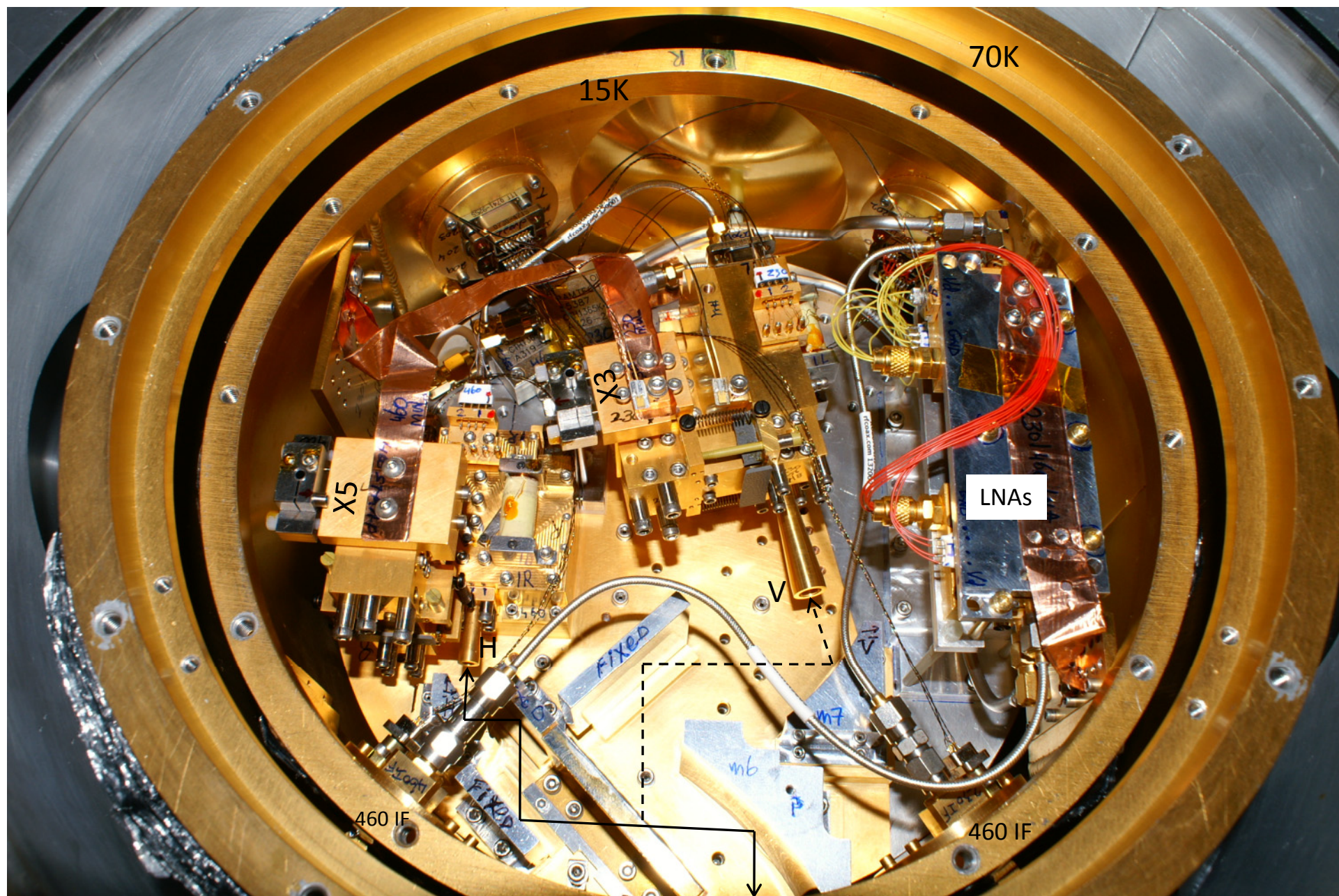
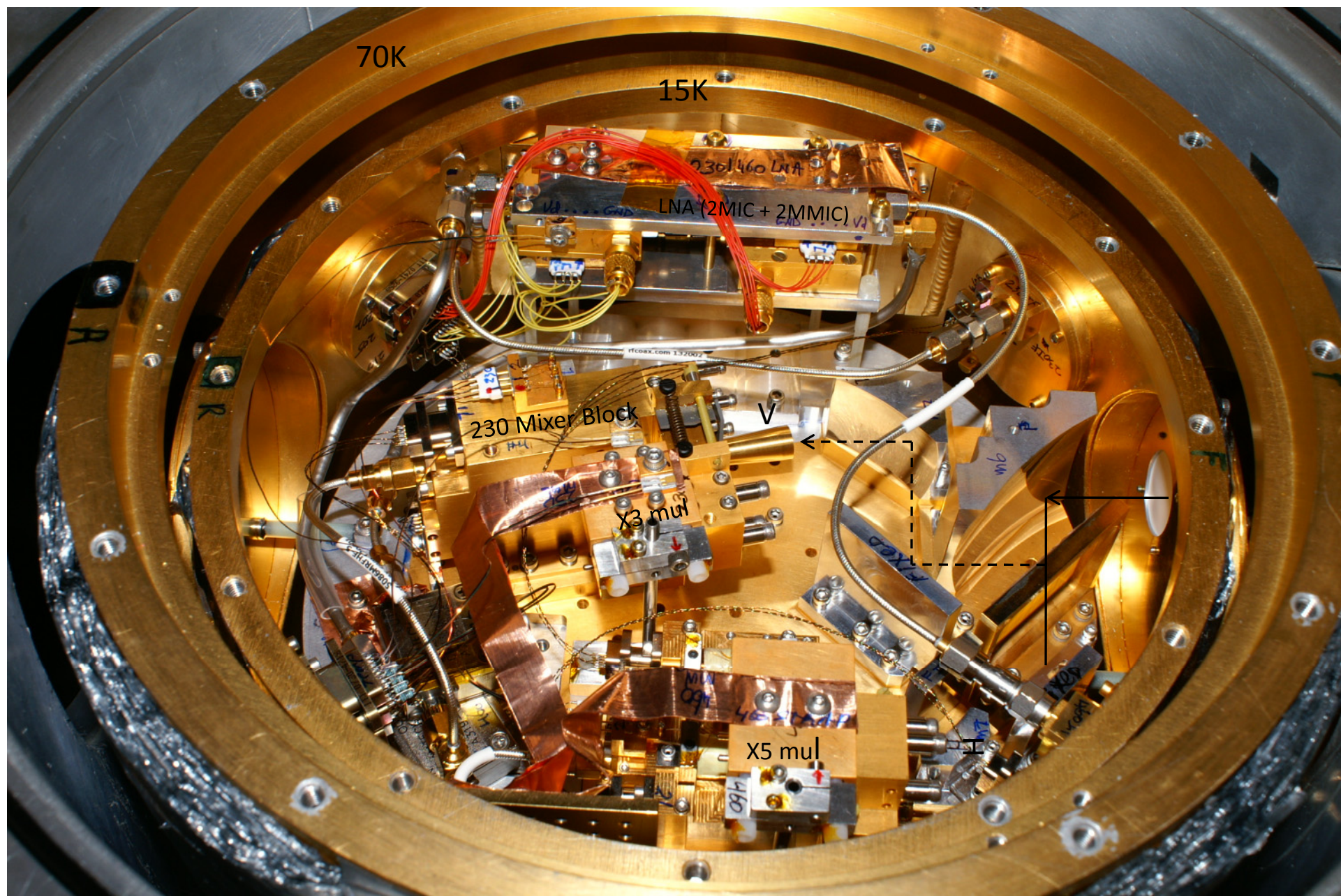


