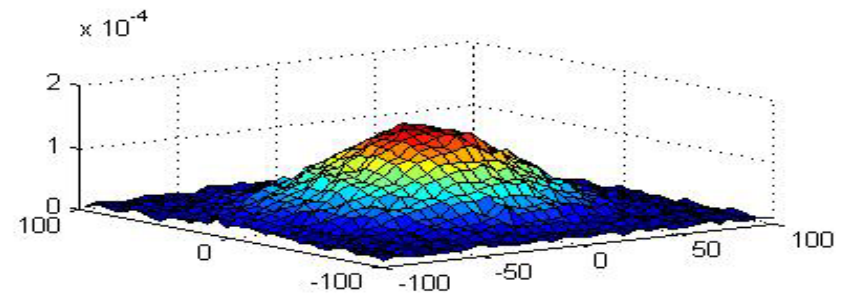
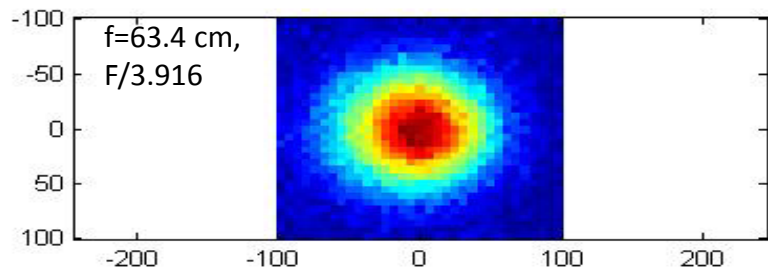
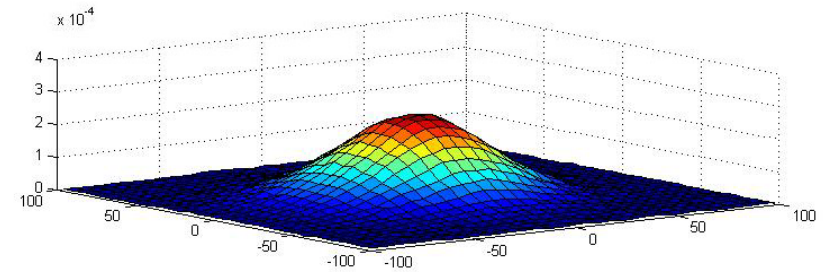
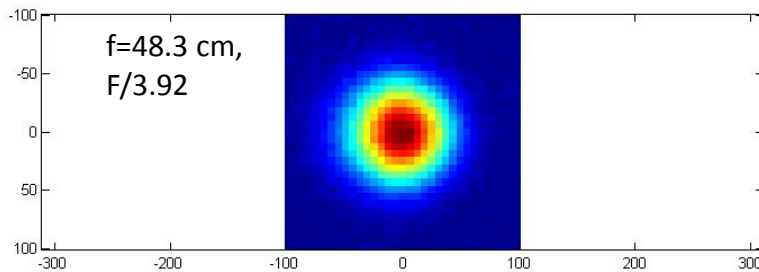
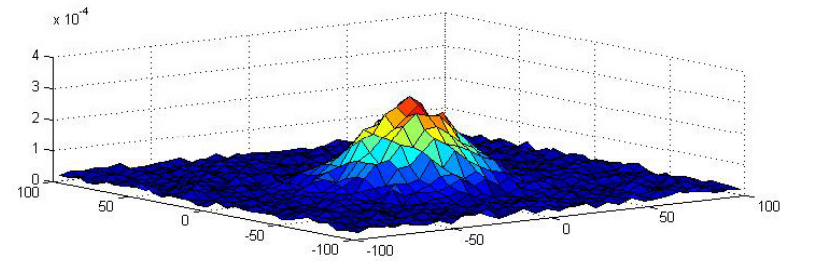
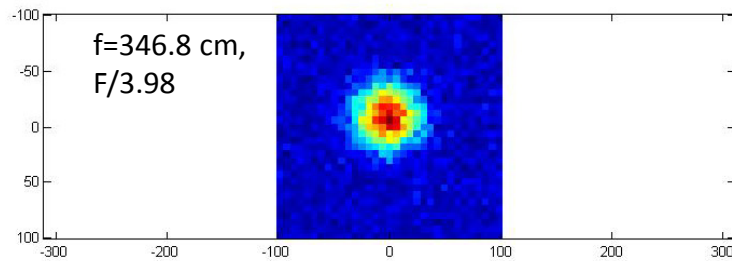
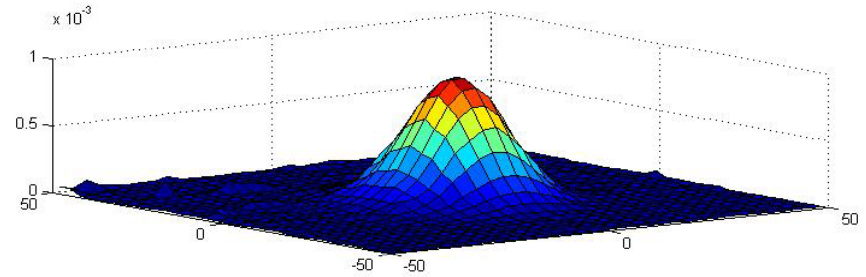
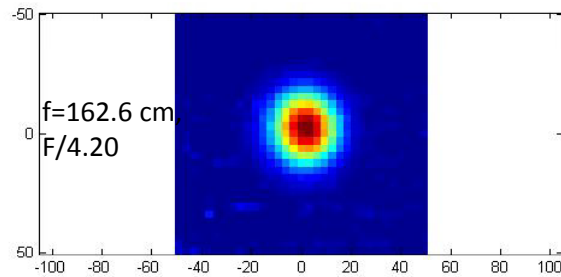


