

Initial Measurements of Radio Frequency Interference at 1 GHz at Fermilab

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Introduction

It has been proposed that a small (~4 meters) parabolic radio telescope at 1 GHz can be used to understand the technical requirements of the 21cm experiment. It would be advantageous if this telescope can be sited at Fermilab so that quick testing and prototyping would be facilitated. To see if Fermilab is a suitable site, a very simple measurement of radio frequency interference near 1 GHz was done.

Measurement

The measurement consisted of a 1-12 GHz ridged horn with an opening angle of 53 degrees was connected to a low noise amplifier (Miteq-00500100-10-10). The band of the amplifier is from 500MHz to 1.0 GHz. The advertised noise figure is 1.0 dB. The gain of the amplifier is about 47dB.

Figure 1 shows the spectrum taken at the Pagoda Proton Area control room. The measurement was taken just north of the control room inside the berm pointing north. Figure 2 is the spectrum taken at the same location but pointing east towards Chicago. Figure 3 is taken at Site 55 (near C0) with the horn pointing north. In all three plots, the yellow trace is with the ridge of the horn oriented vertically (E field vertical) and the cyan trace is with the ridge of the horn oriented horizontally (E field horizontal).

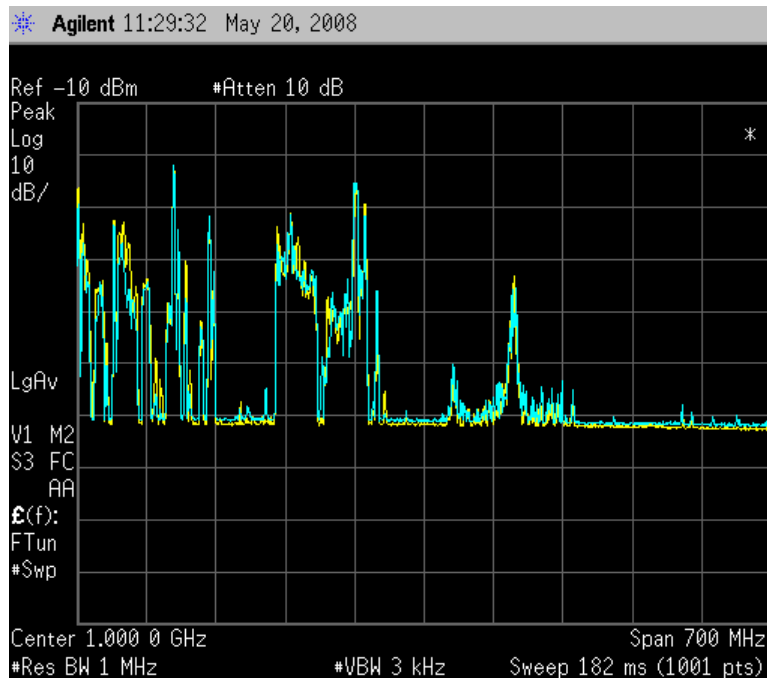


Figure 1. RFI spectrum taken at the Pagoda Proton Area control room pointed north. The yellow trace is with the ridge of the horn oriented vertically (E field vertical) and the cyan trace is with the ridge of the horn oriented horizontally (E field horizontal).

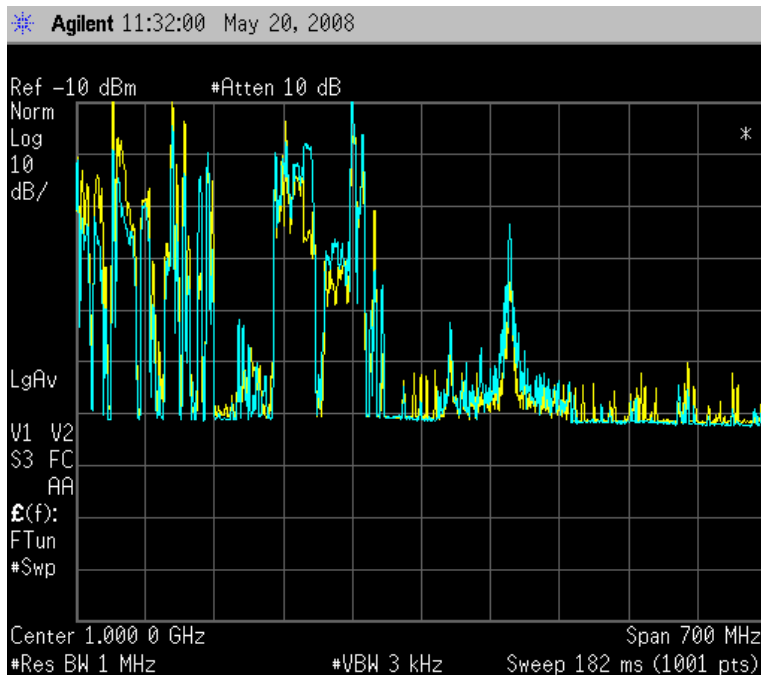


Figure 2. RFI spectrum taken at the Pagoda Proton Area control room pointed east. . The yellow trace is with the ridge of the horn oriented vertically (E field vertical) and the cyan trace is with the ridge of the horn oriented horizontally (E field horizontal).

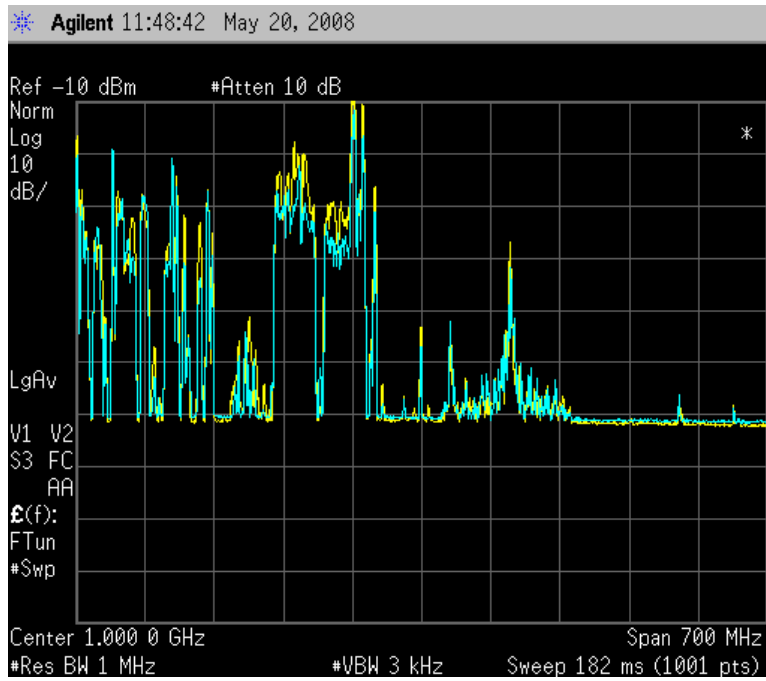


Figure 3. RFI spectrum taken at Site 55 pointed north. . The yellow trace is with the ridge of the horn oriented vertically (E field vertical) and the cyan trace is with the ridge of the horn oriented horizontally (E field horizontal).