## Dual Color 230/460 FPU in Cryostat #2



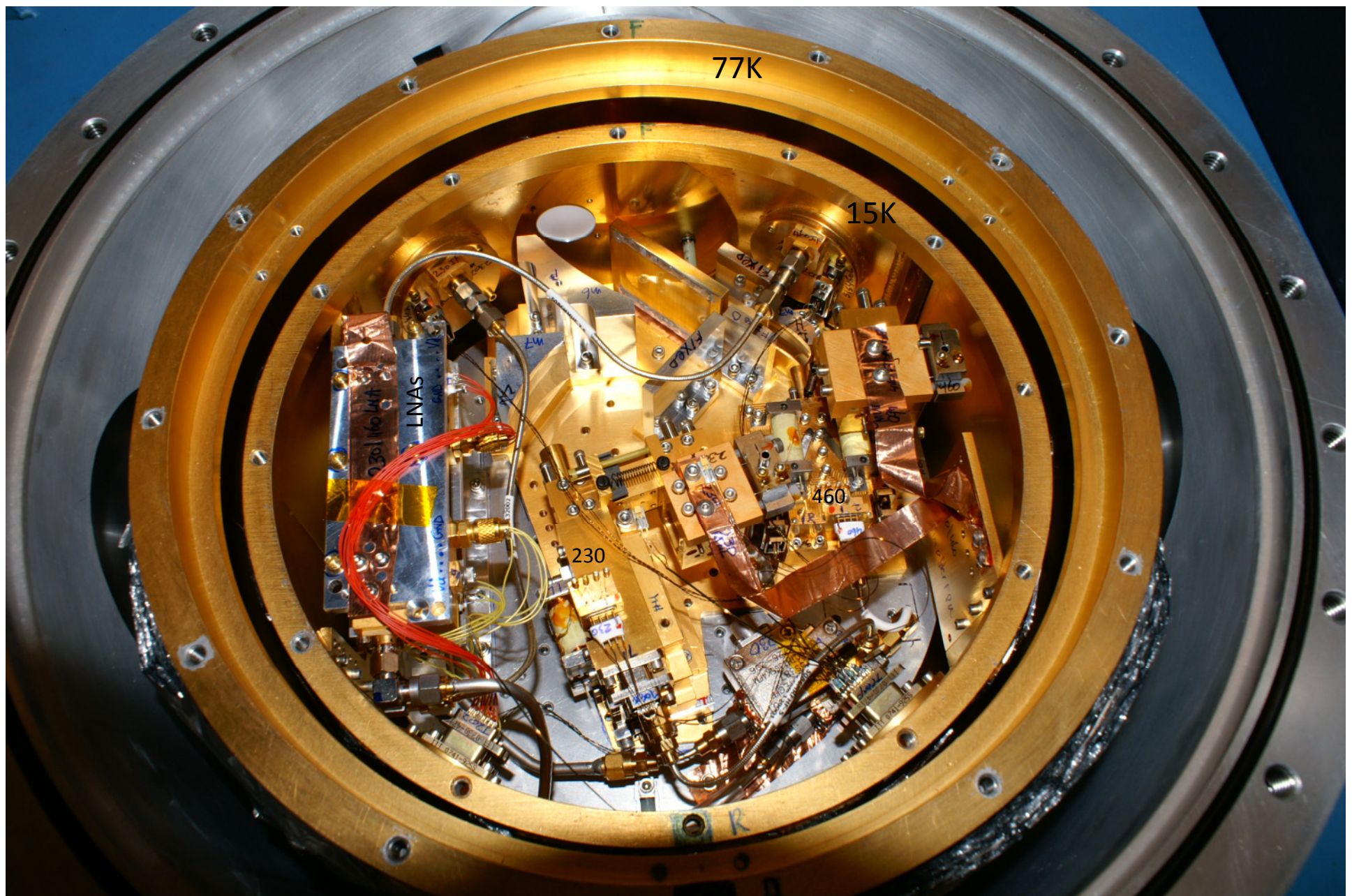


# Dual Color 230/460 FPU in Cryostat #2



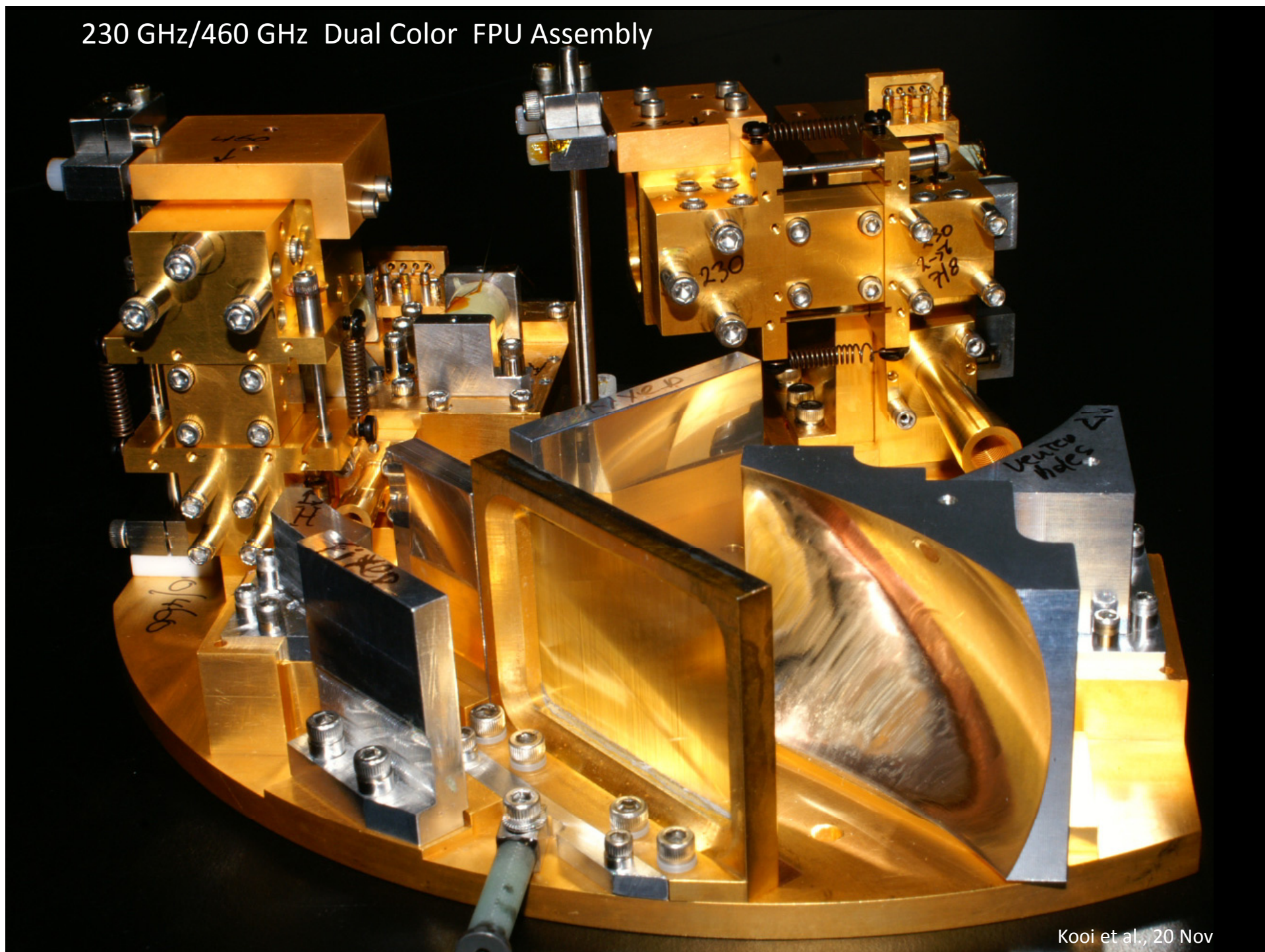


Dual Color 230/460 FPU in Cryostat #2

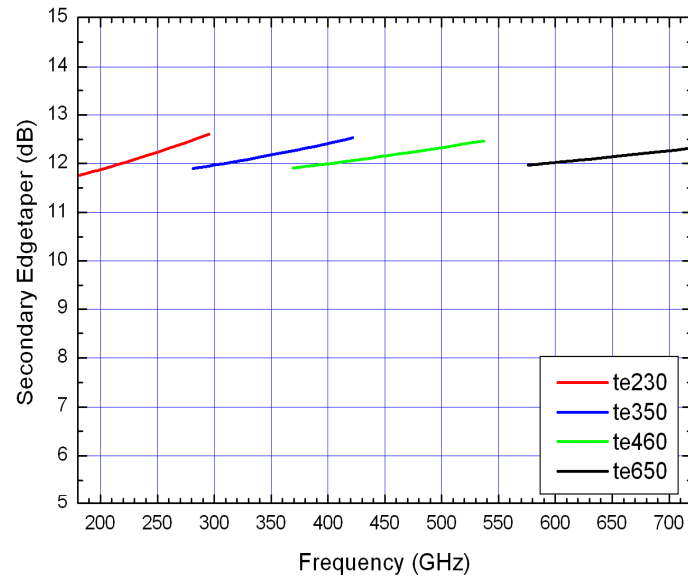