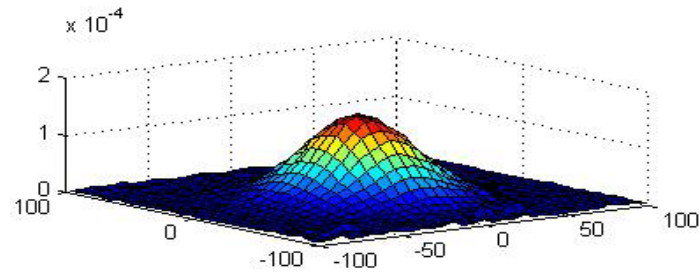
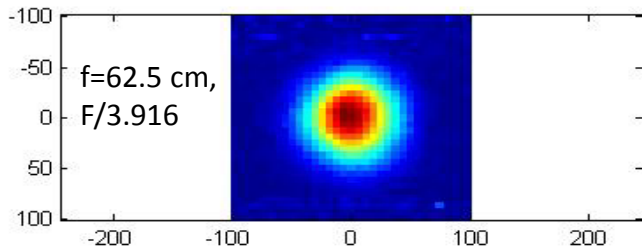
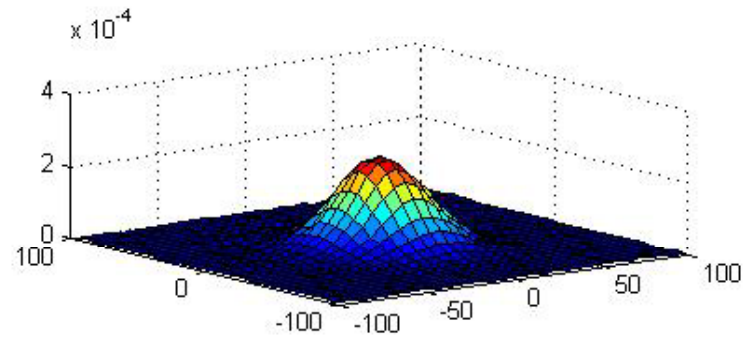
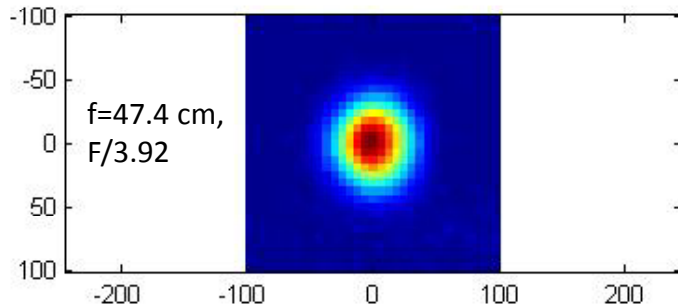
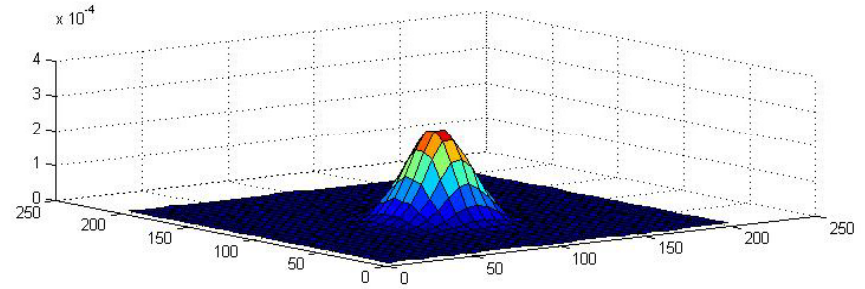
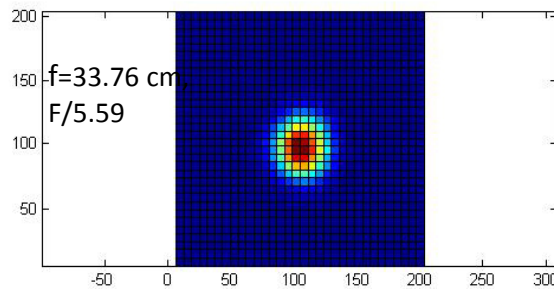
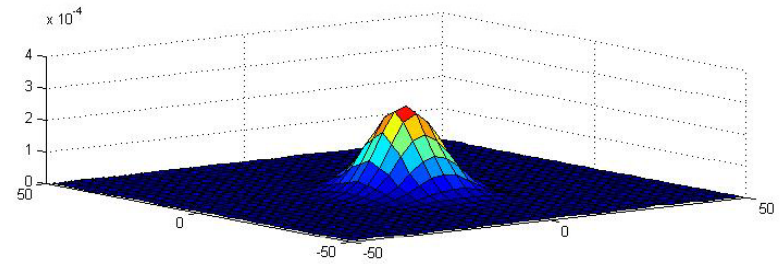
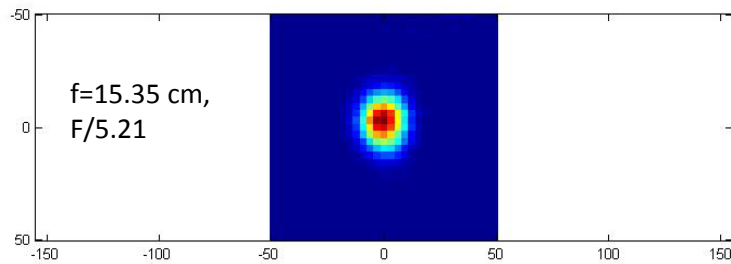
345 Mixer Beam Measurements (Direct detection mode) at 4 distances Cryostat

$$\langle f/D \rangle = 3.951 \pm 0.031 \text{ (Design: F3/3 – F/4.0)}$$

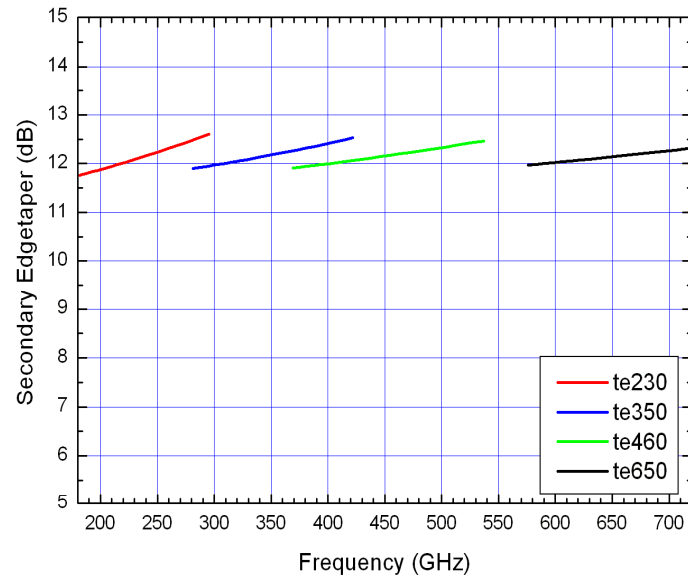


650 Mixer Beam Measurements (Direct detection mode) at 4 distances Cryostat

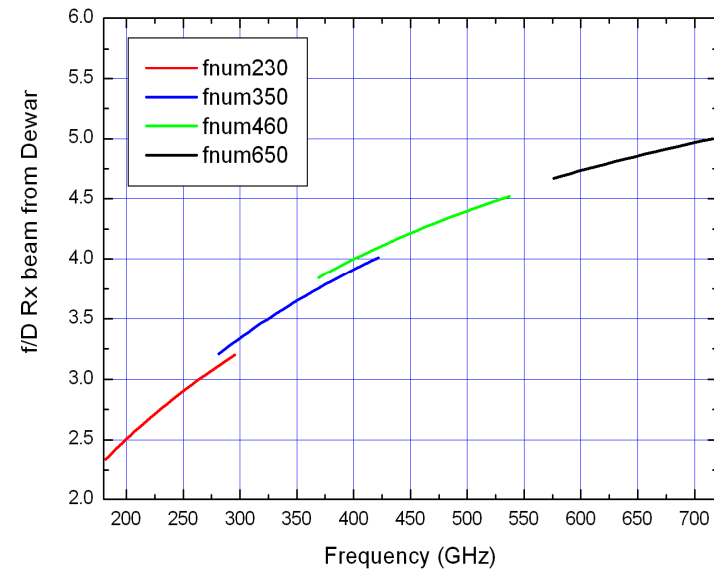
$$\langle f/D \rangle = 5.41 \pm 0.159 \text{ (Design: } F/4.7 - F/5.0)$$



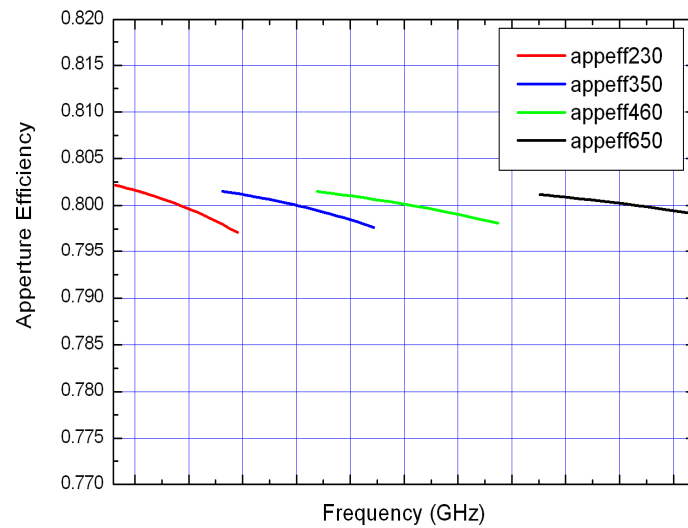
CSO Sidecab Rx Design Parameters



Secondary edgetaper of the proposed sidecab optics configuration.

