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To: EDGES Group

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Subject: The effect of galactic recombination lines on the signature.

Figure 1 shows the n=443 recombination line of carbon from lowband1 data from 2016\_251 to 2017\_094 using only data with GHA=1 to +1 hours. The absorption line is clearly seen with a FWHM width of about 50 kHz (200 km/s) at the expected frequency for the carbon line. Figure 2 shows that the recombination lines are not seen when data with GHA=6 to 18 hours is averaged. Figures 3, 4 and 5 show the lines over a broader frequency range. Given the narrow width of the lines compared with their frequency spacing of about 500 kHz their influence on broad signature amplitude is estimated to be less than about 0.02 K even in the “Galaxy up” data and even less in the “Galaxy down” data.

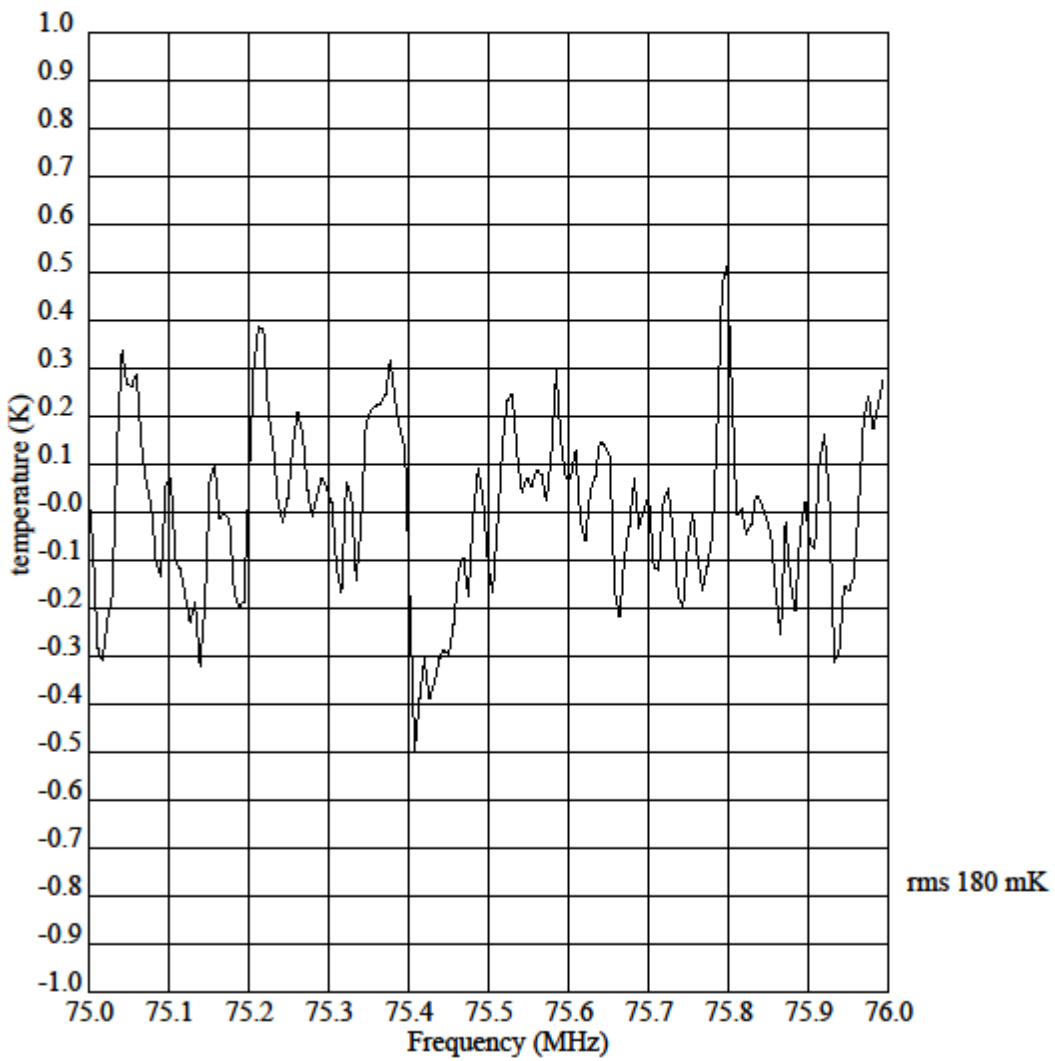


Figure 1. Carbon recombination line  $n=443$  absorption with rest frequency 75.4322 MHz. GHA - 1 to +1.

