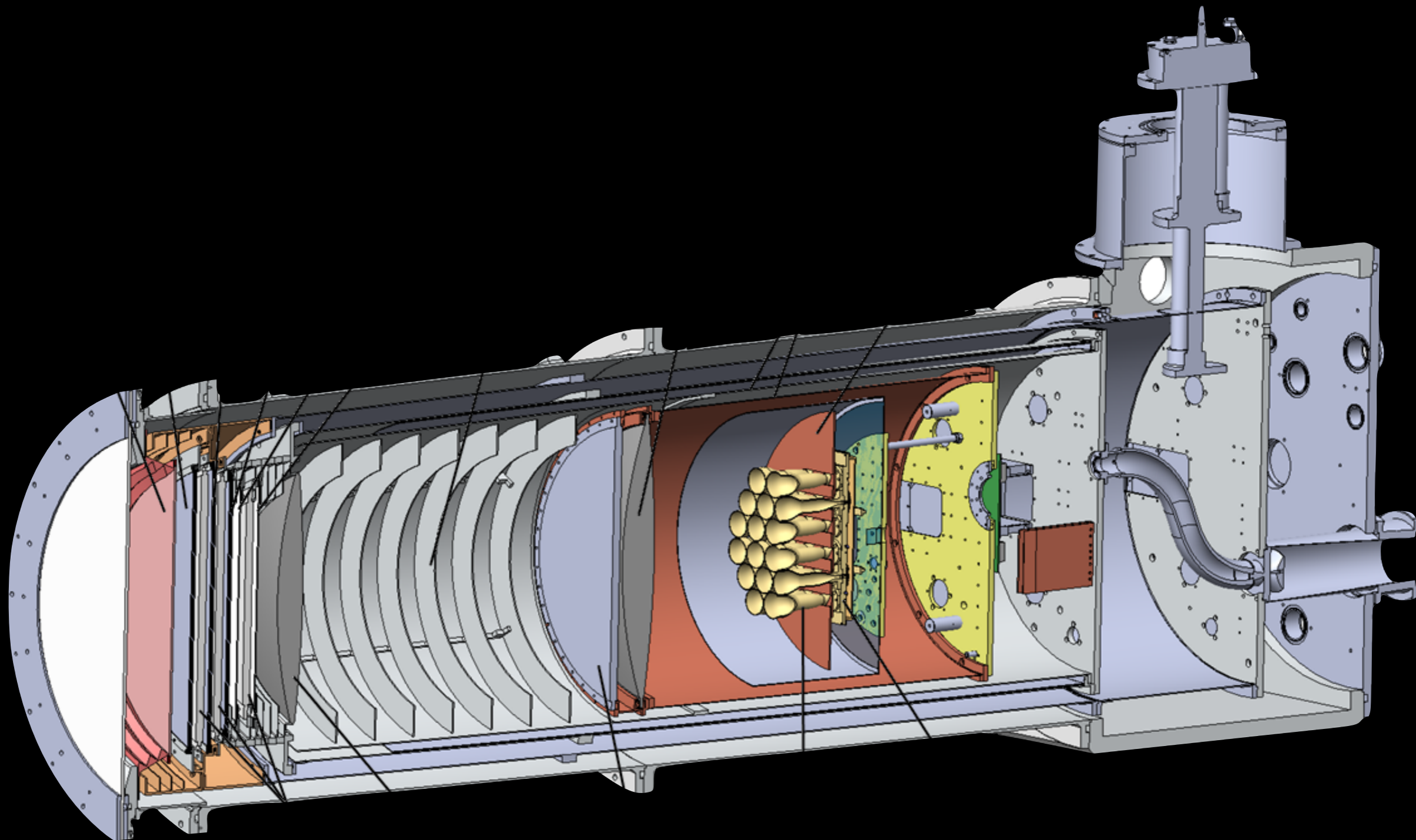


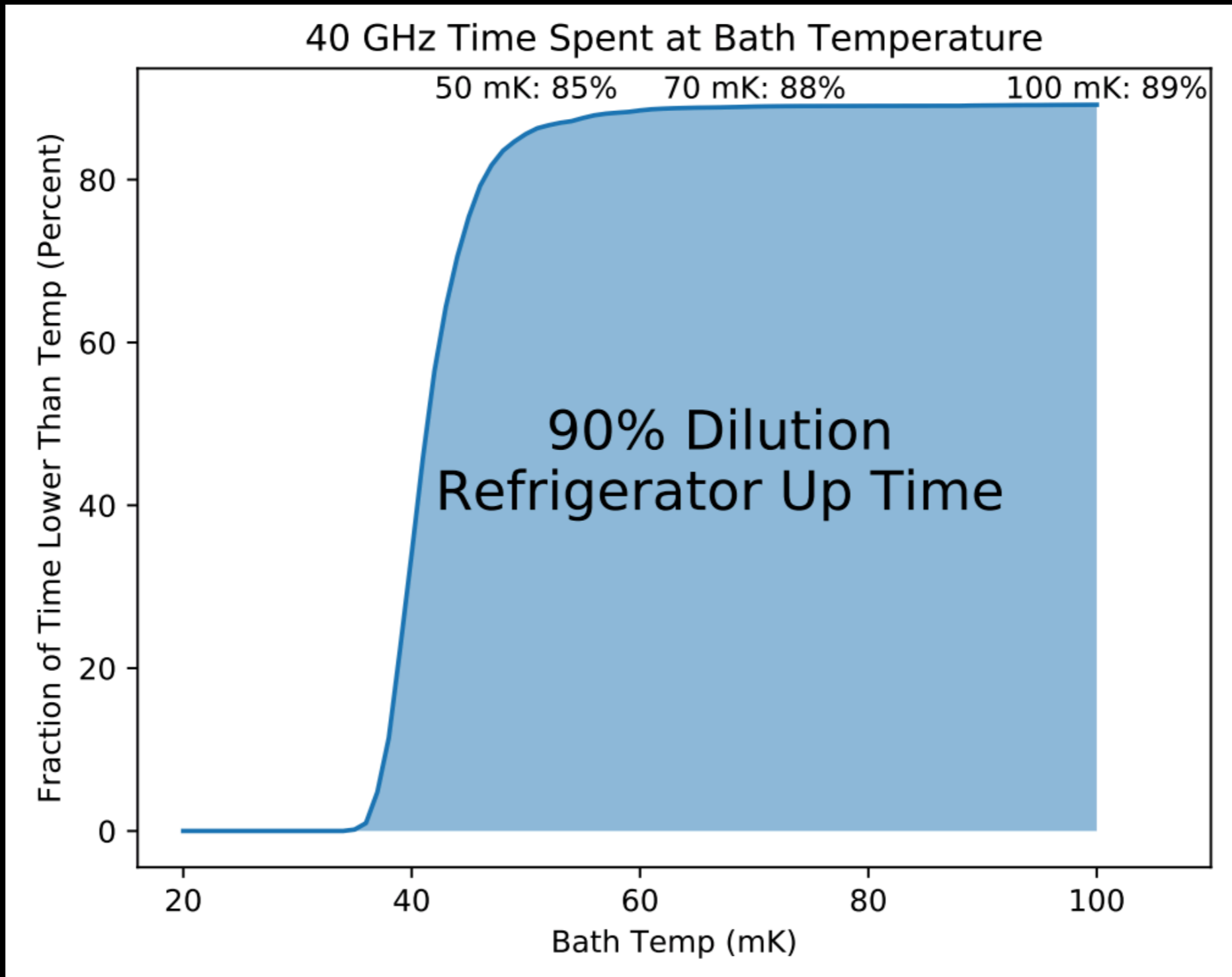


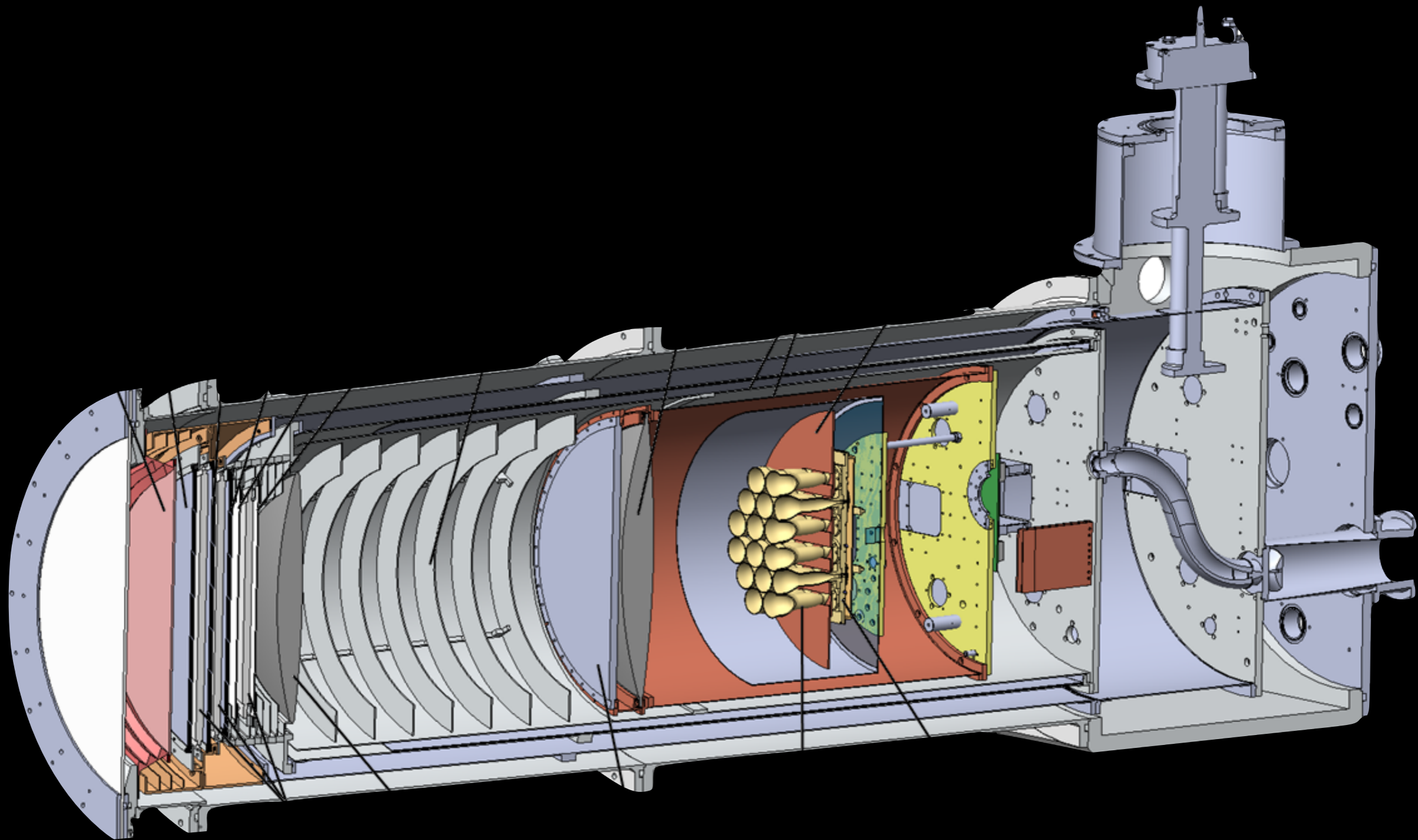