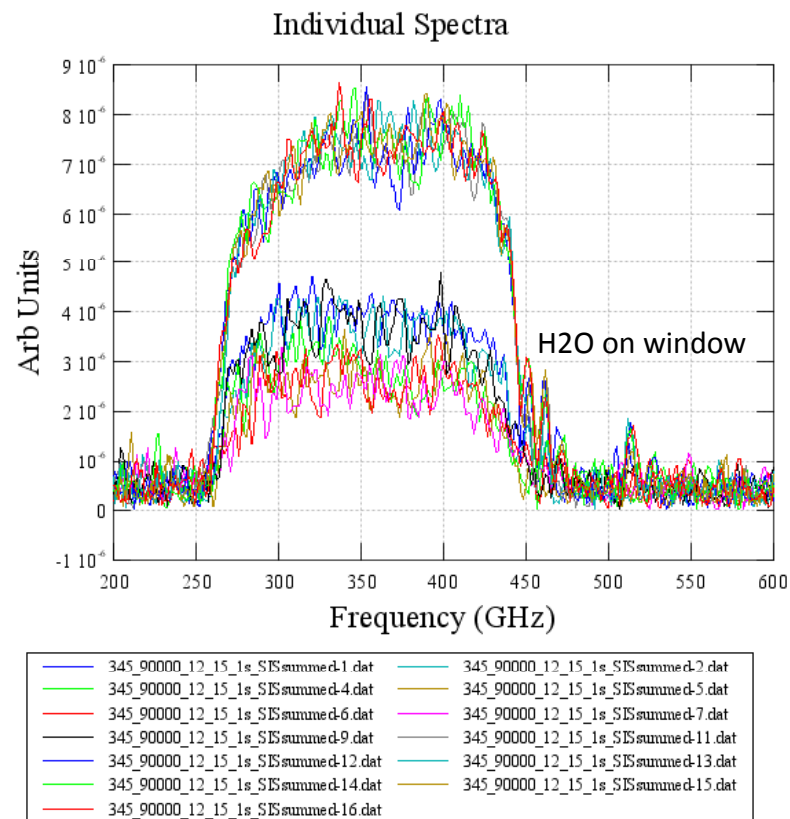
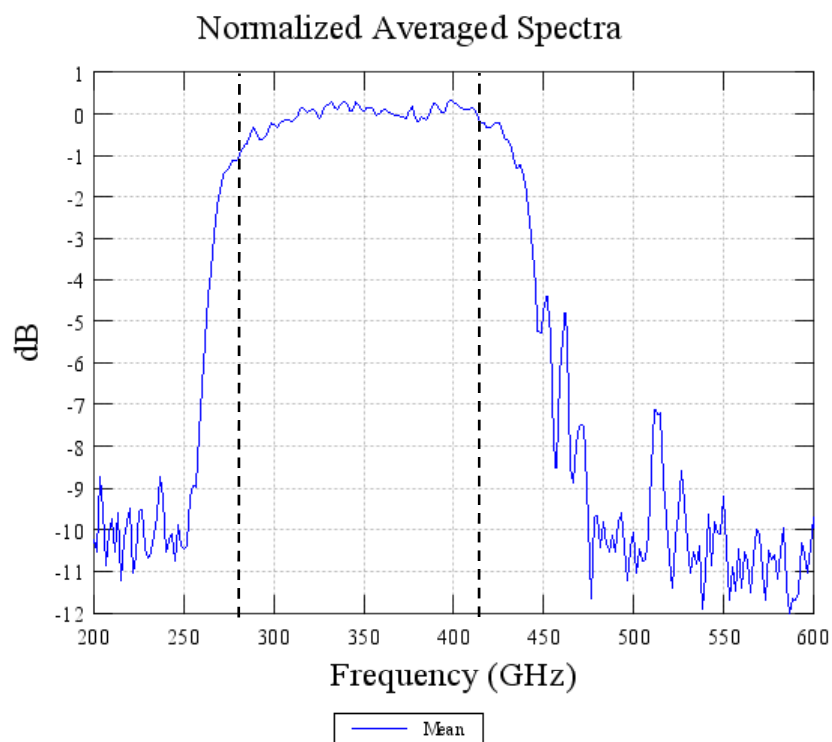


f/D ratio of the Receiver beams just outside the cryostat. Below 230 GHz, there will be some vignetting ($\leq 1\%$) on the 5th mirror due the fast beam



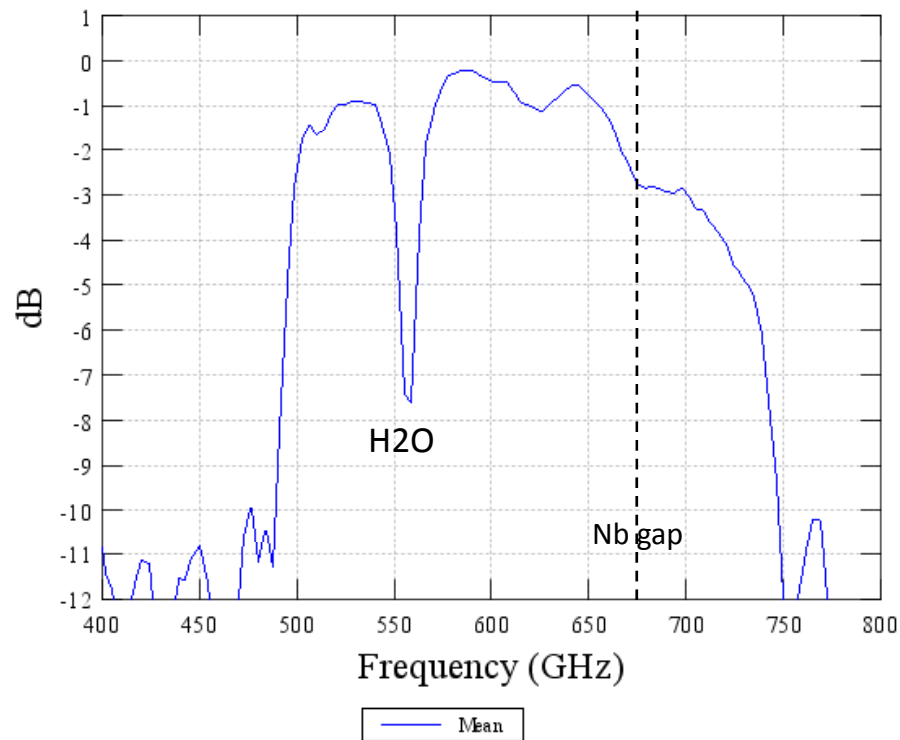
Aperture efficiency with a fixed 5th mirror – Cryostat focal distance