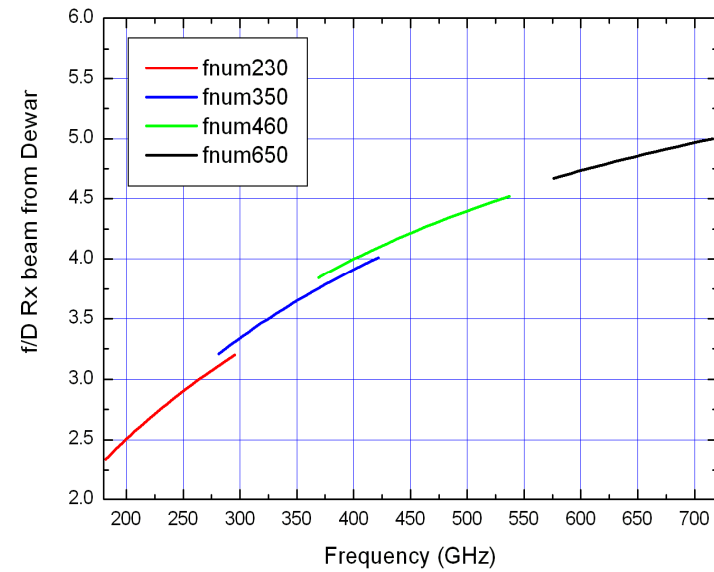
# 230 GHz/460 GHz Dual Color FPU Assembly



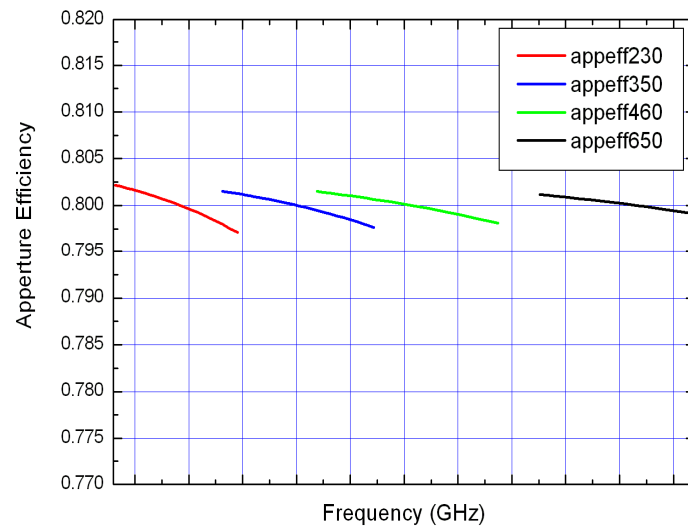
# CSO Sidecab Rx Design Parameters



Secondary edgetaper of the proposed sidecab optics configuration.