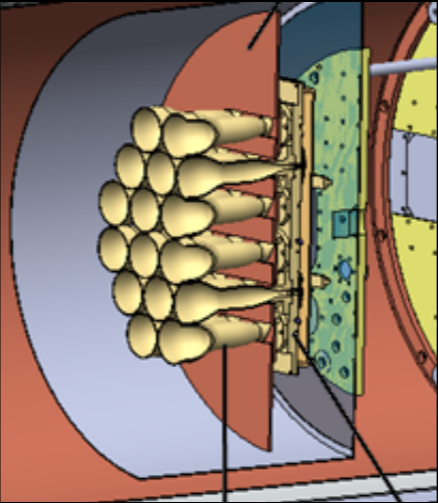


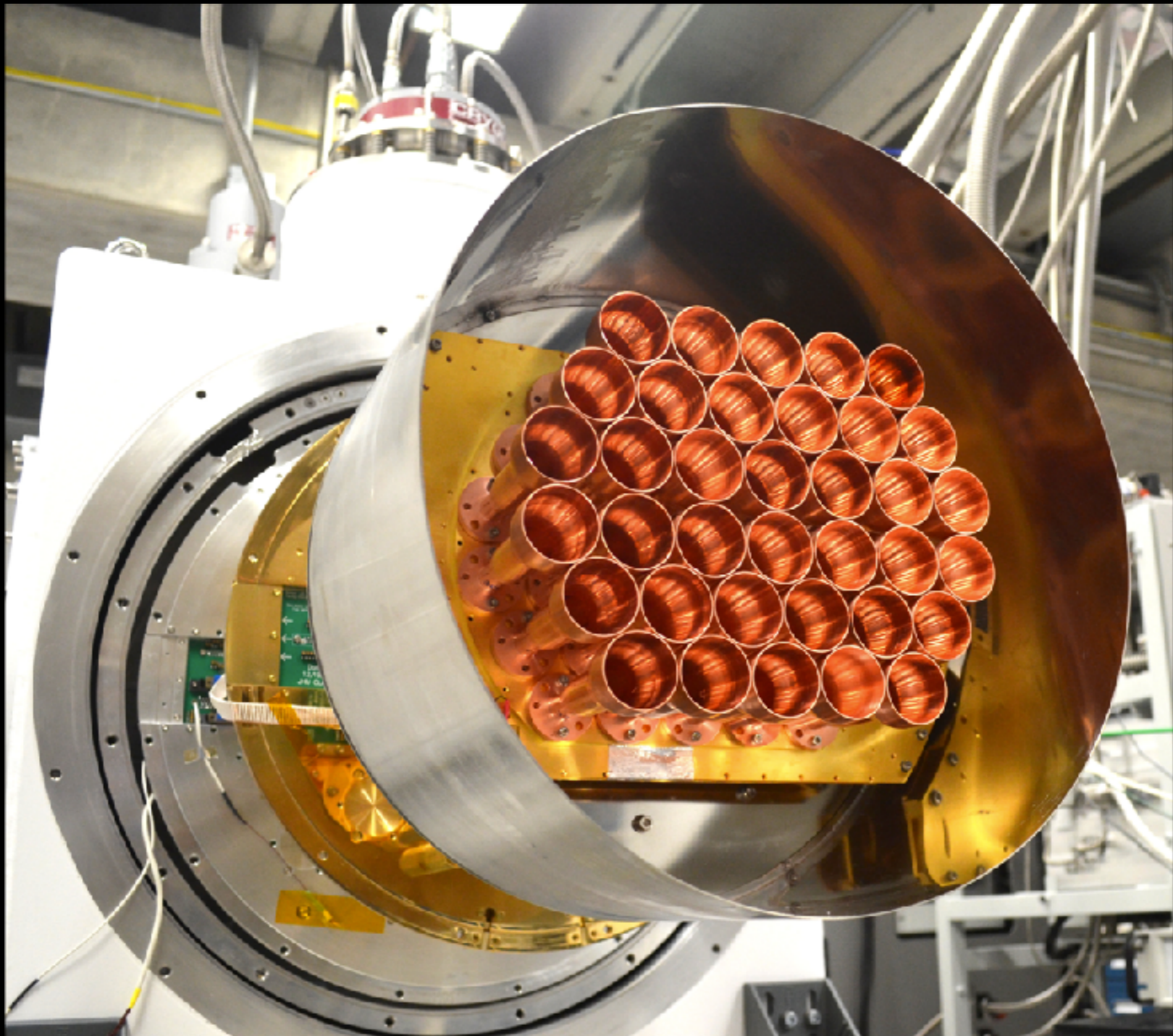


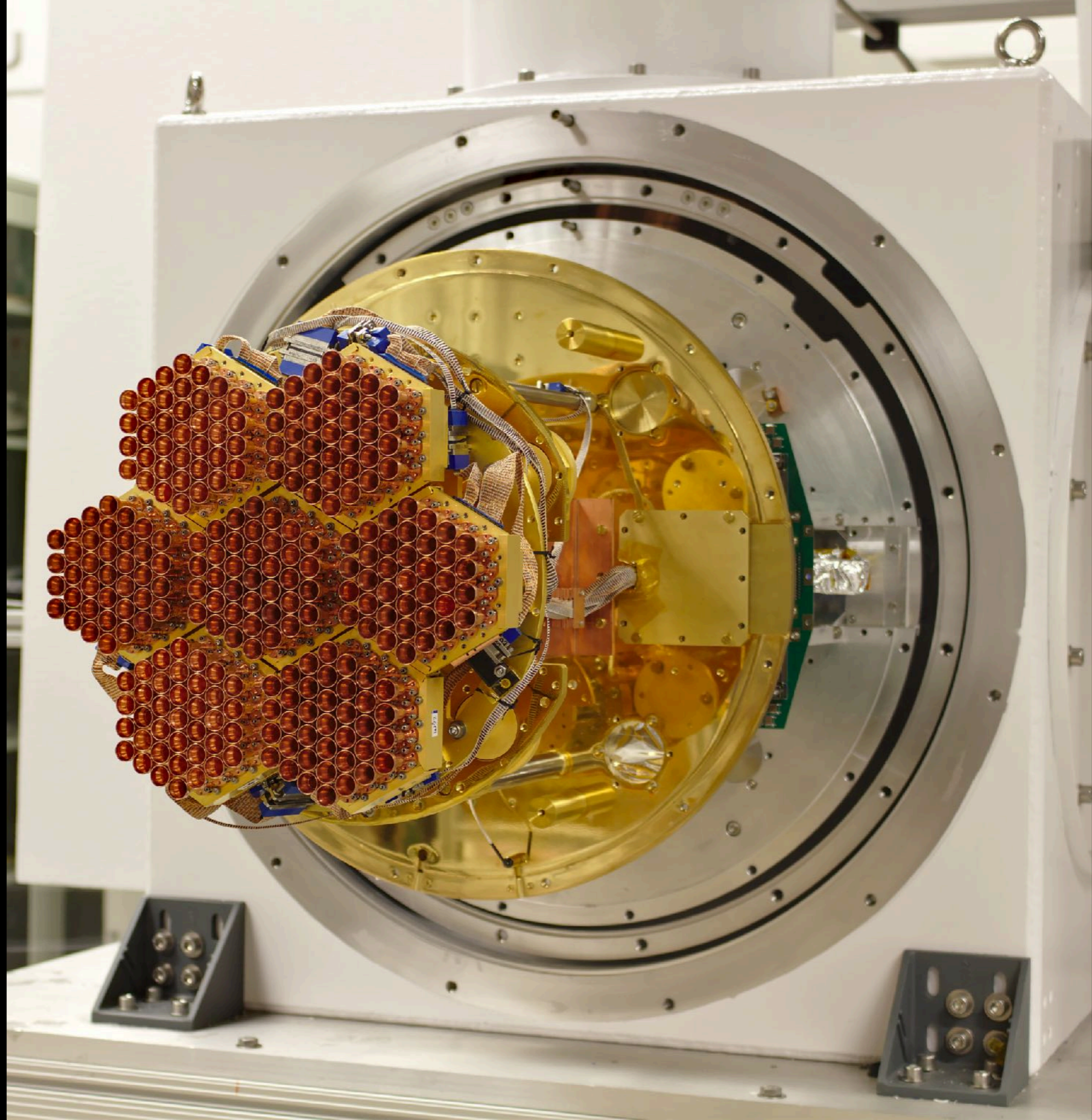




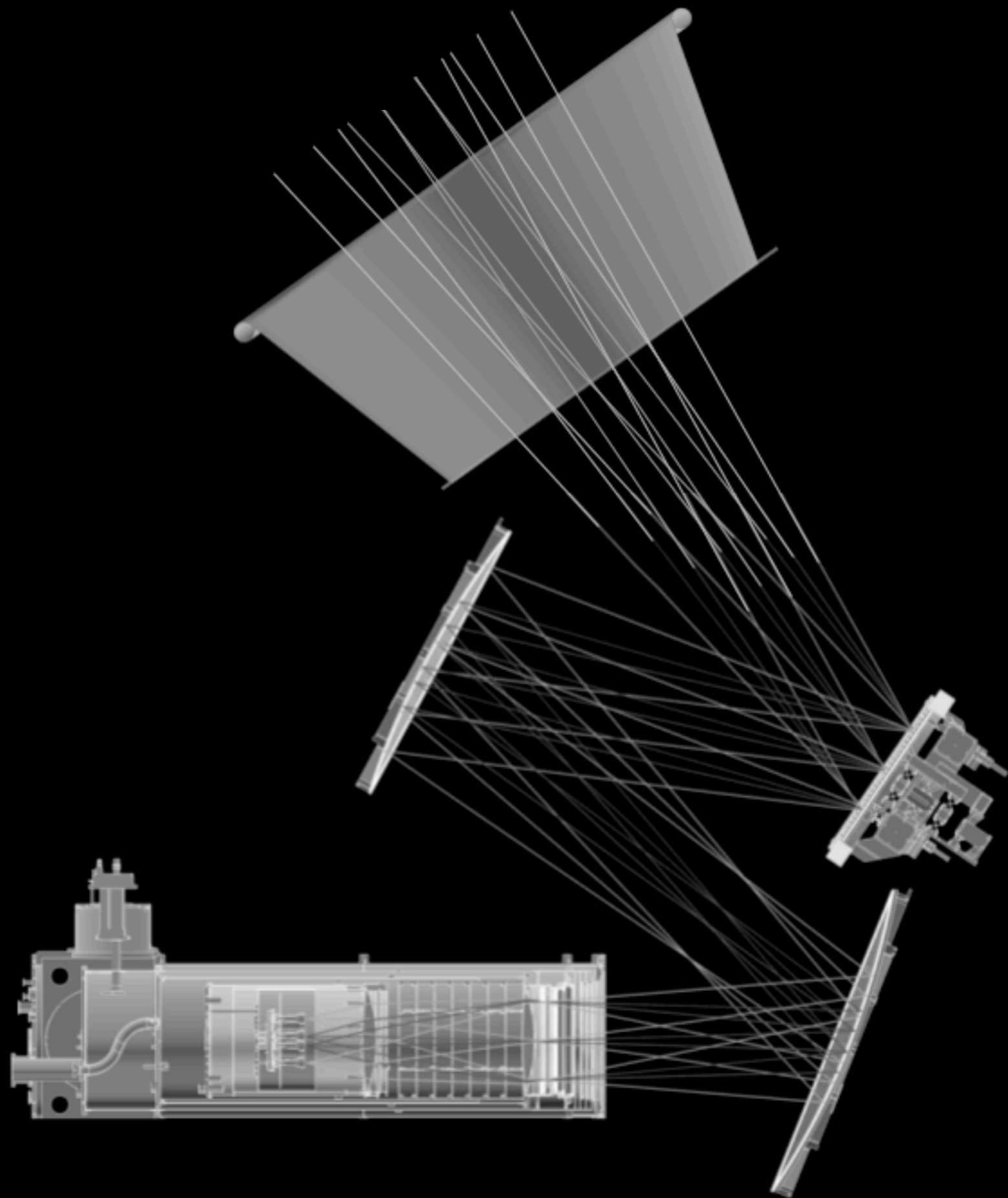