280-420 GHz Balanced Mixer FTS measurements

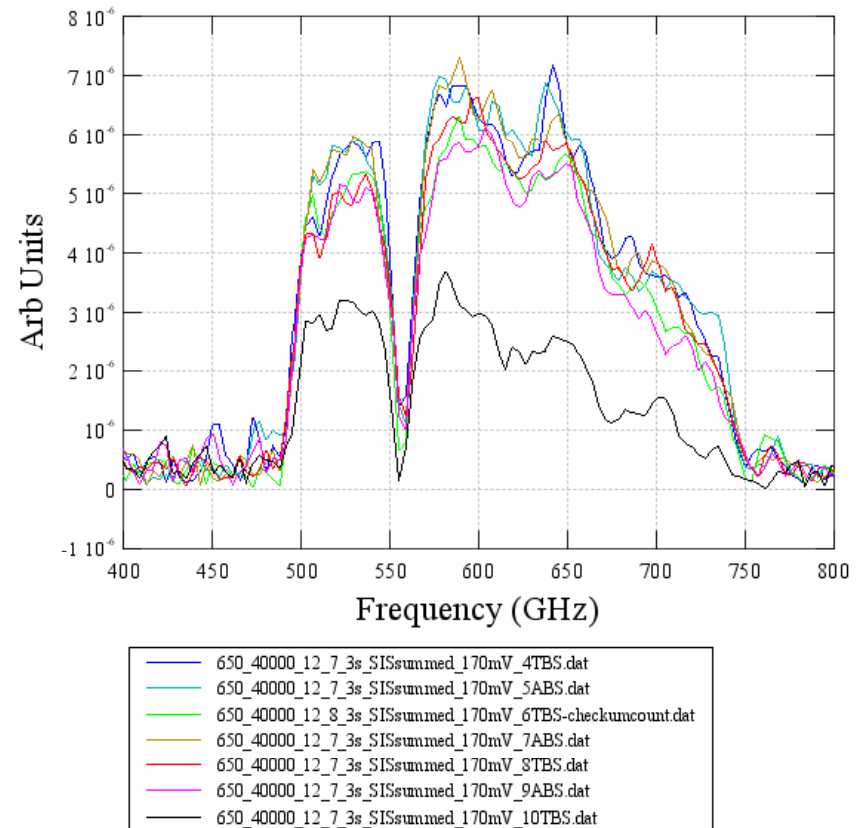


570-730 GHz Balanced Mixer FTS measurements

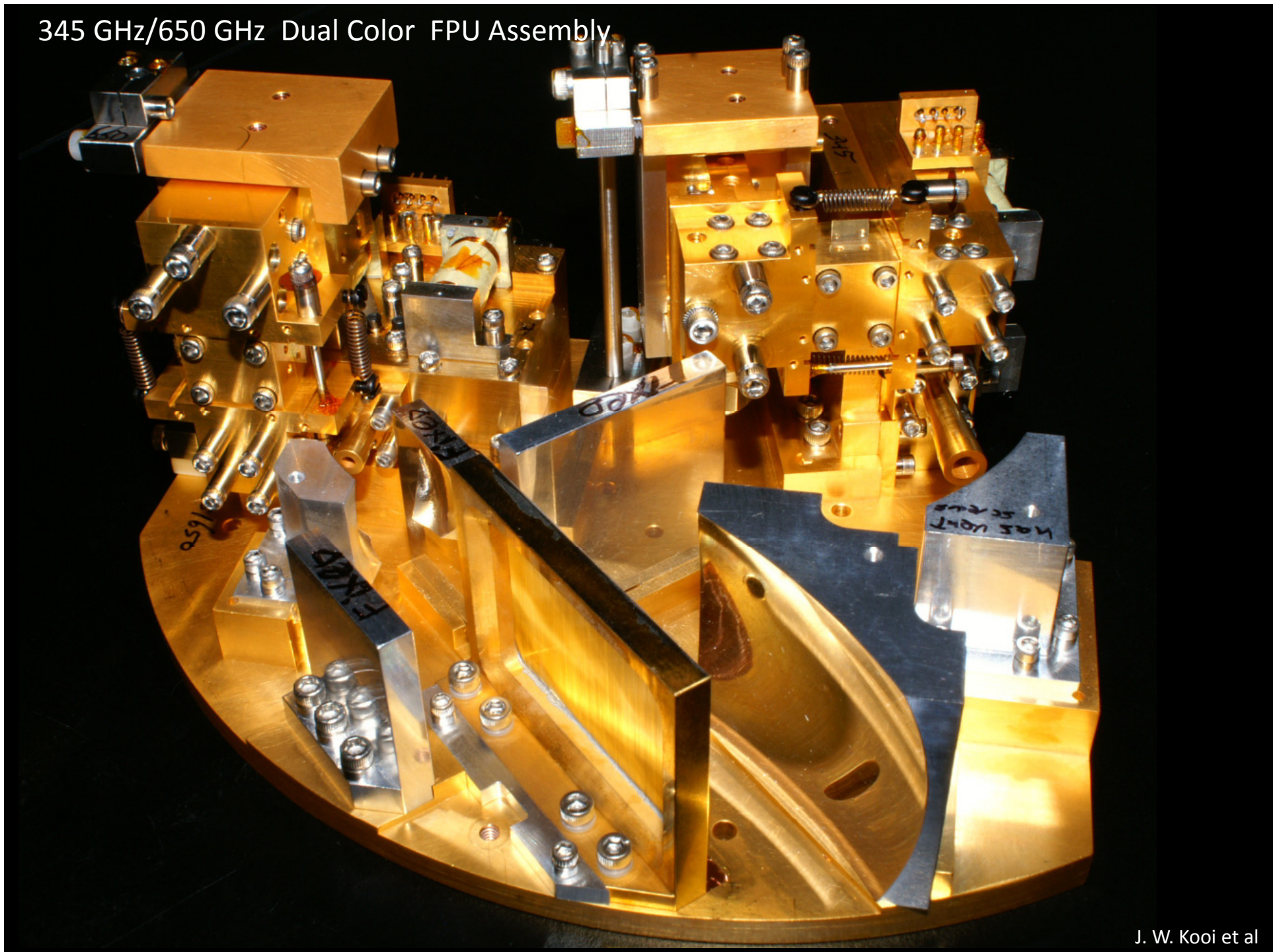
Normalized Averaged Spectra



