

ECA 127 Anechoic Chamber Background Measurements

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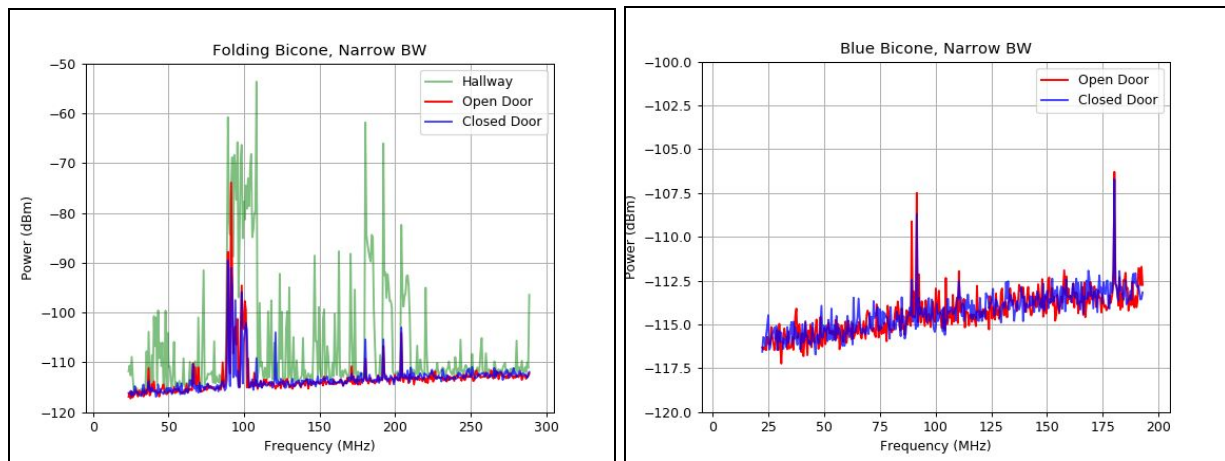
This memo discusses the radio background measurements made in the ECA 127 anechoic chamber on Oct 8, 2020. The measurements were performed by Mickey Horn and Danny Jacobs with the guidance of Georgios Trichopoulos.

Setup

The measurements were recorded using a Fieldfox spectrum analyzer and two different biconical antennas. The first antenna is the SAS-542 (large and foldable). The second is the BicoLOG 5070 (small and blue). I'll refer to the two different antennas as "folding" and "blue" throughout the rest of the memo. Typically, we prefer to use an LNA in our measurements to increase the gain of our system. However, this requires a wall socket to power it, which was not available in the chamber. Therefore, we did not use an LNA.

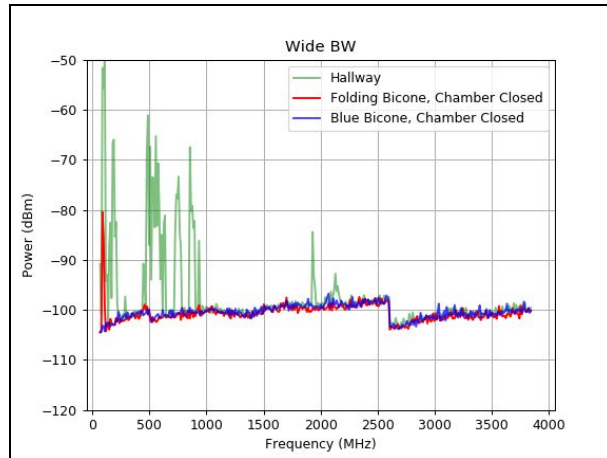
We recorded two different spectral windows. The first is 20-200 MHz with a small 100 Hz resolution. The second is 20 MHz - 4 GHz with 1 kHz resolution. We took measurements within the chamber (with the door both open and closed), as well as in the hallway right outside to get a better idea of how well the chamber is insulating outside noise.