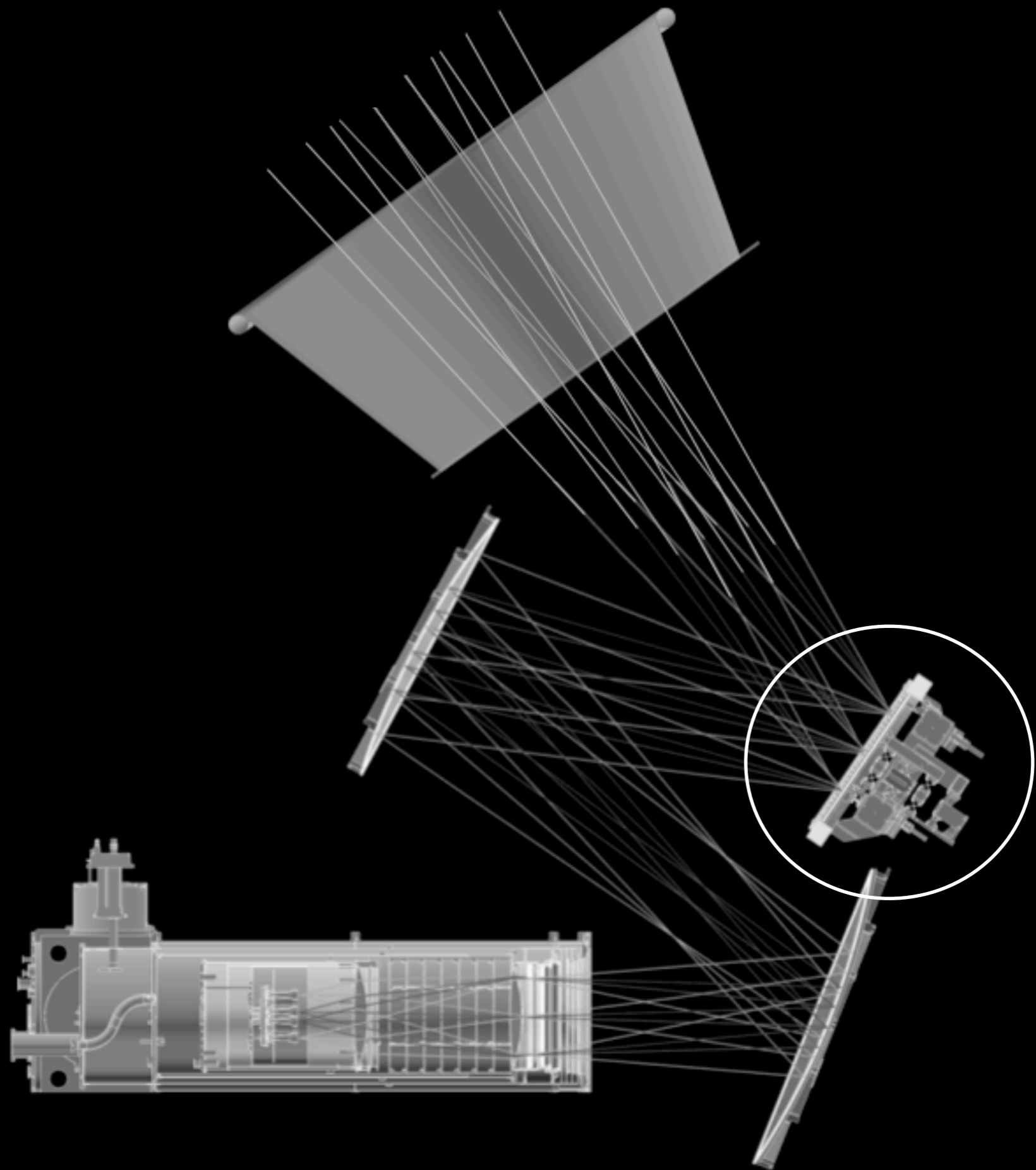




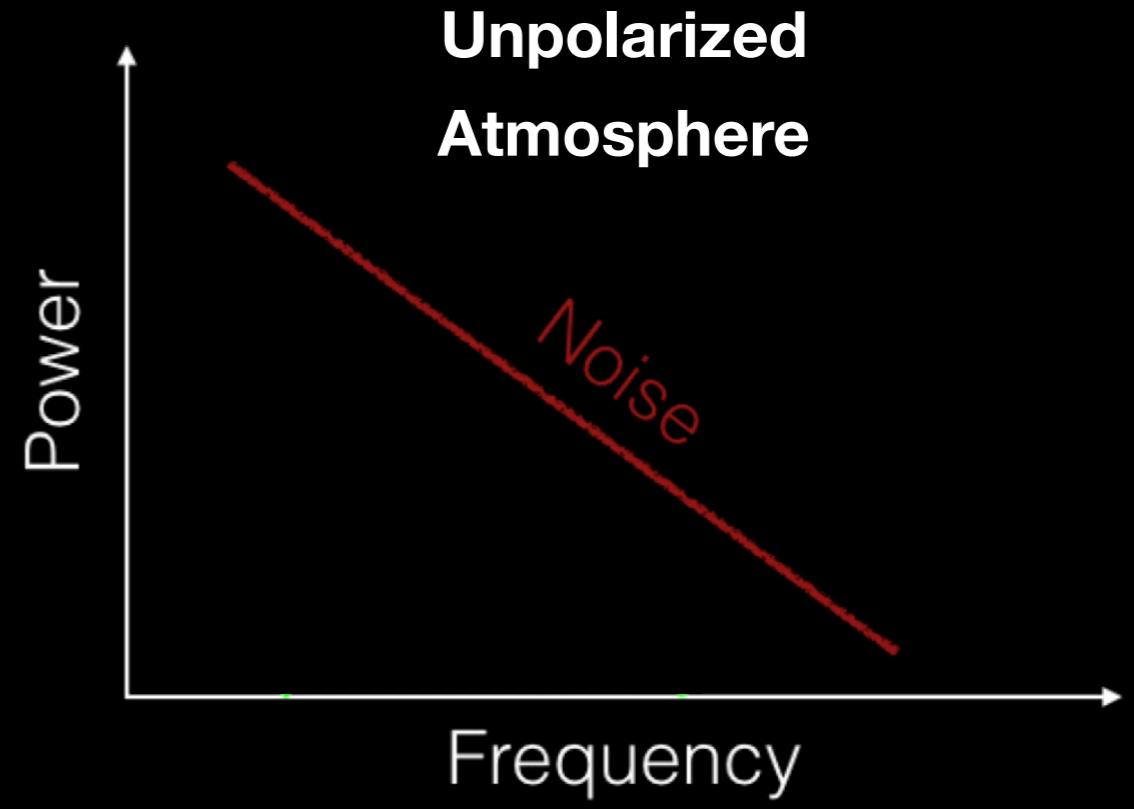
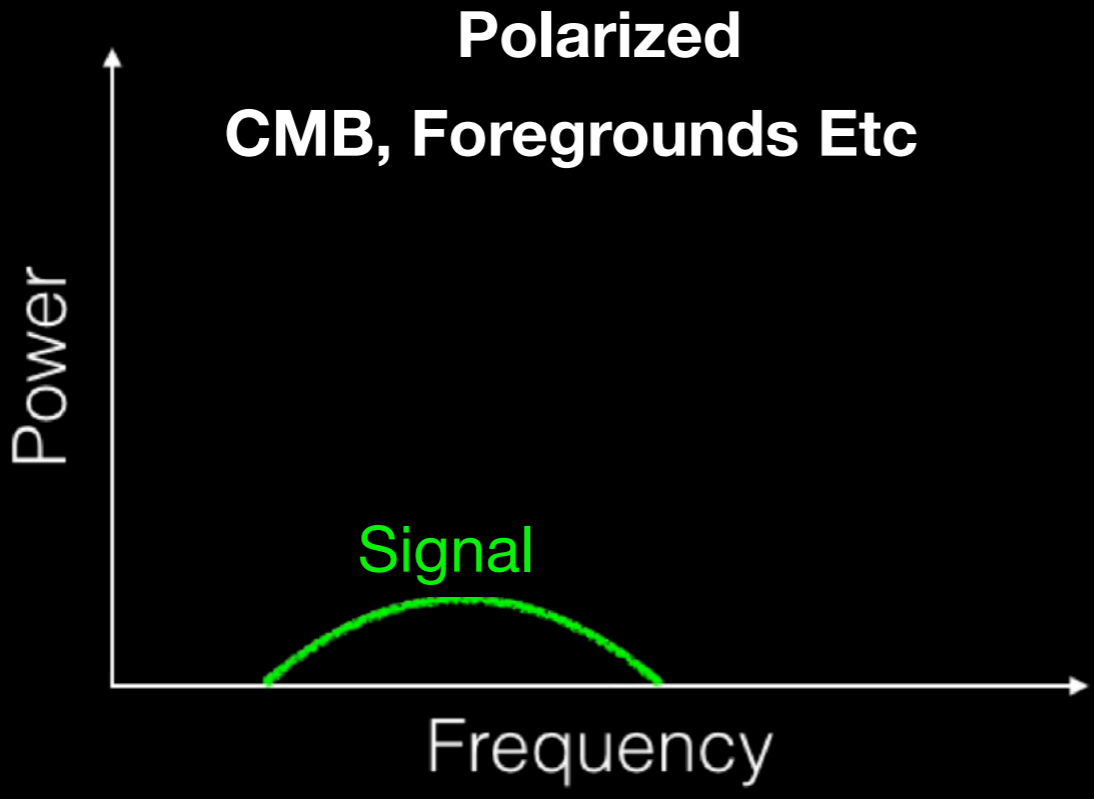