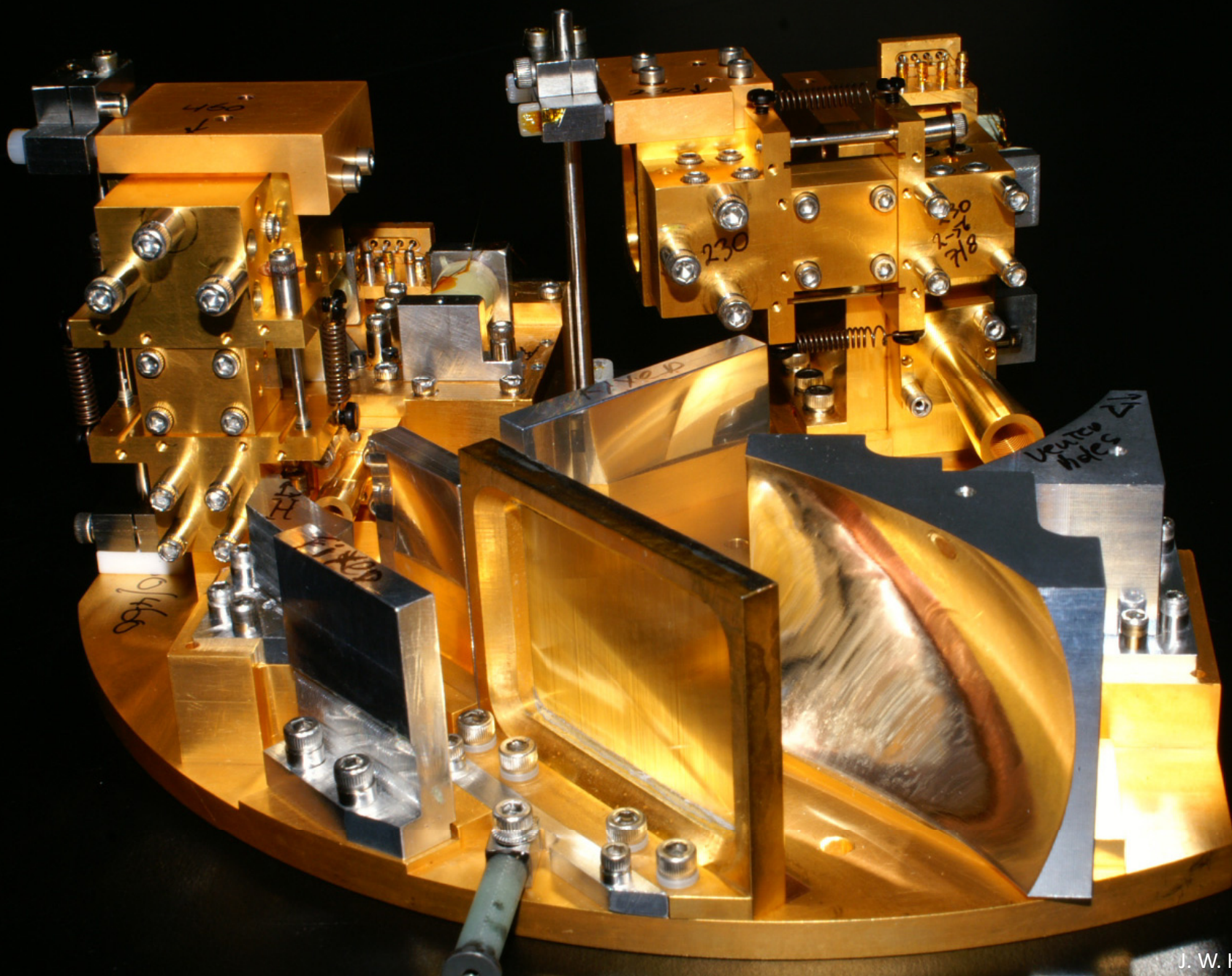
Individual Spectra



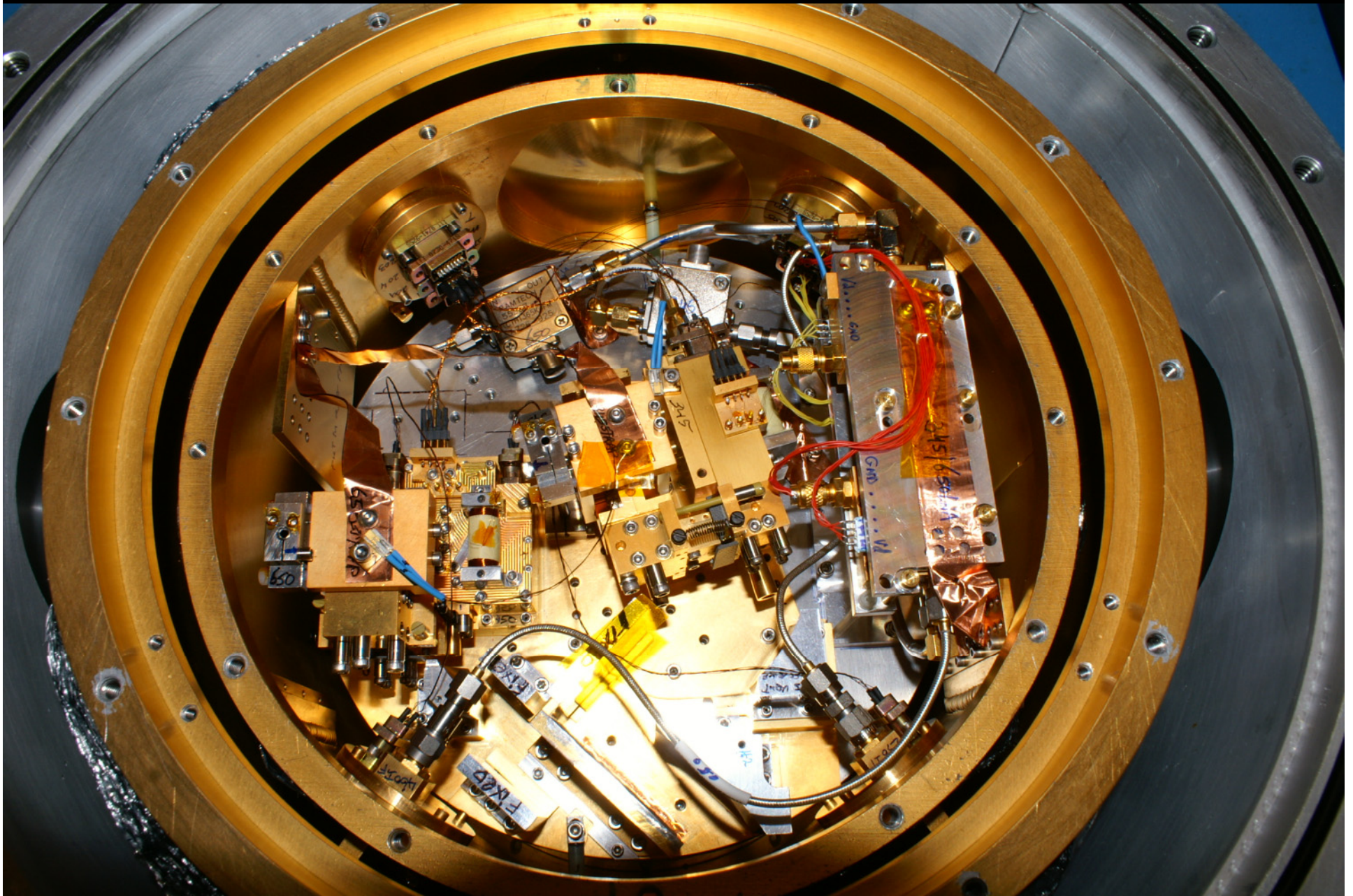
345 GHz/650 GHz Dual Color FPU Assembly



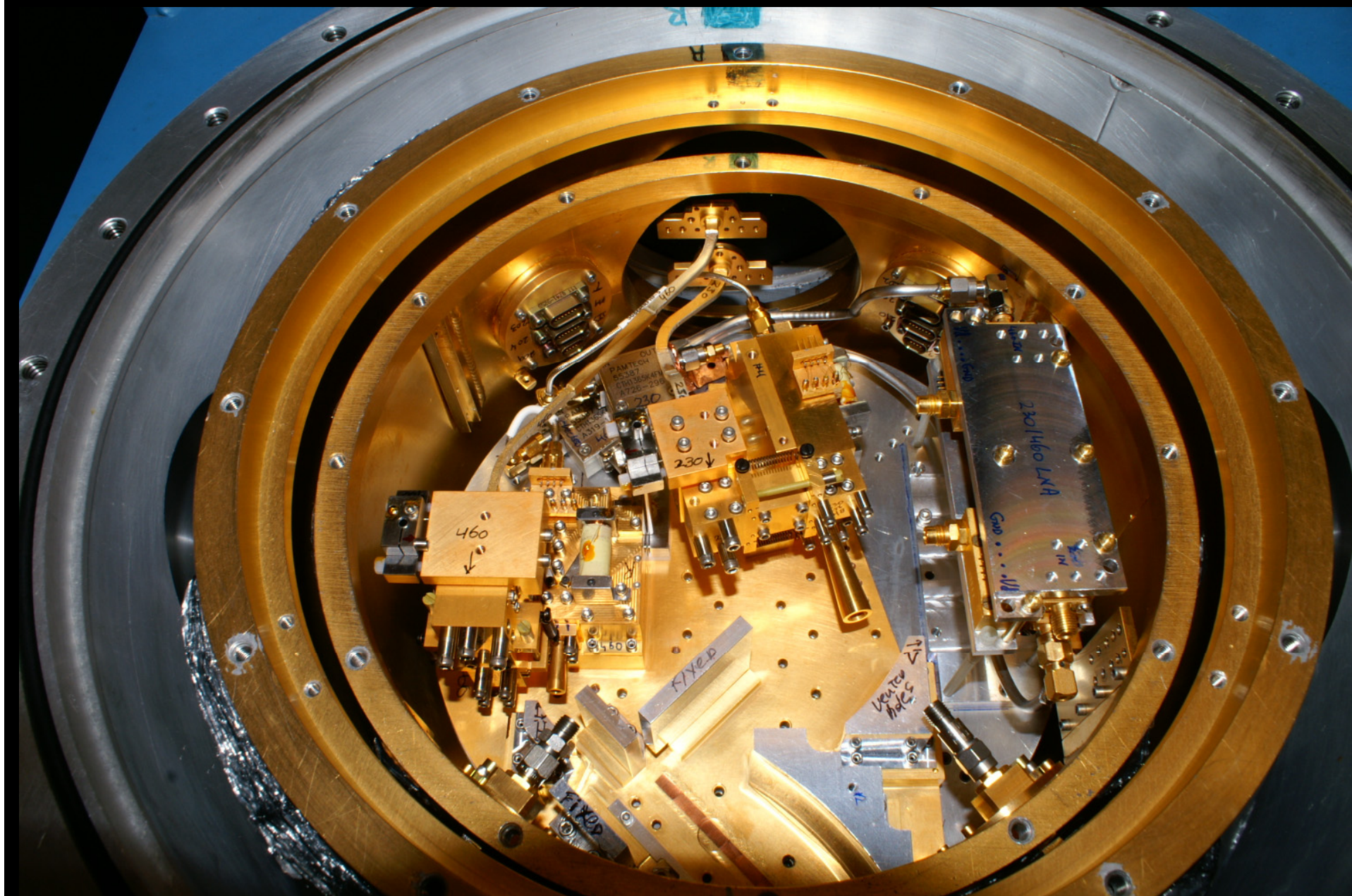