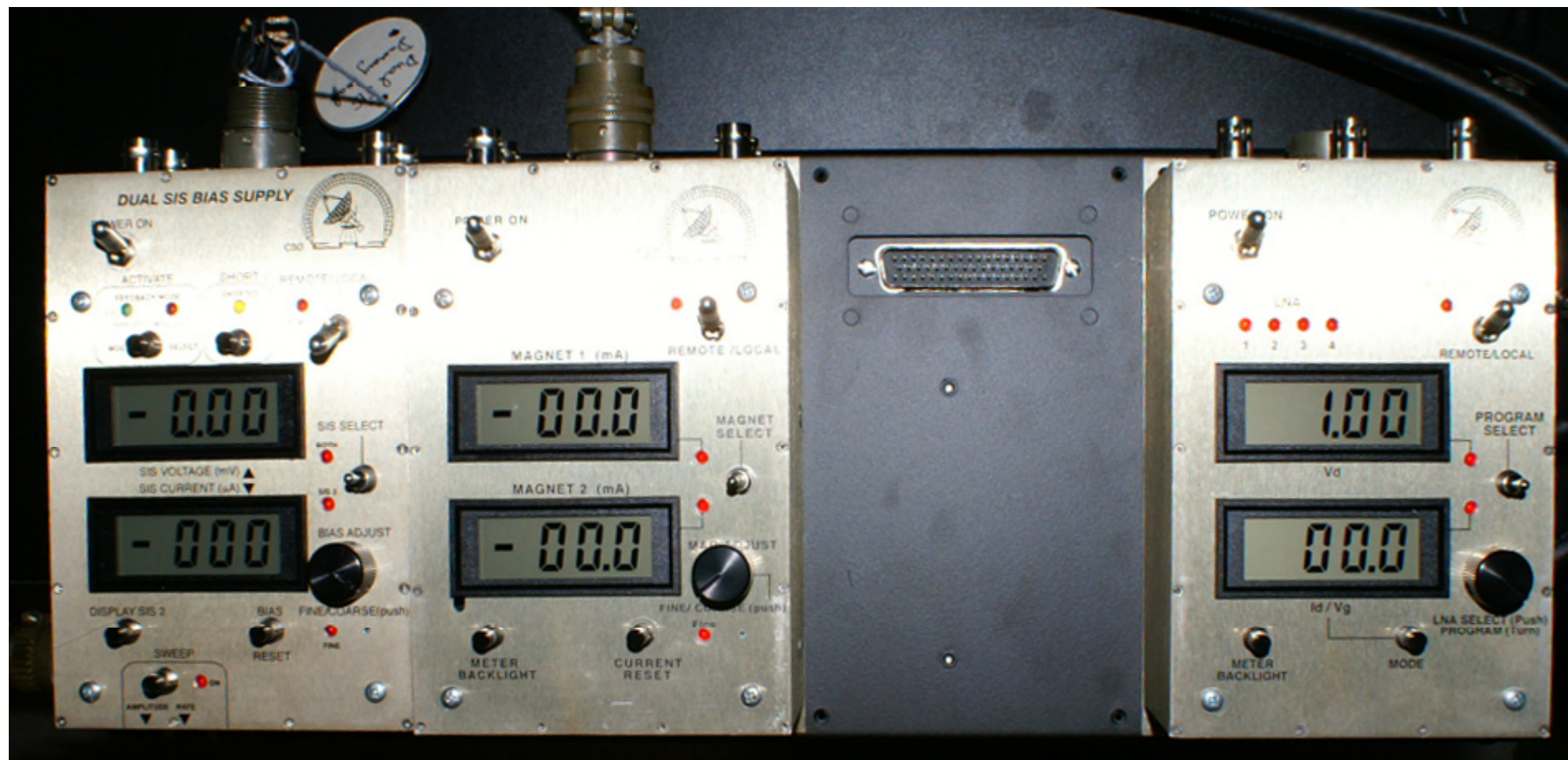
f/D ratio of the Receiver beams just outside the cryostat. Below 230 GHz, there will be some vignetting ( $\leq 1\%$ ) on the 5<sup>th</sup> mirror due to the fast beam