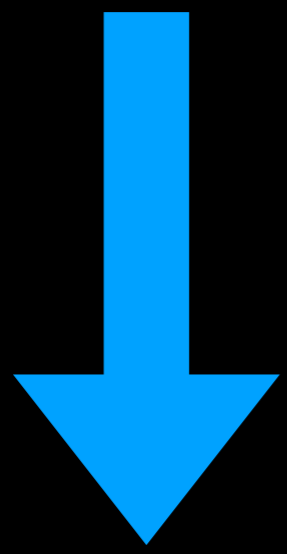
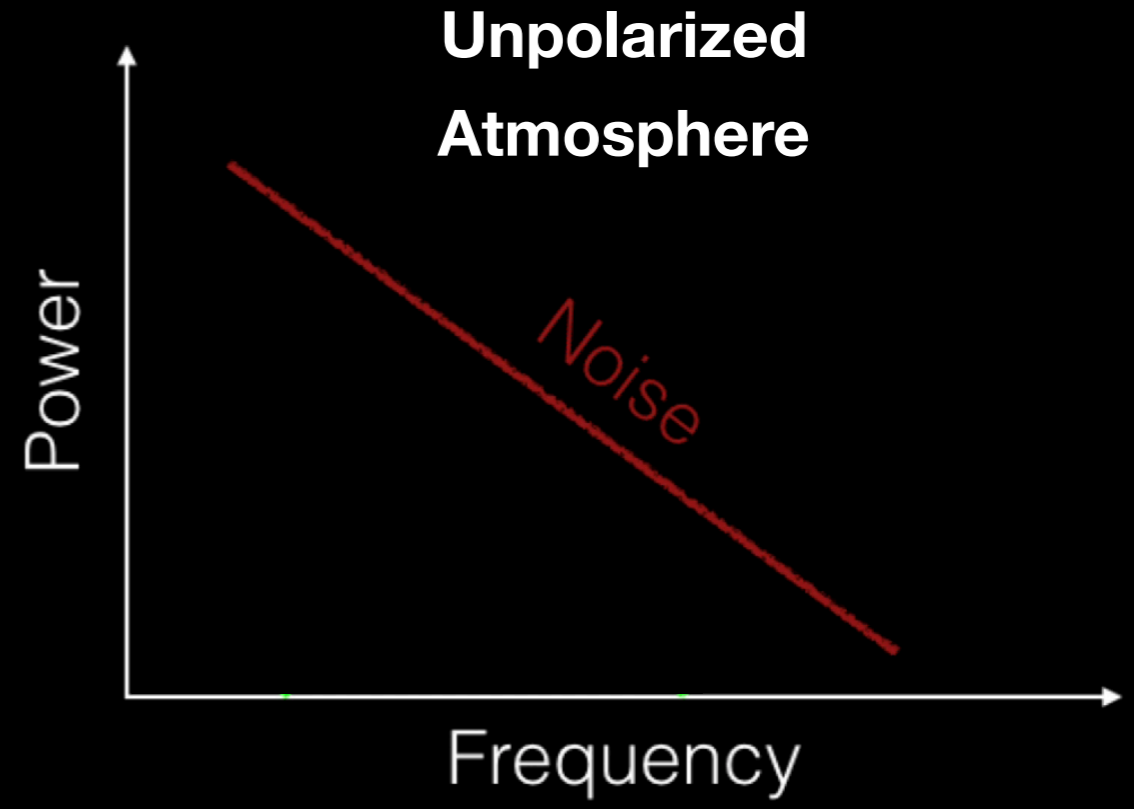
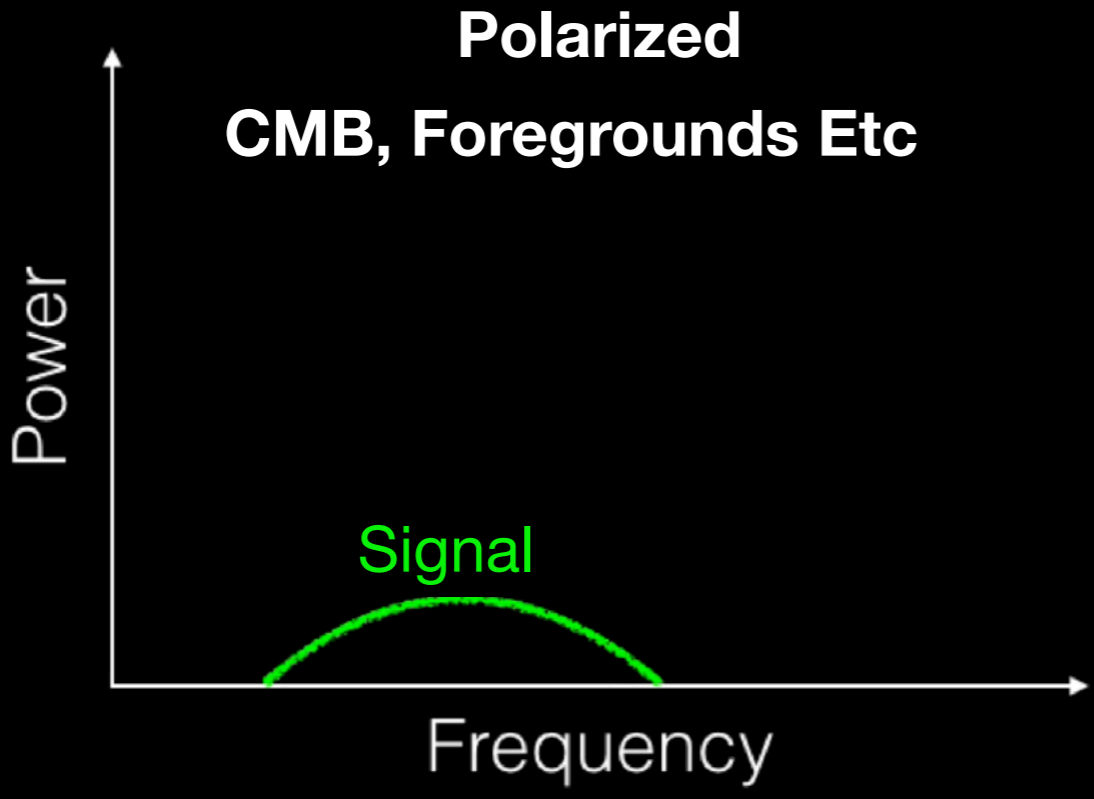