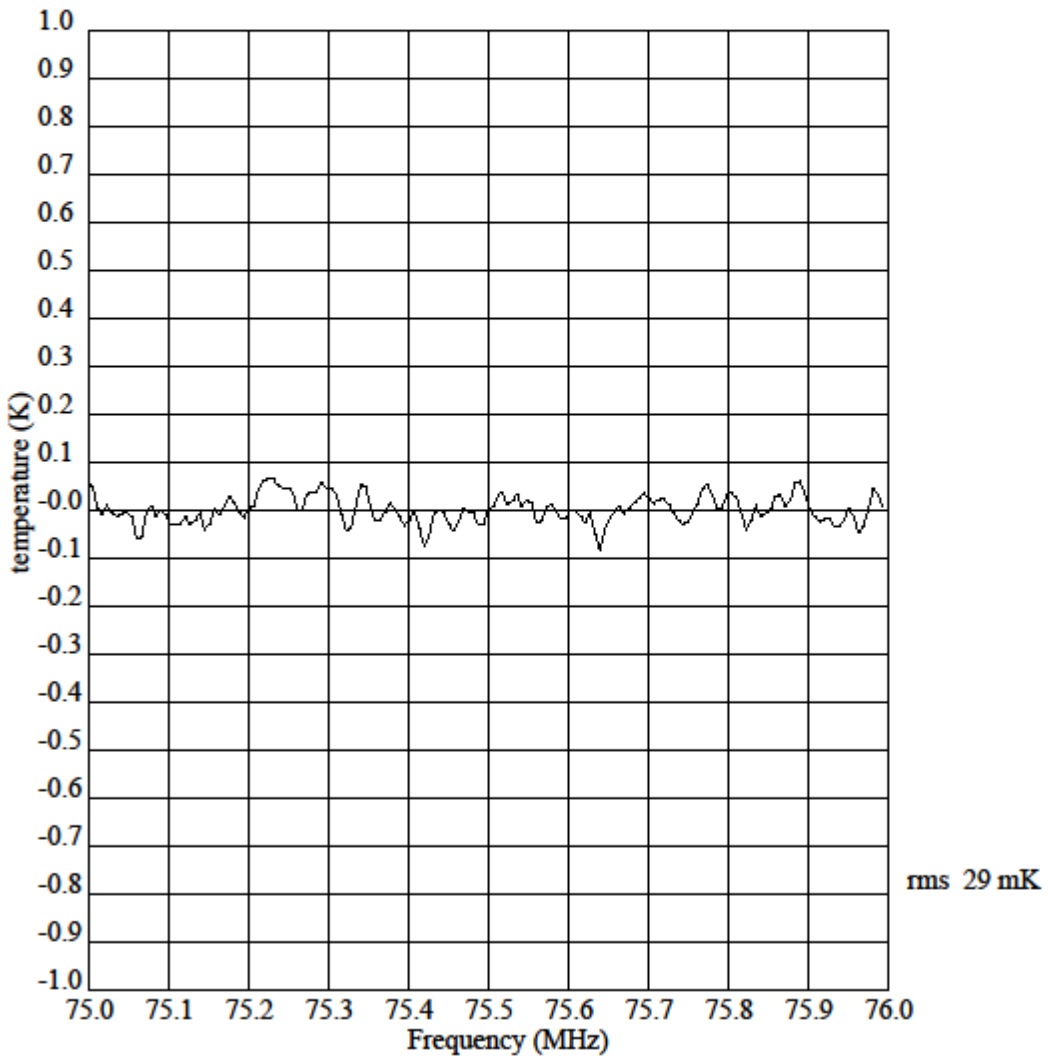


Figure 2. Spectrum using data with GHA=6 to 18 hours.