Aperture efficiency with a fixed 5<sup>th</sup> mirror – Cryostat focal distance



## Remote Programmable Bias Electronics



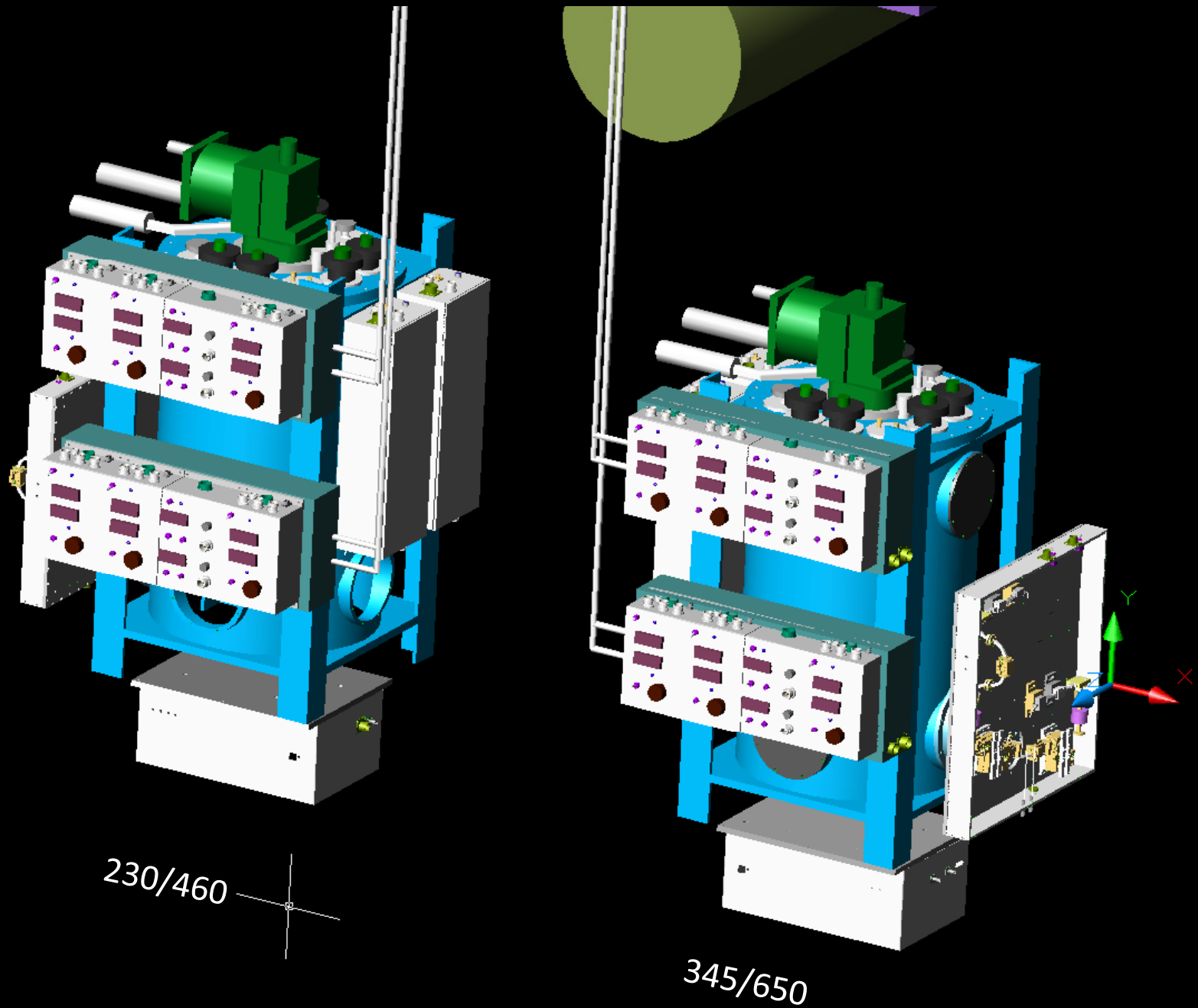
Dual SIS

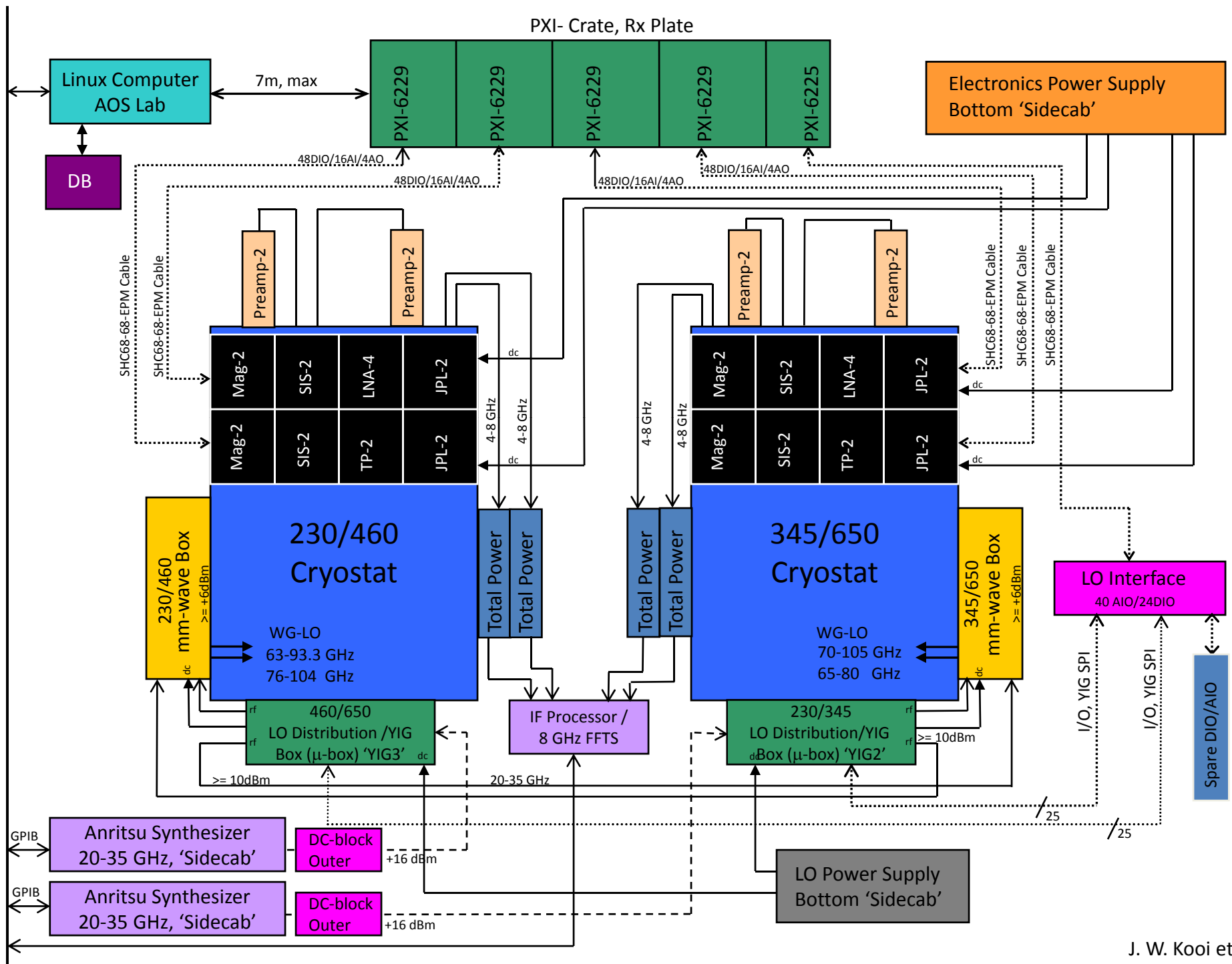
Dual Magnet

JPL PA  
(under design)