230 GHz/460 GHz Dual Color FPU Assembly



345/650 Balanced Mixers, Optics, LNA in Cryostat



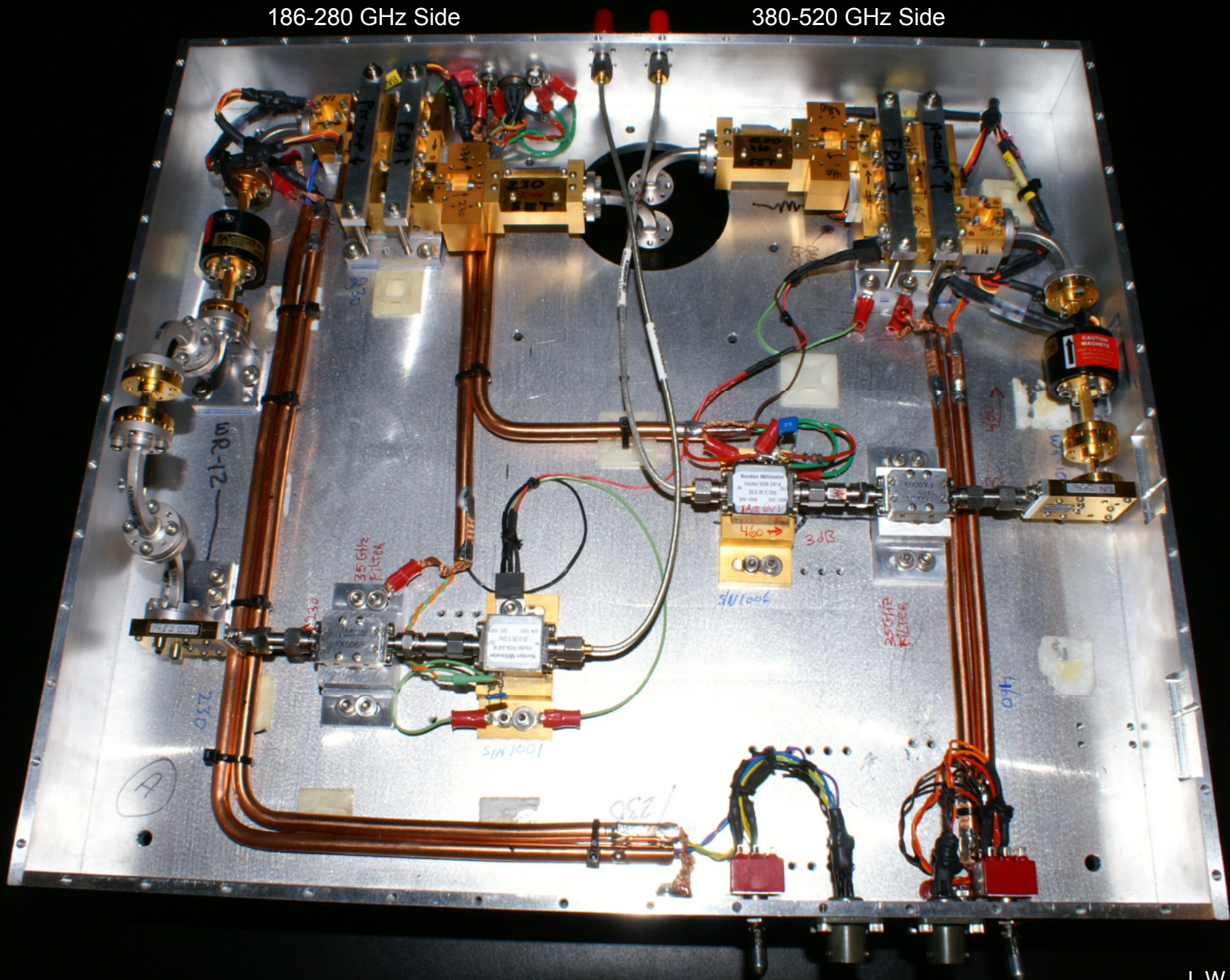
230/460 Balanced Mixers, Optics, LNA, LO-Waveguide in Cryostat