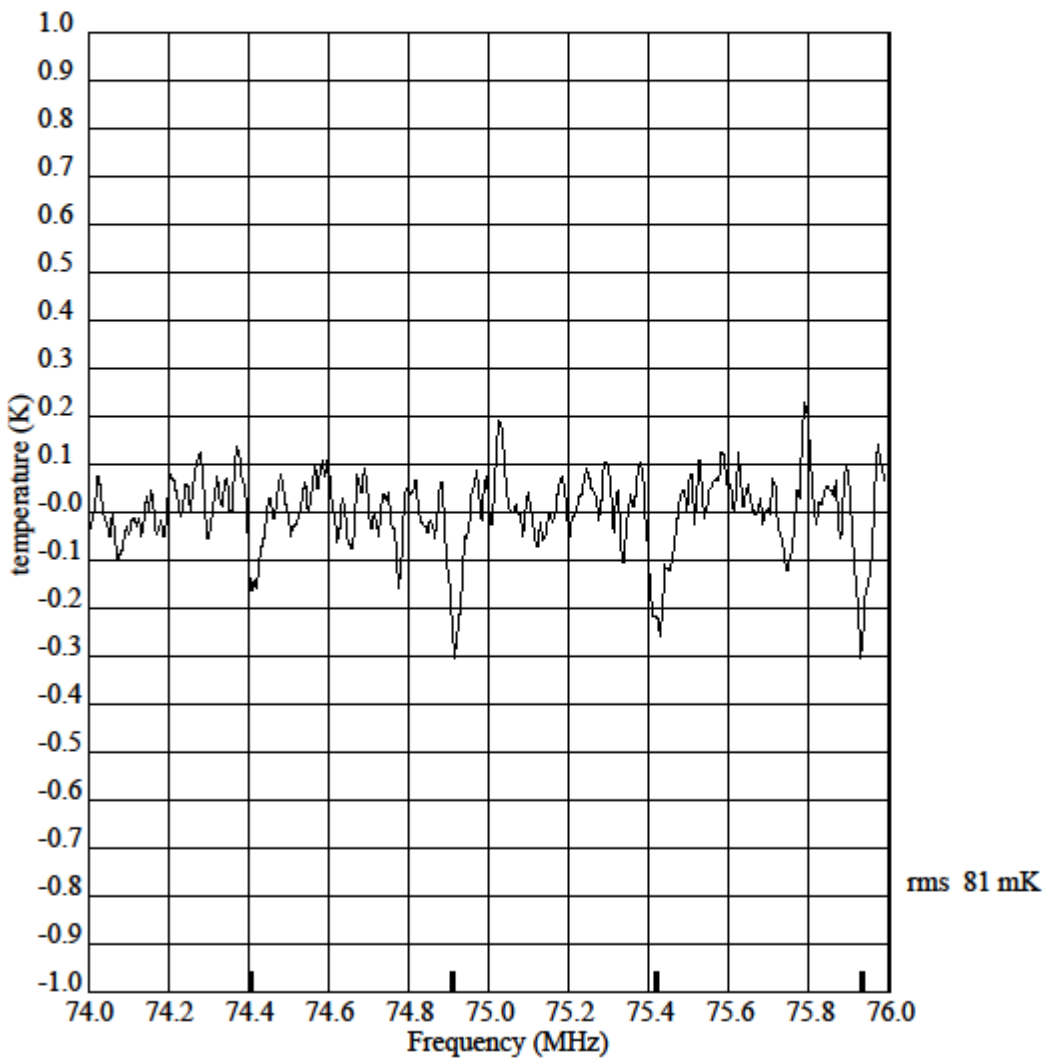


Figure 3. Spectrum using data from GHA=-6 to + 6 hours. Carbon lines with  $n=445$ ,  $444$ ,  $443$  and  $442$  marked.