Narrow Bandwidth Measurements

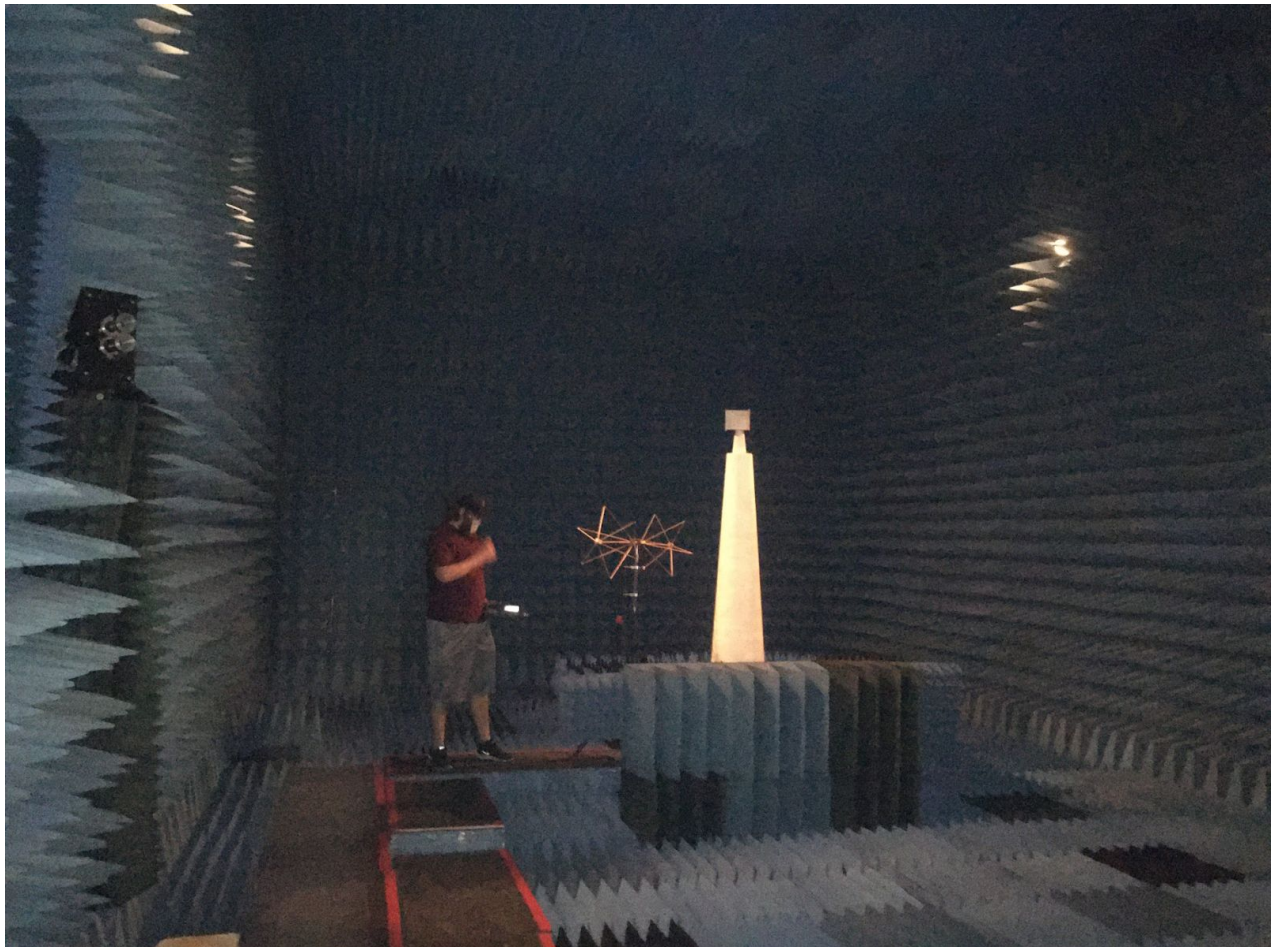


It'll be more useful to focus on the left plot, as the Blue Bicone's sensitivity is quite low without an LNA (and thus we can hardly see anything above noise). The left plot does indicate that the chamber does a fairly effective job at blocking a lot of the noise in the spectrum, particularly outside of the FM radio range. Closing the door has a fairly minimal impact. Within the chamber, the highest noise source is FM, and with the door closed, it is about 25 dB louder than the noise floor. This is still much quieter than we've seen in other locations. ECHO's two current frequencies of interest, 70 and 137 MHz, are fairly quiet.