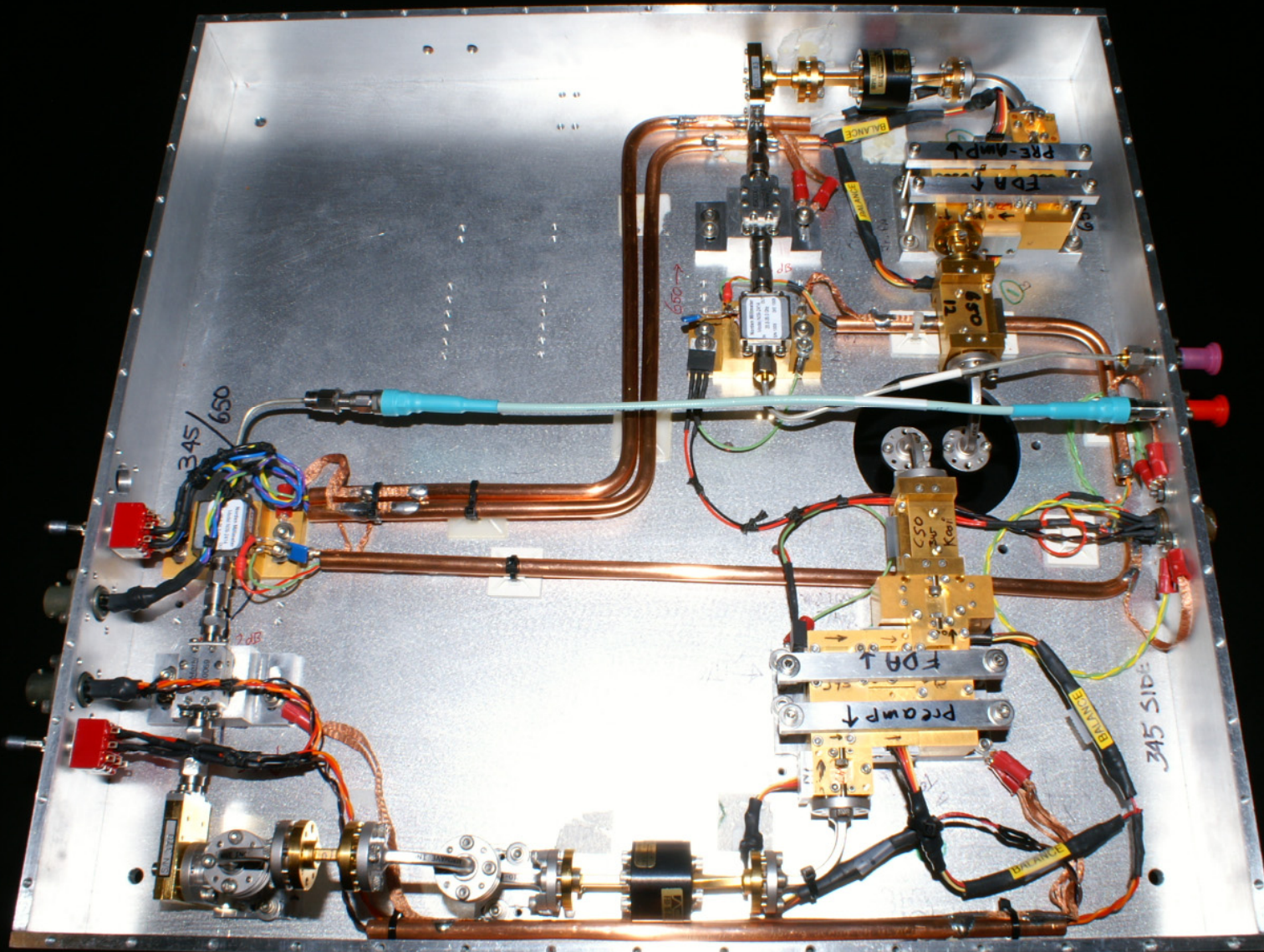
Synthesized LO 230/460 mmWave Box

186-280 GHz Side

380-520 GHz Side

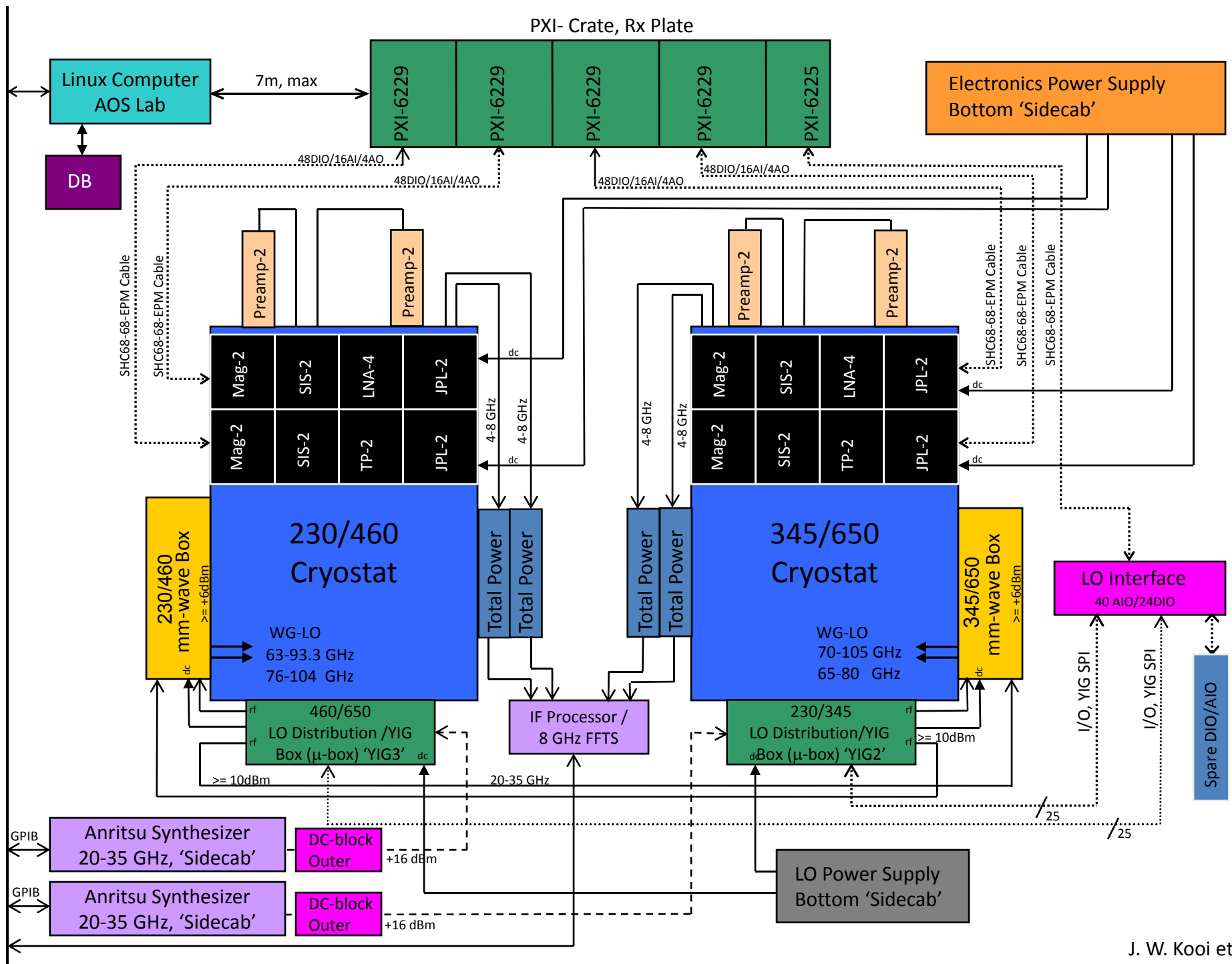


Synthesized LO 345/650 mmWave Box



Synthesized LO 20-35 GHz 'Mu-Box'





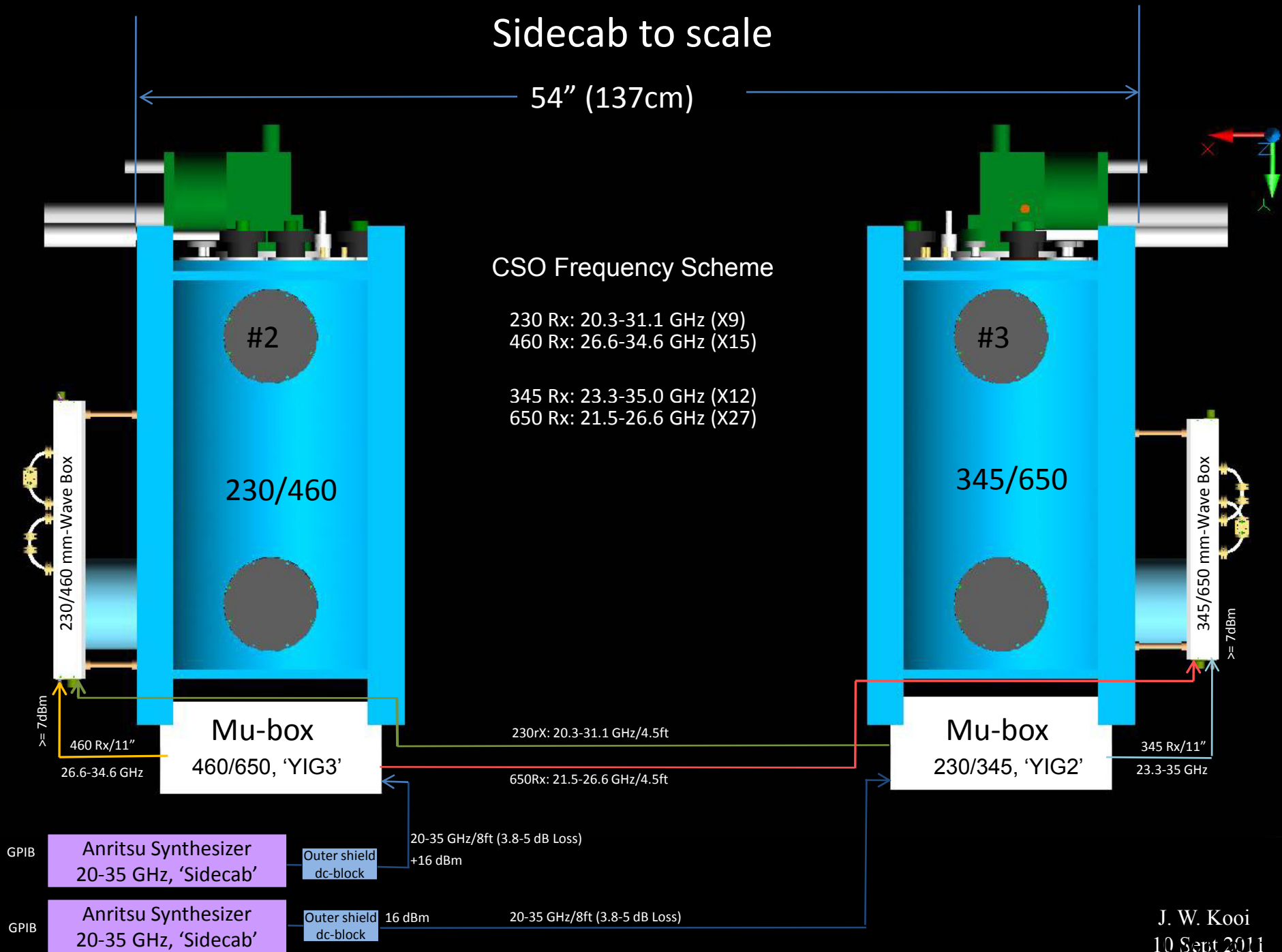
Sidecab to scale

54" (137cm)