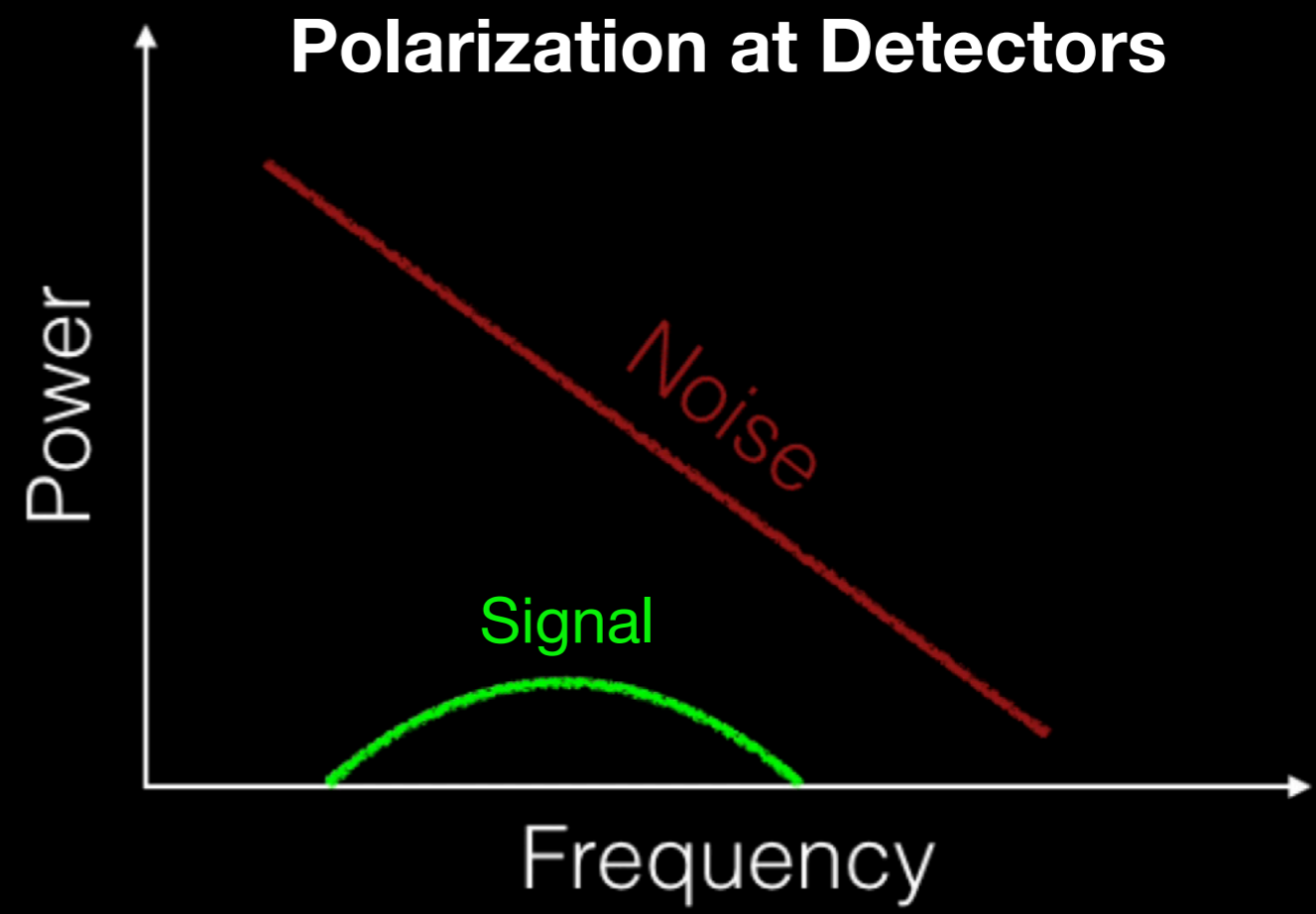
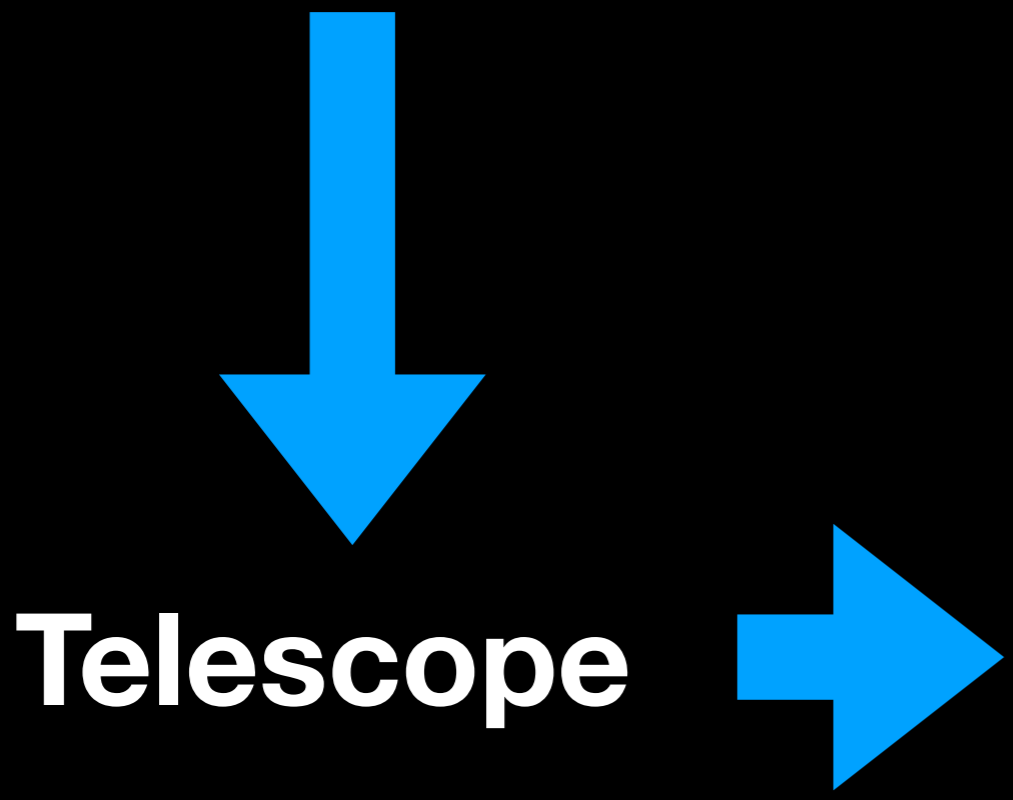
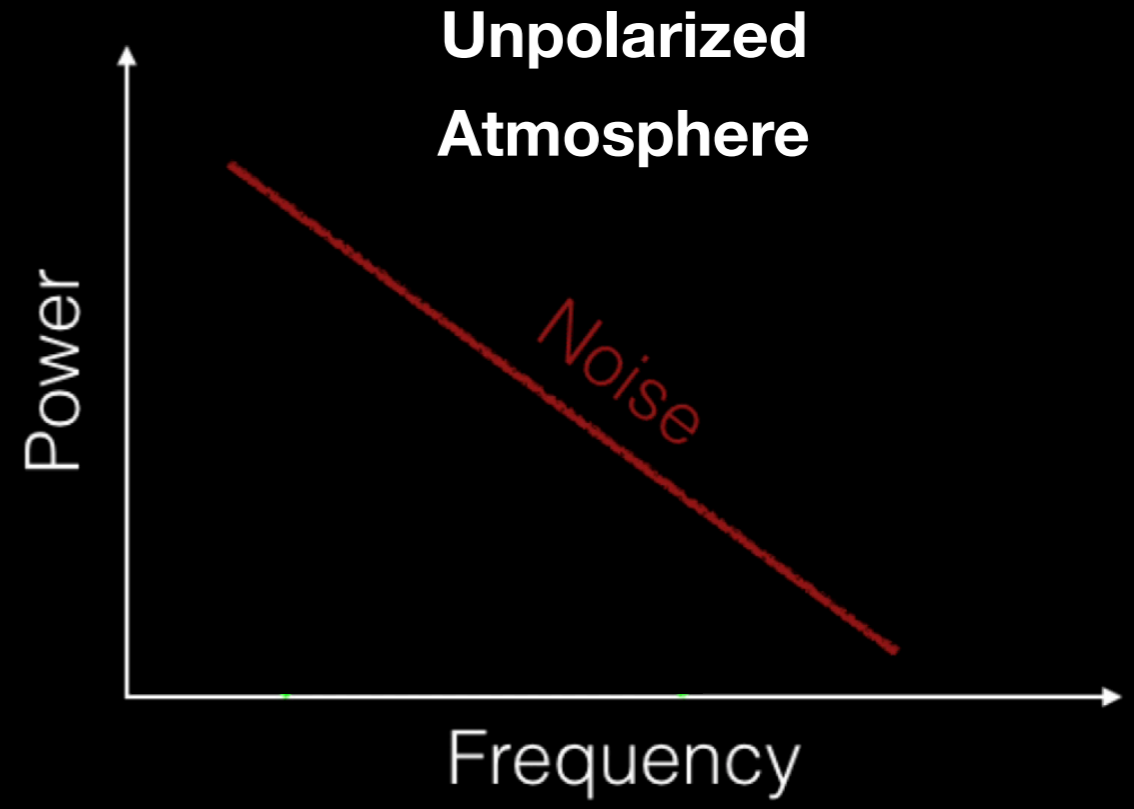
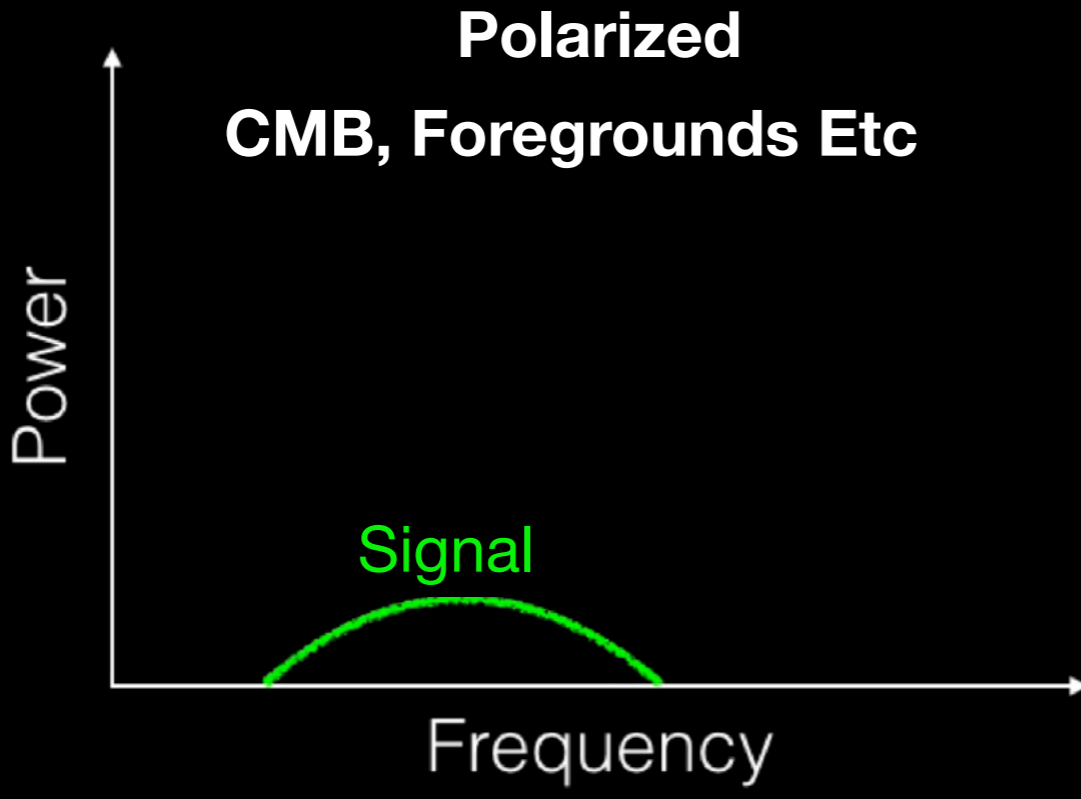


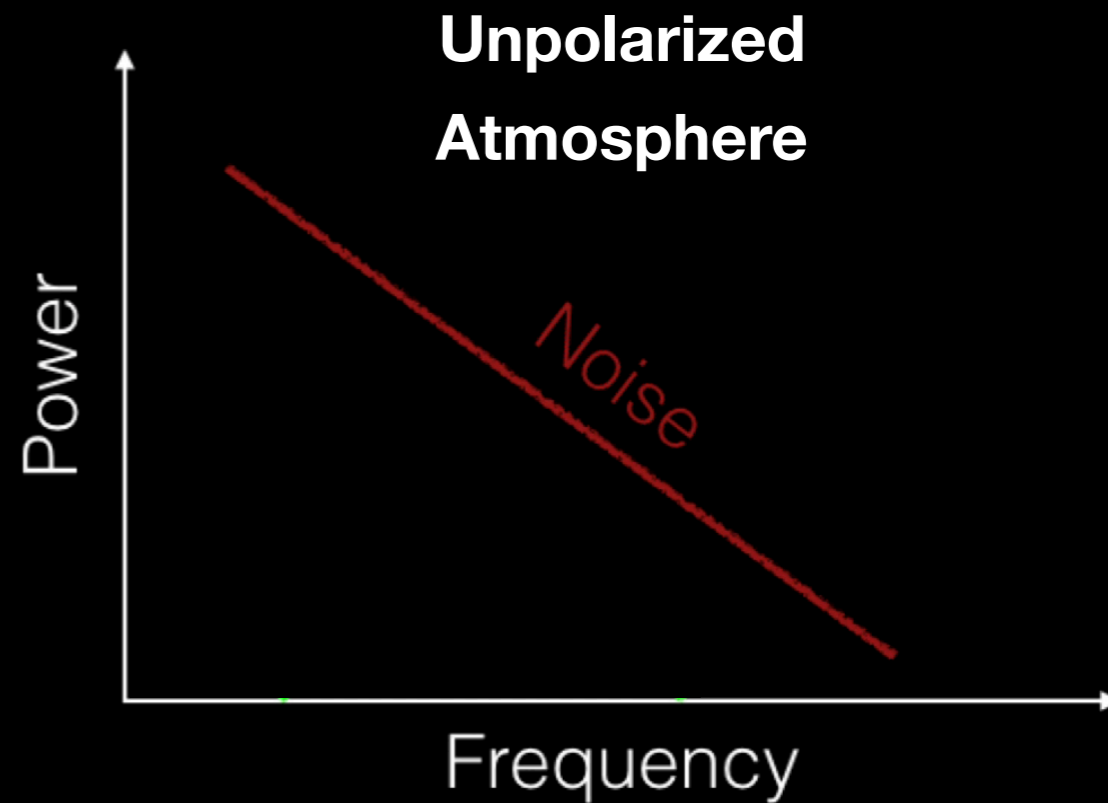
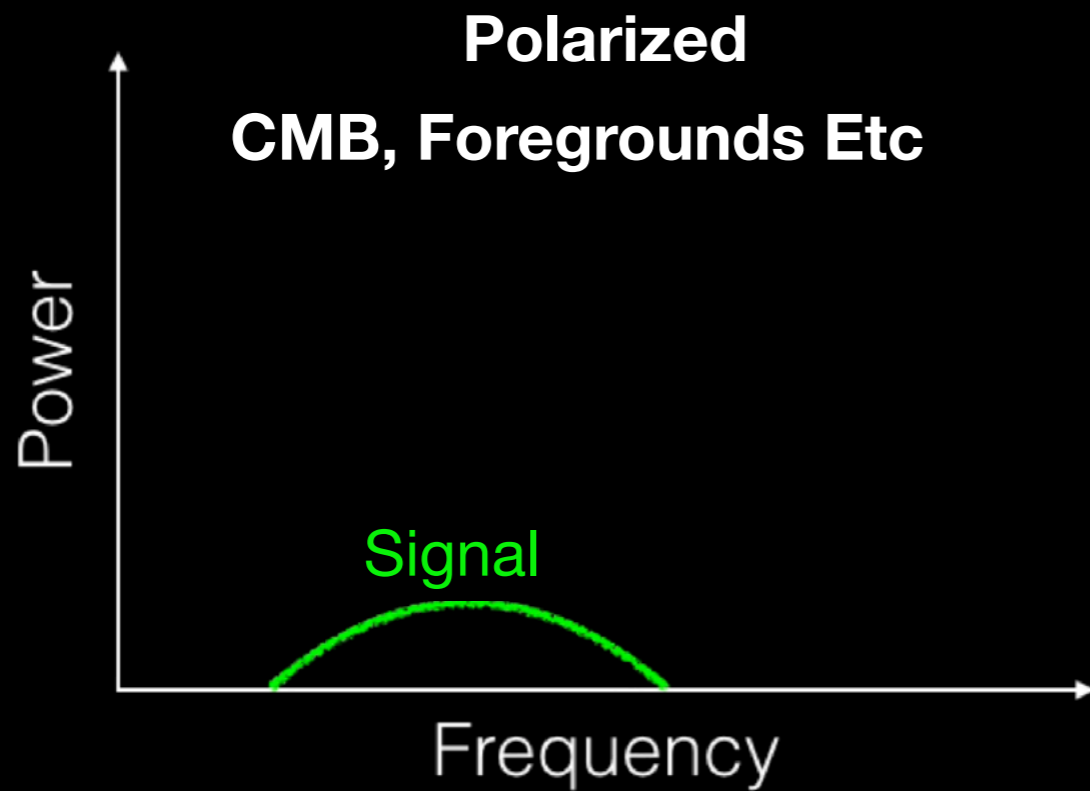
The atmosphere is (effectively) unpolarized.