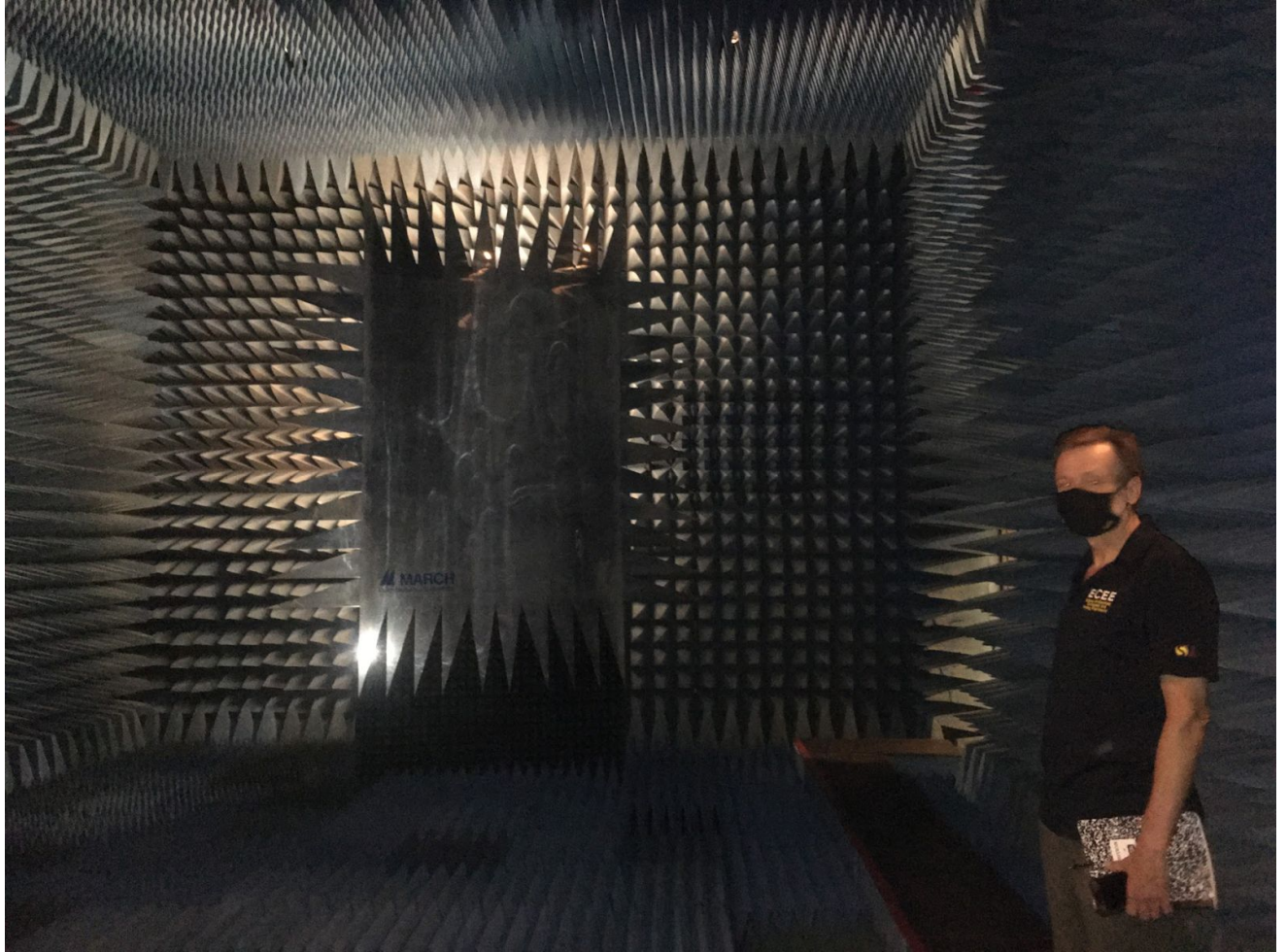
Wide Bandwidth Measurements



Here, we can see that the anechoic chamber is remarkably quiet as we get to higher frequencies. There is almost no visible noise increase after 500 MHz. There is that strange dip at about 2500 MHz, which I believe is an artifact of our testing setup, as the hallway background dips lower than too.



Background measurement setup in anechoic chamber. Note DUT mount on foam pillar.



A radiation coupler on the wall over Jim's head is aimed at the reflector which forms parallel wavefronts aimed at the DUT pillar.