CSO Frequency Scheme

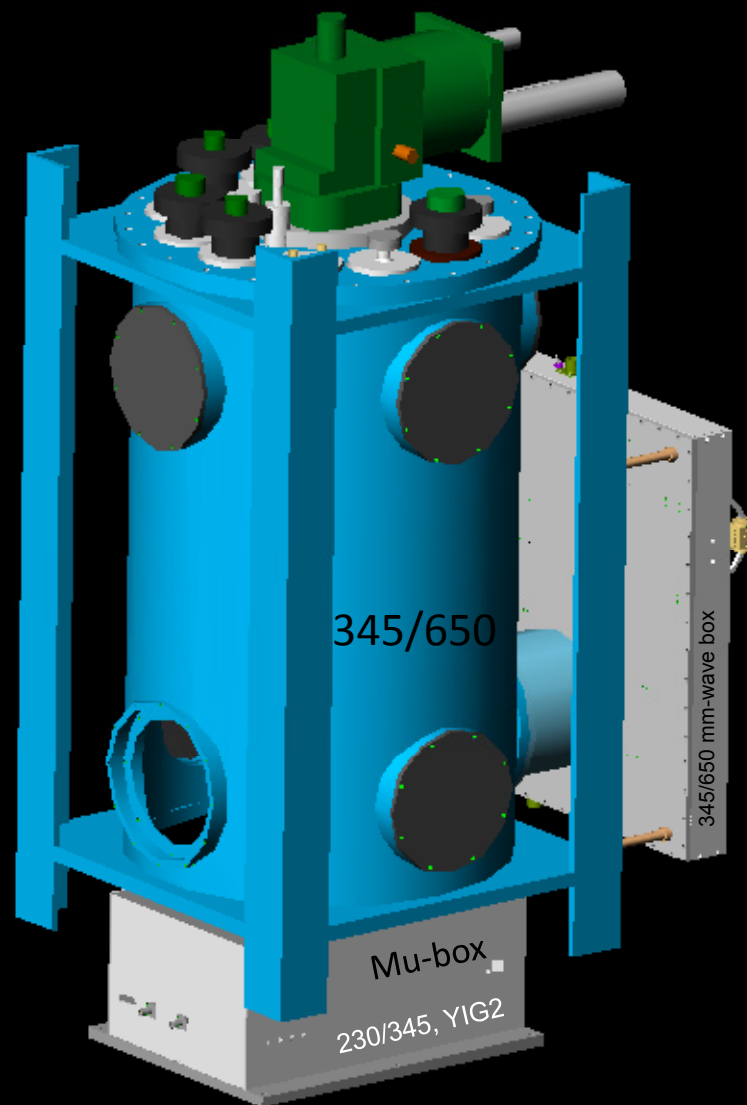
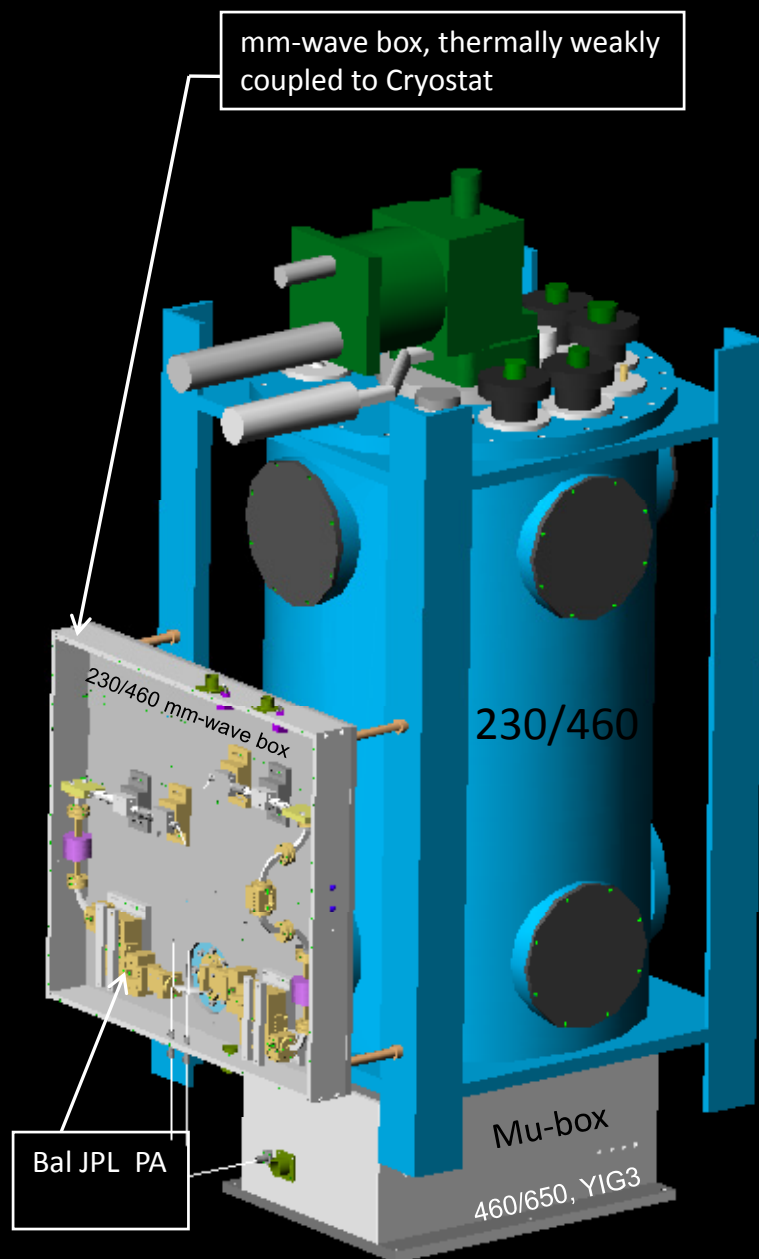
230 Rx: 20.3-31.1 GHz (X9)
460 Rx: 26.6-34.6 GHz (X15)

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

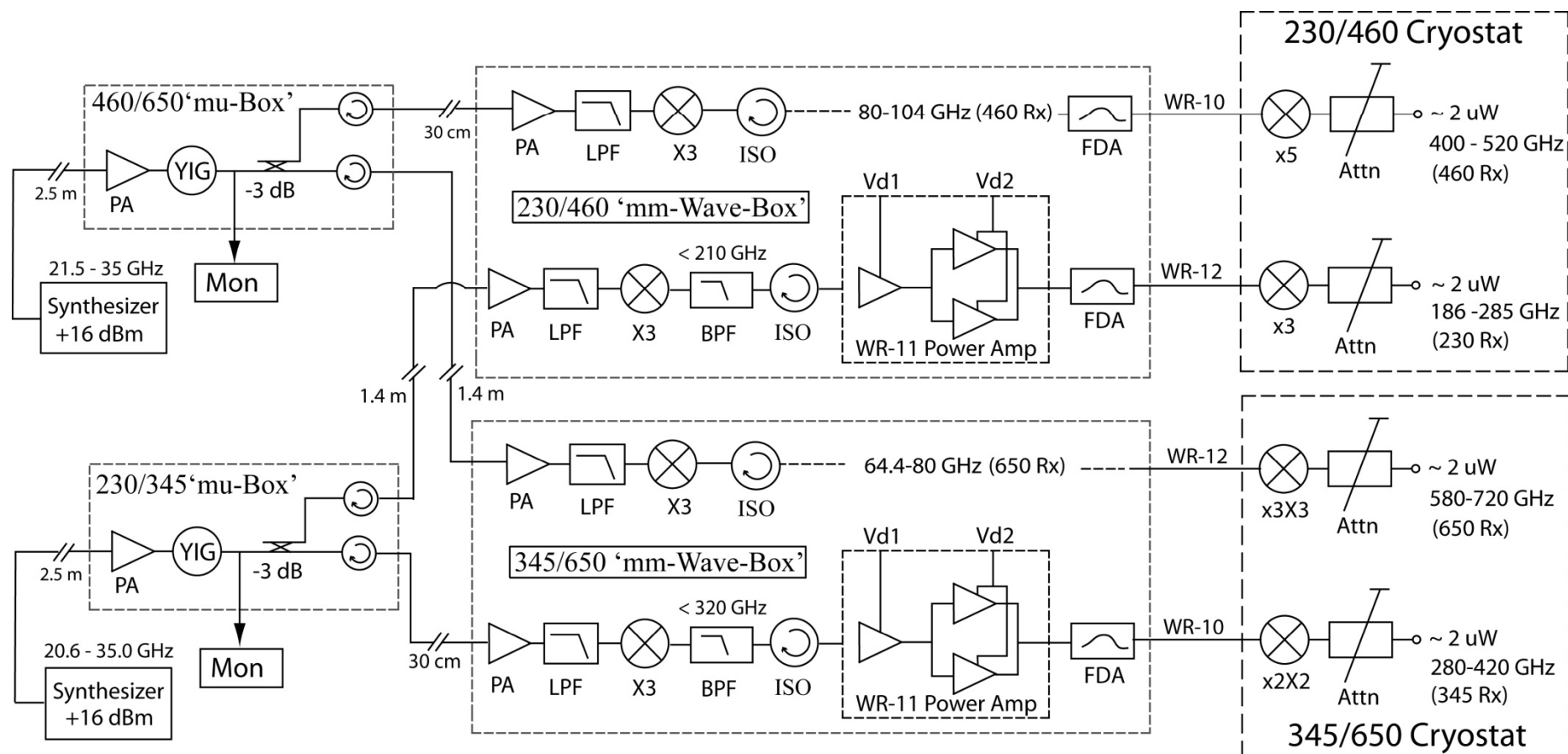


Optical beam
(from M4)

mm-wave box, thermally weakly
coupled to Cryostat



Synthesized LO layout



CSO dual-frequency synthesized local oscillator layout. At the input of the mu-Box the baseband frequency of 20\$-35~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\$-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.

So what is next..

- FTS and Beam scans of the 230/460 balanced mixers (Nov 2011)
- IF amplifier passband checkout (Nov 2011)
- Connect 230/460 Synthesized LO and Characterize Heterodyne Performance (Dec/Jan 2011)
- Data analyses end Jan 2012
- Install 230/460 CSO Feb 2012 barring unforeseen issues.

-Critical path: Bias Electronics.

Still needed: Dual SIS Bias boxes, TP monitor, JPL PA Bias boxes

Need to get Precision Cryostat back from CSO for rebuild to house 345/650 FPU. The rebuild will take ~ 3 month, thus the 345/650 should be ready to go to the CSO Summer 2012.