Quad LNA

# Sidecab layout with Synthesized 230/460 \* 345/650 Rx







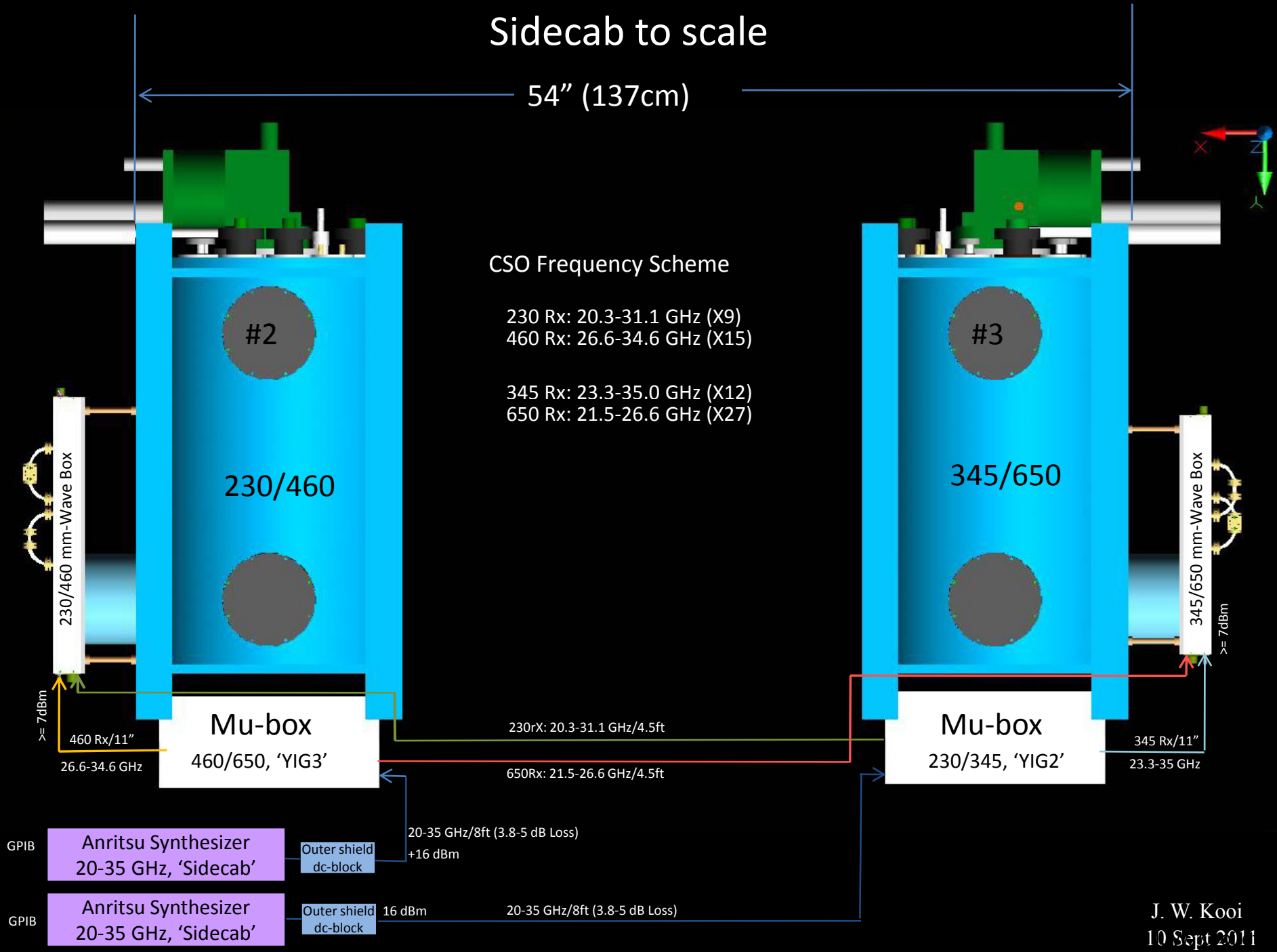
# Sidecab to scale

54" (137cm)

## CSO Frequency Scheme

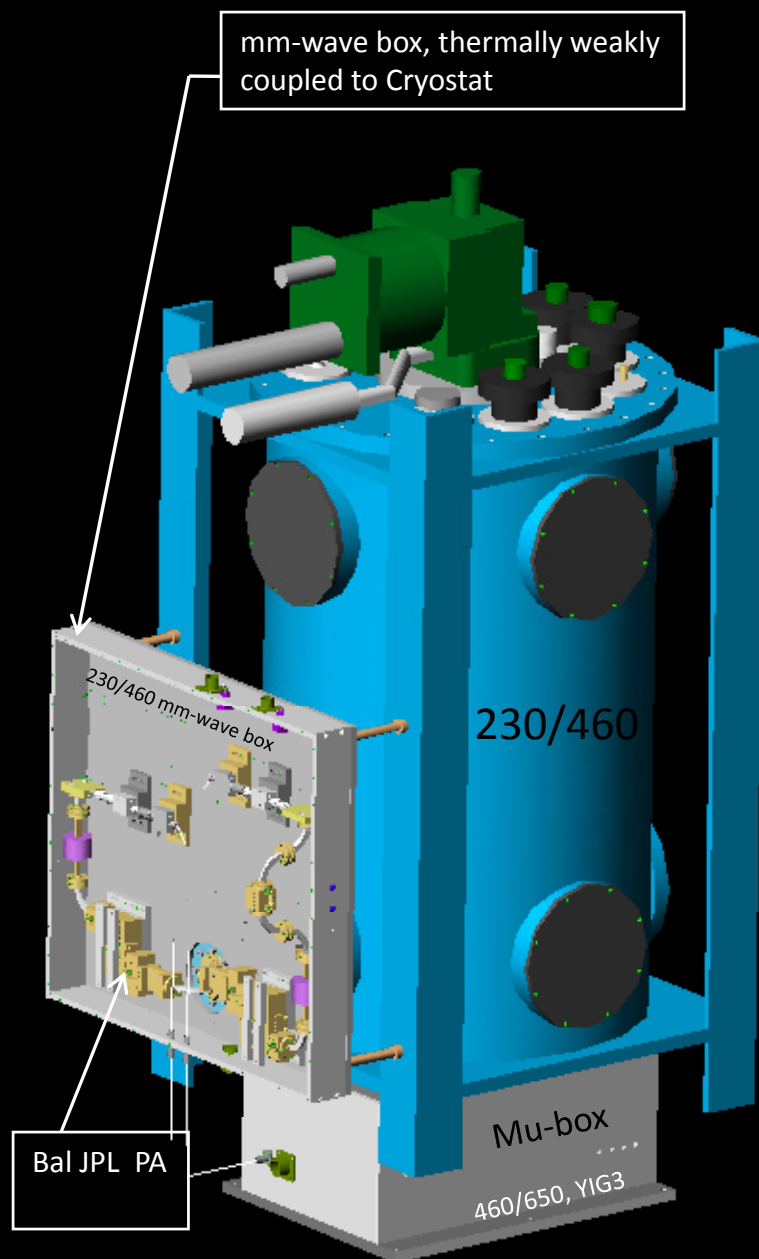
230 Rx: 20.3-31.1 GHz (X9)  
460 Rx: 26.6-34.6 GHz (X15)