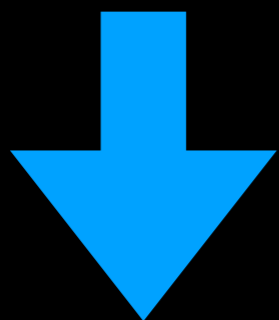


Telescope

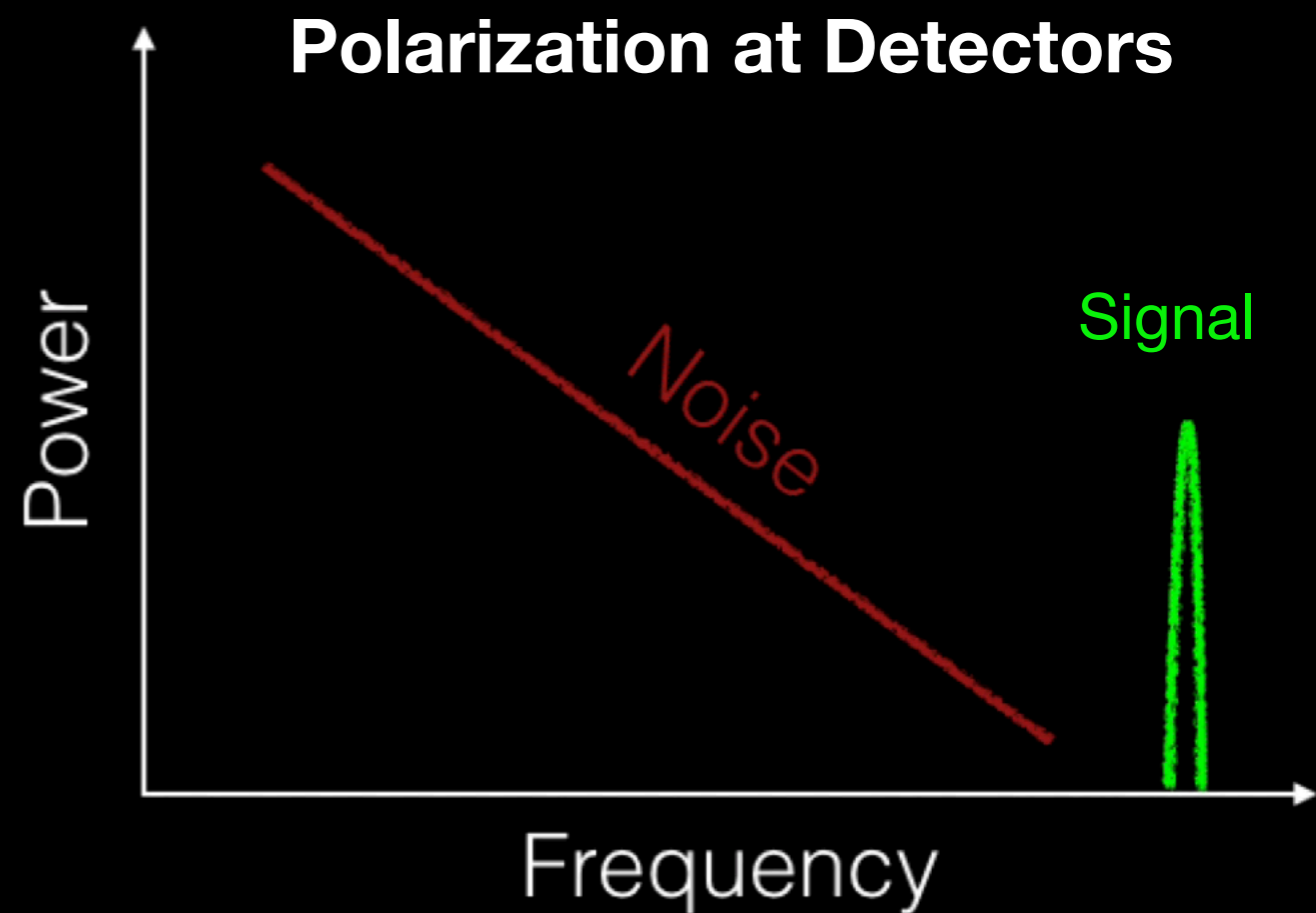
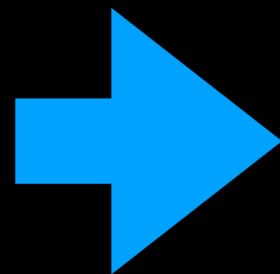