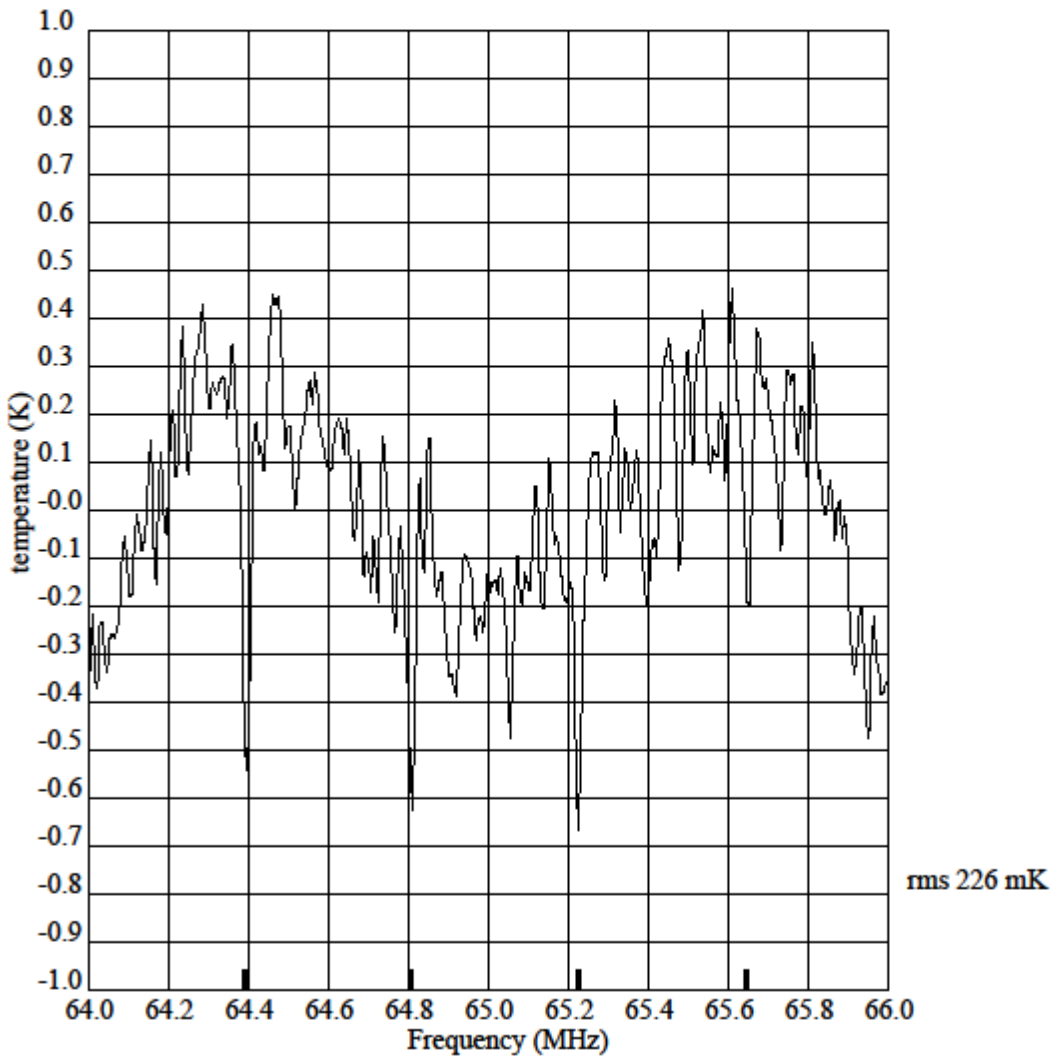


Figure 4. Spectrum from GHA = -6 to +6 showing carbon line absorption for  $n=467, 466, 465, 464$ .