345 Rx: 23.3-35.0 GHz (X12)  
650 Rx: 21.5-26.6 GHz (X27)

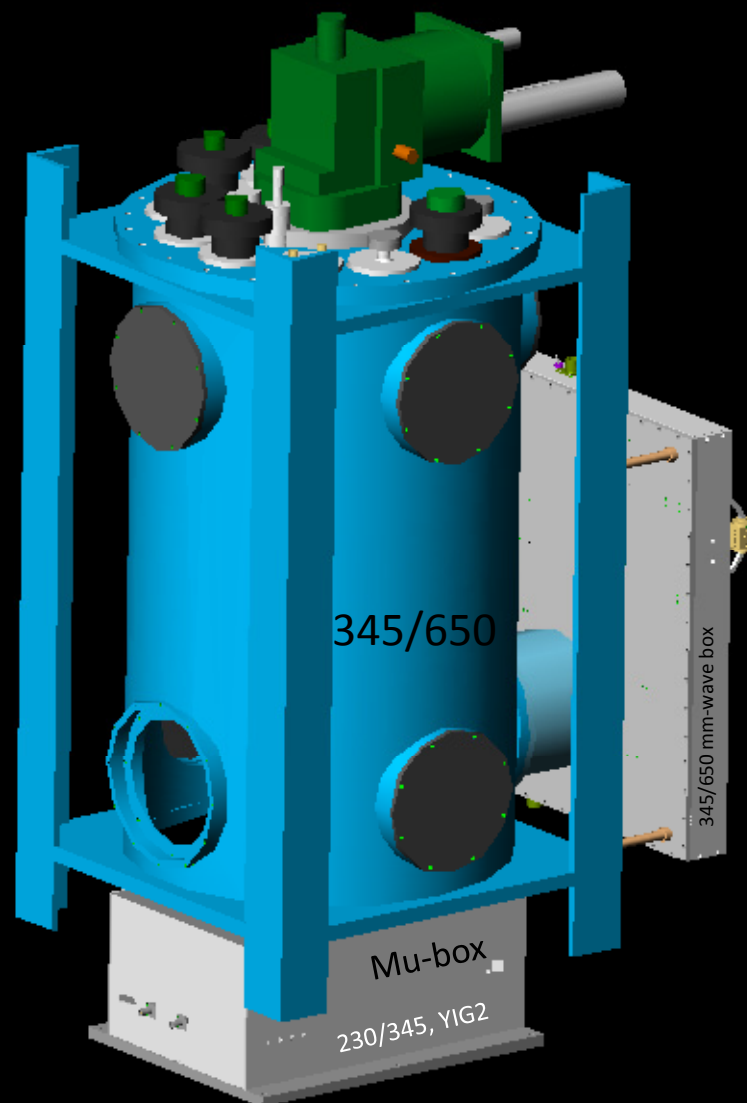


Optical beam  
(from M4)