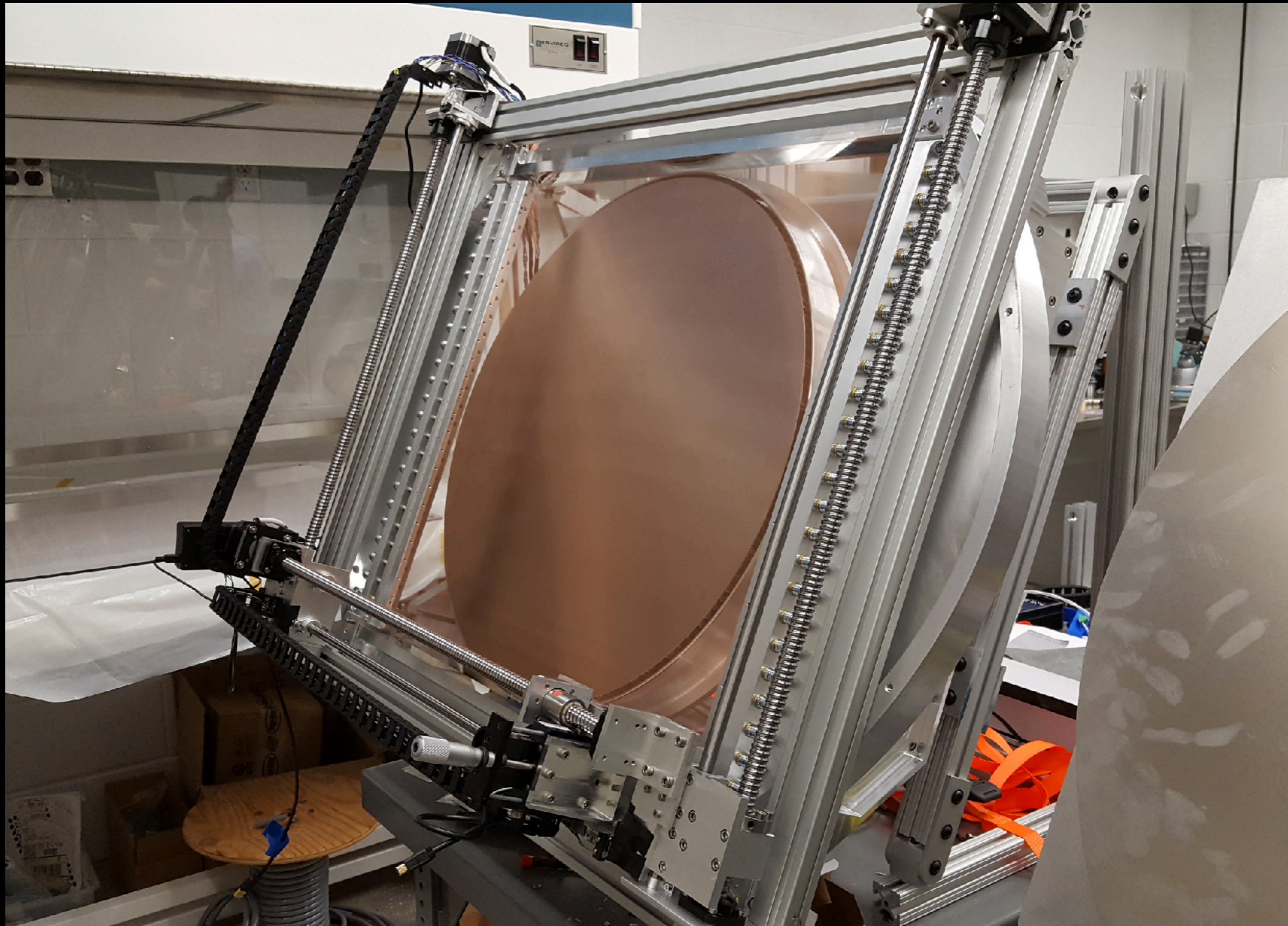
Modulator



Telescope

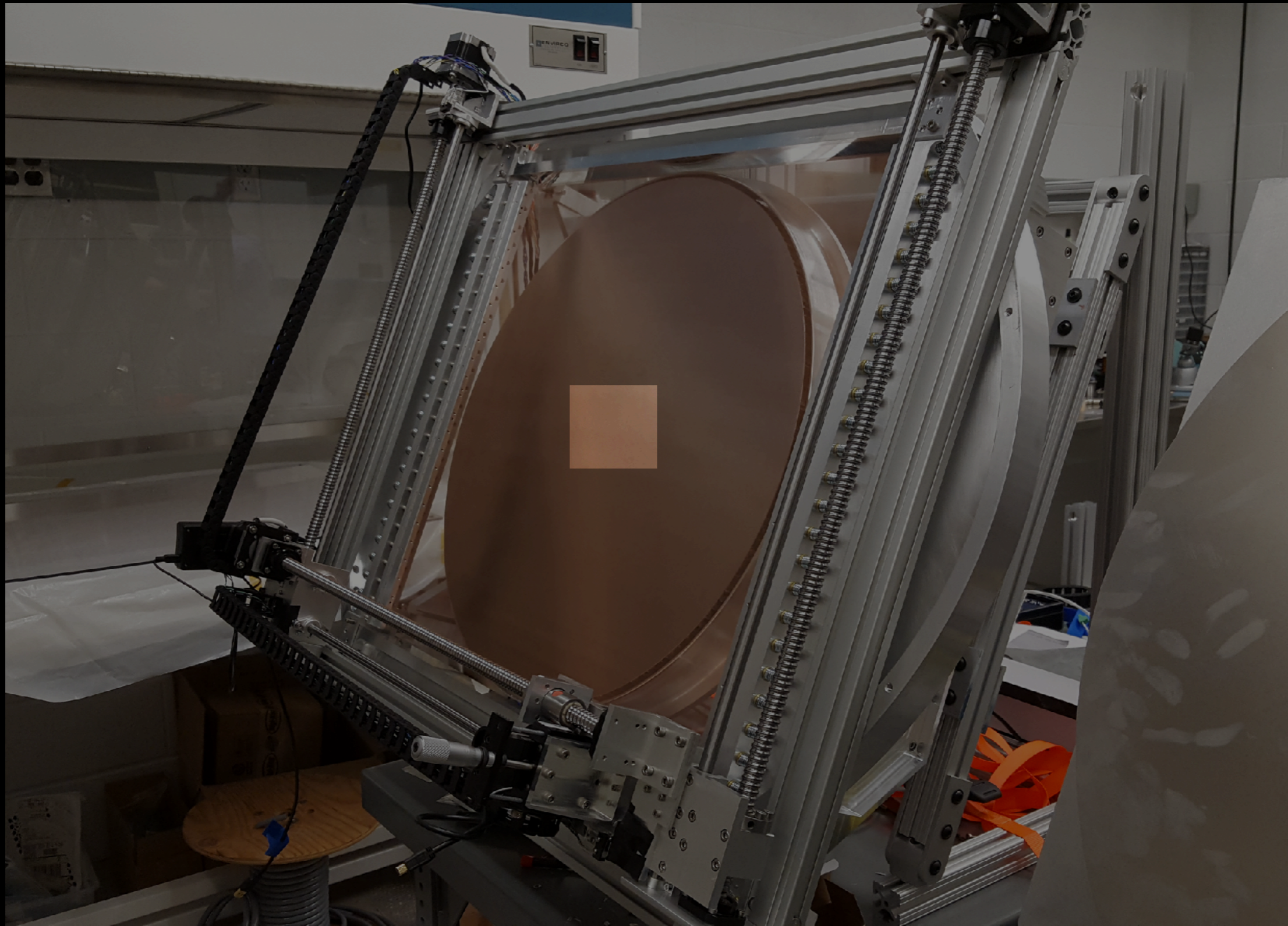


Variable Delay Polarization Modulator (VPM)



Harrington et al 2018, SPIE, arXiv:1807.03807

Variable Delay Polarization Modulator (VPM)

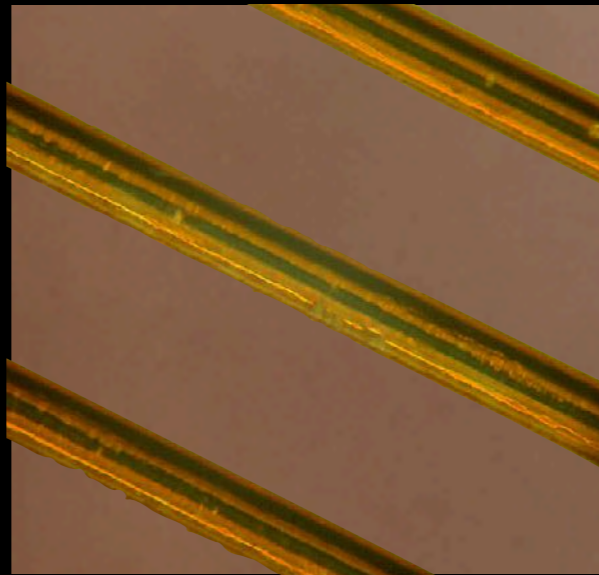


Harrington et al 2018, SPIE, arXiv:1807.03807

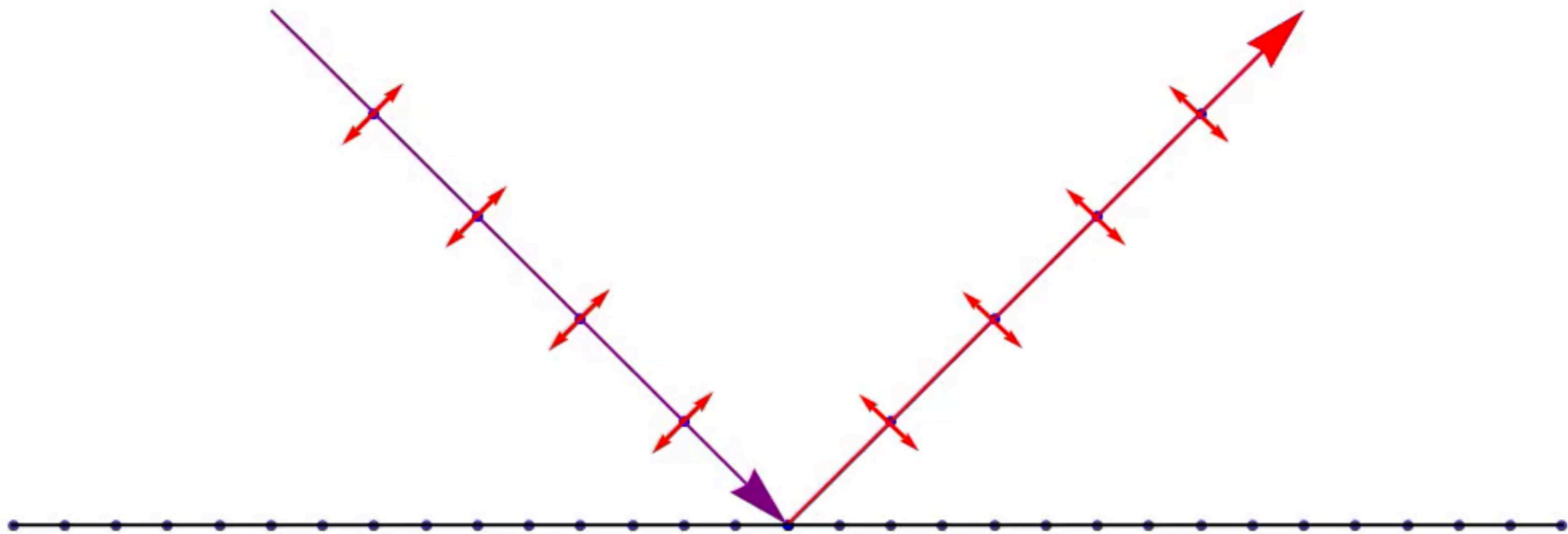
Variable Delay Polarization Modulator (VPM)

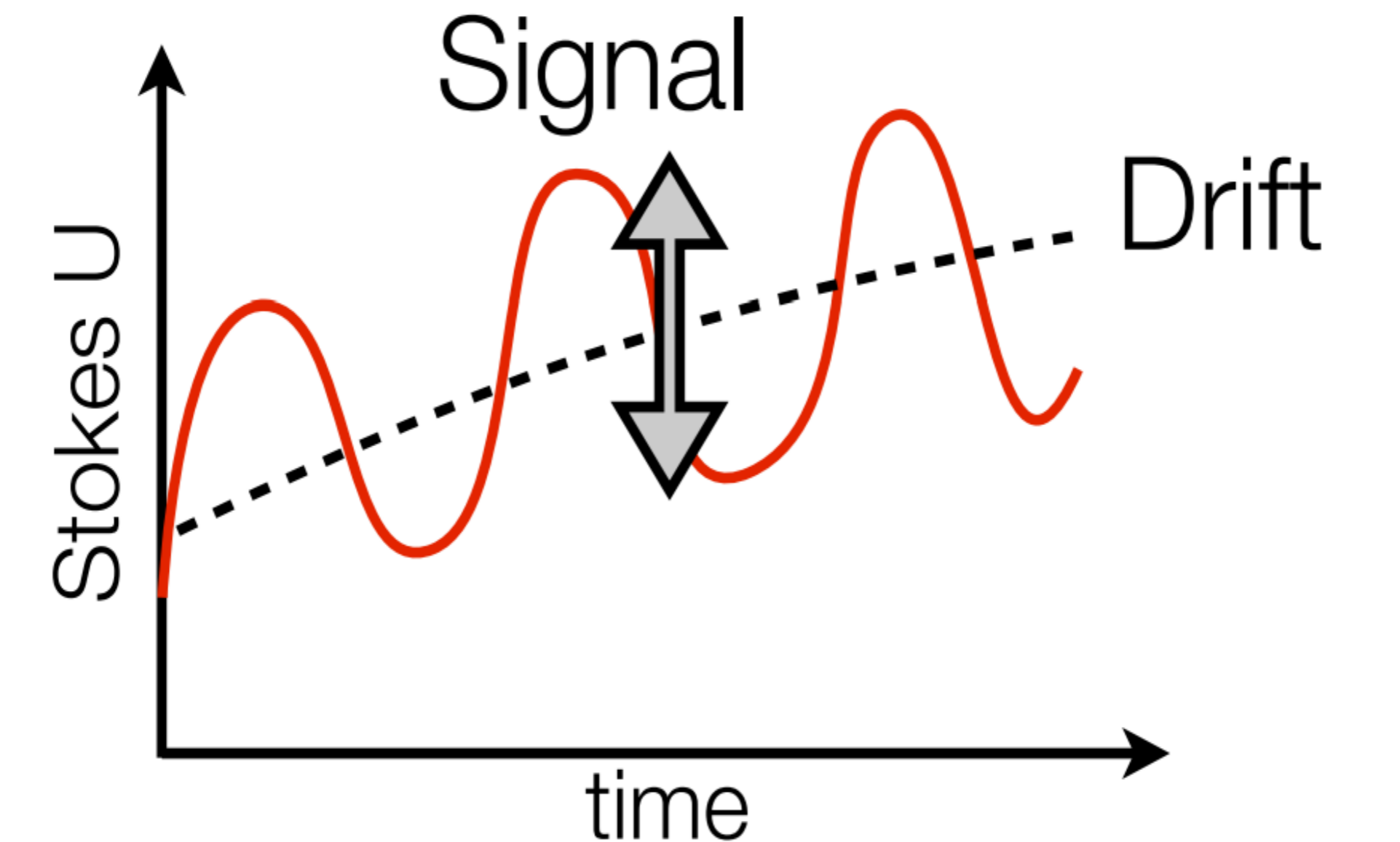


Variable Delay Polarization Modulator (VPM)