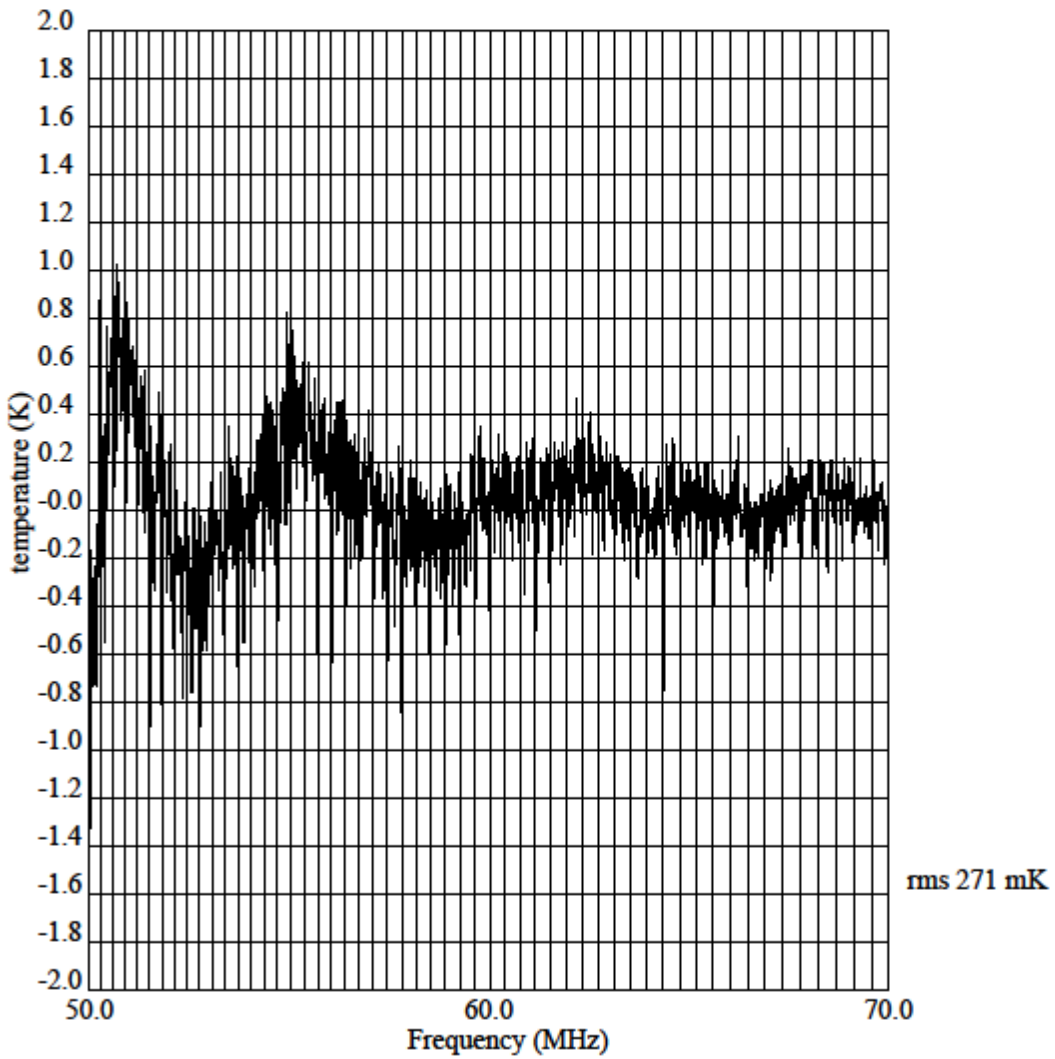


Figure 5. Carbon recombination absorption lines from 50 to 70 MHz. Thin vertical lines are rest frequencies for  $n=455$  to 508.