mm-wave box, thermally weakly  
coupled to Cryostat

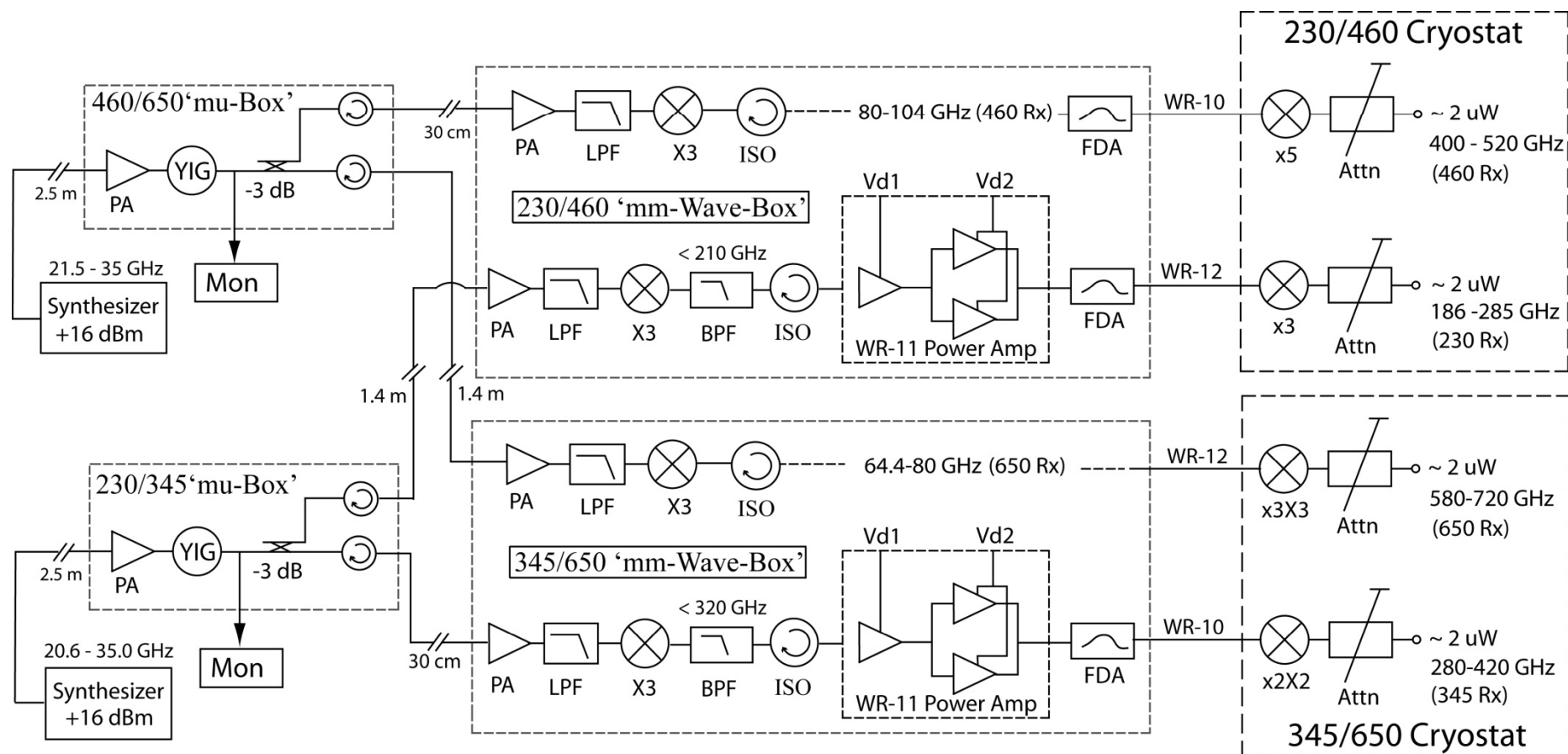


M5





## Synthesized LO layout

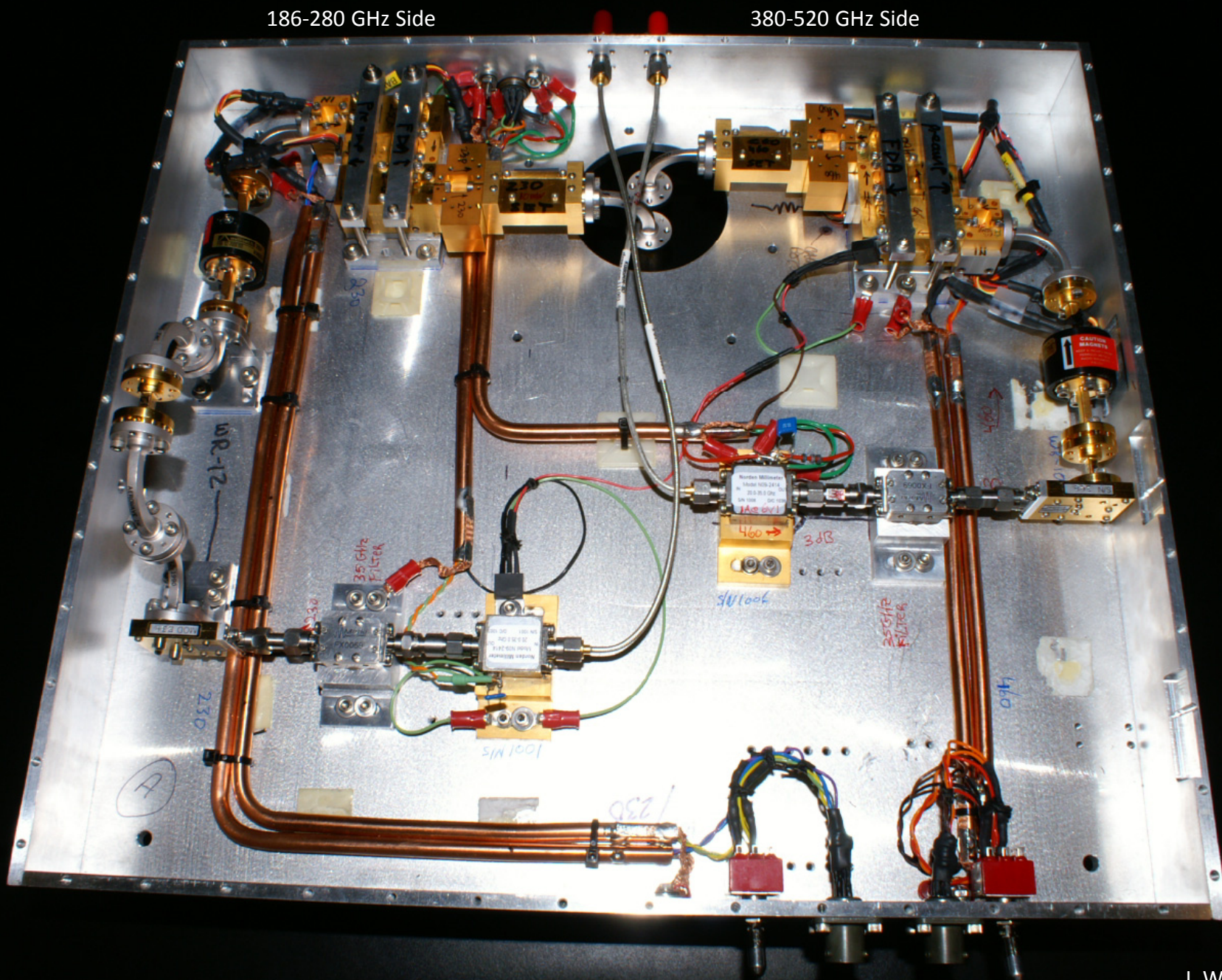


CSO dual-frequency synthesized local oscillator layout. At the input of the mu-Box the baseband frequency of 20.6-35.0 GHz (Ka-band) is amplified and drives the medium power amplifier into saturation. The LO signal is filtered by the YIG to remove low level spurious and harmonic content, passively multiplied (X3) to 63.5-105 GHz, once again amplified (WR-11 waveguide power amplifiers), signal conditioned (FDA), and finally injected into the cryostat where the carrier signal is multiplied up to the final submillimeter frequency (186-720 GHz) and injected into the balanced mixers via a cooled attenuator. Spectral line observations below 186 GHz will need to be in the mixer lower side band.

# Synthesized LO 230/460 mmWave Box

186-280 GHz Side

380-520 GHz Side





# Synthesized LO 20-35 GHz 'Mu-Box'