d   





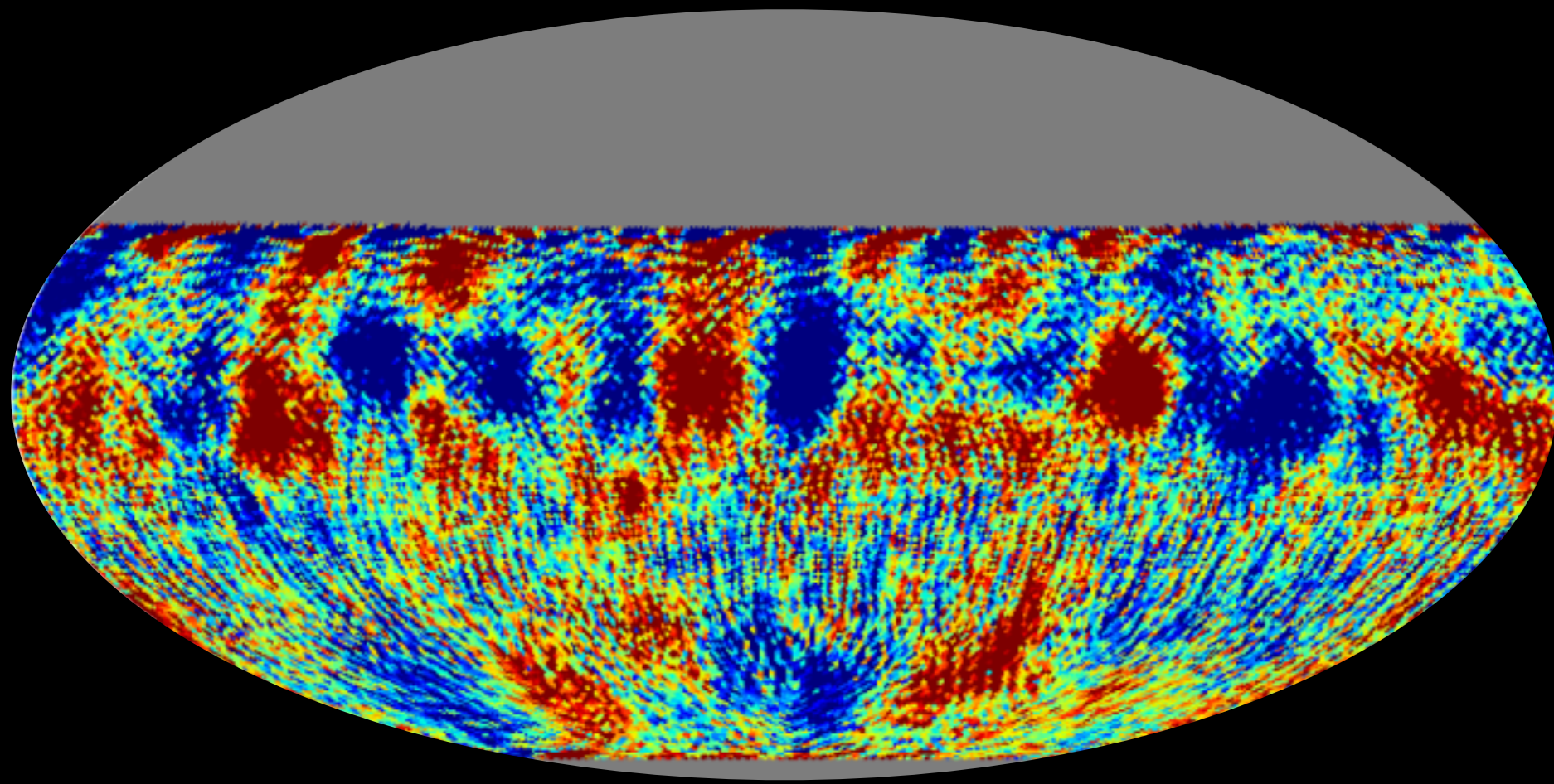
CLASS

Signal Modulation Example

1 Hz (~1 deg)

0.1 Hz (~10 deg)

<0.01 Hz (>100 deg)

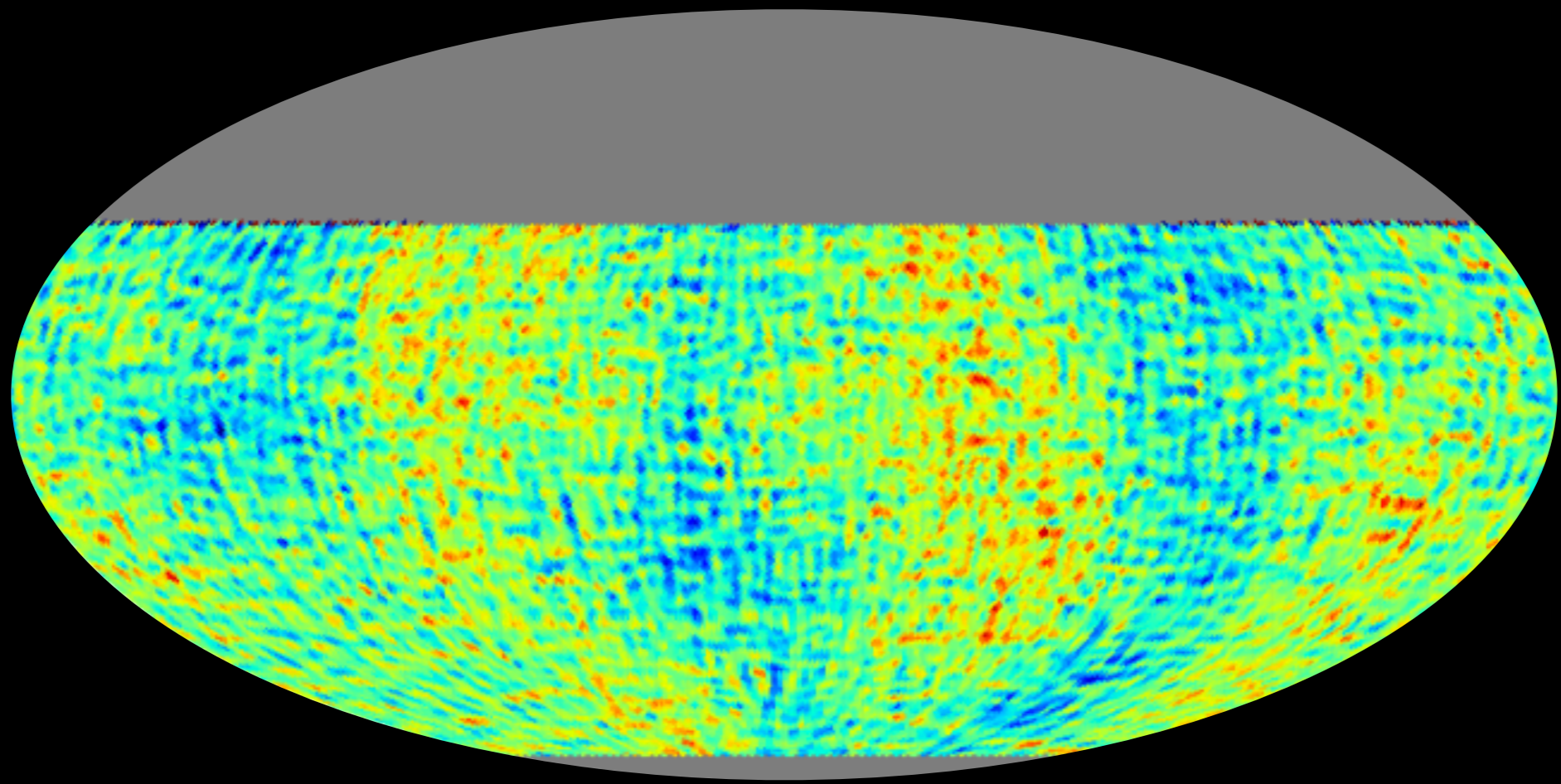


-1.5



+1.5

μK

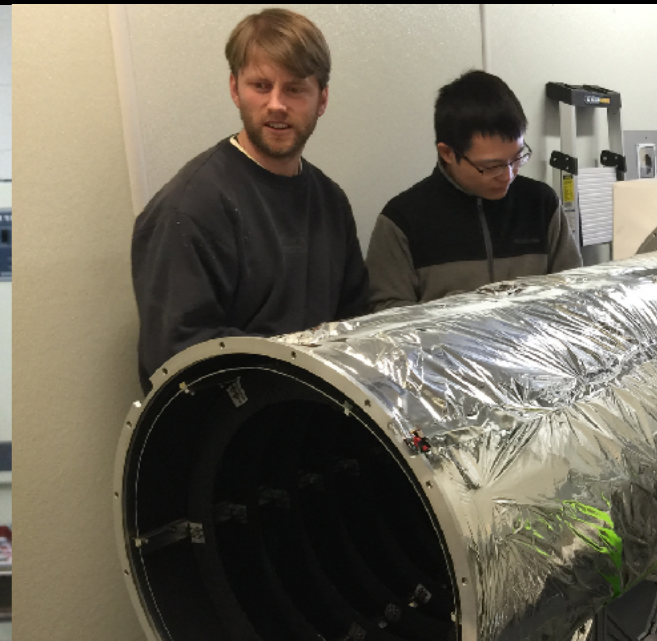
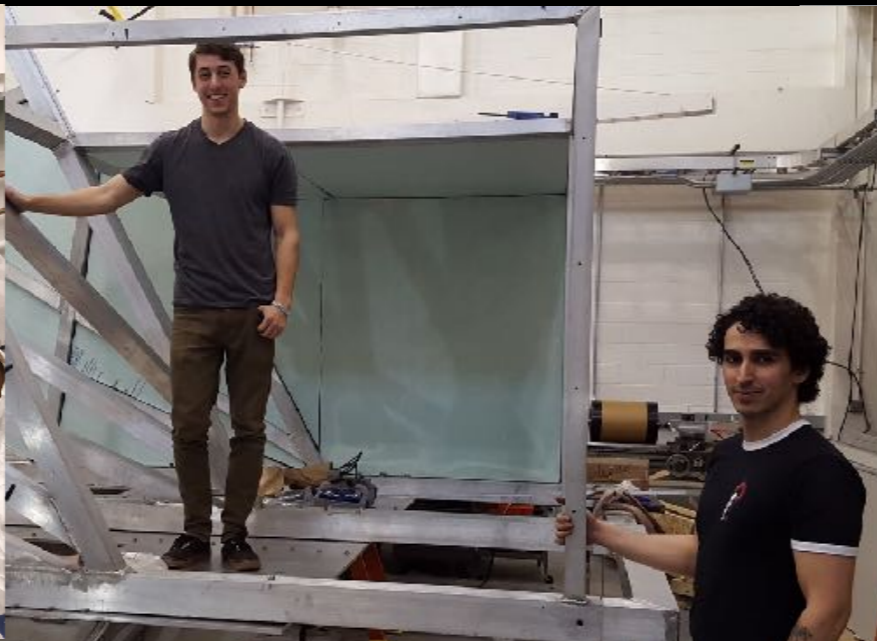


-1.5



+1.5

μK

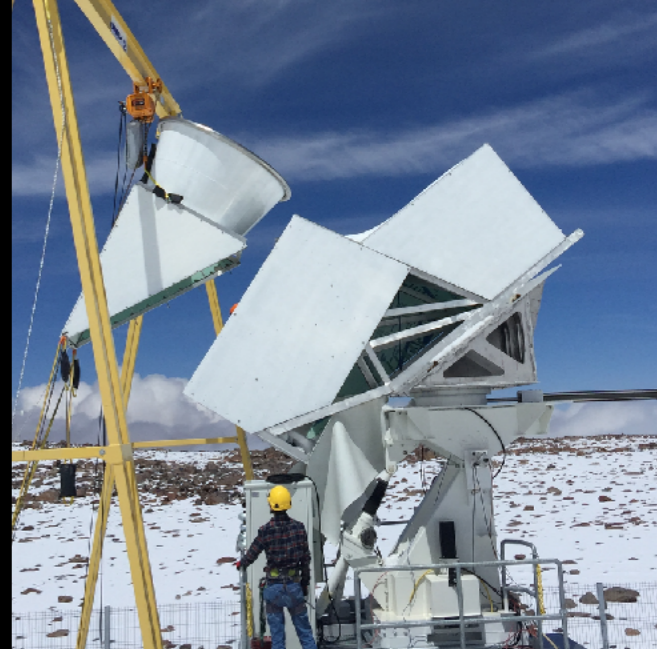


The CLASS Team is working hard!

2016: Survey Start

2018: First 90 GHz Telescope Observing

40 GHz papers in preparation



**See talks by
Katie Harrington
(Today)
and Joseph Eimer
(Wednesday)
for new results!**

