

DEUTERIUM ARRAY MEMO #012
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May 22, 2002

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To: Deuterium Array Group
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 Subject: RFI sensitivity: Galactic center vs anticenter

The expected signal strength of the 327 MHz D1 line as the ratio $\Delta T_A / T_{sys}$

Where ΔT_A = antenna temperature difference “on” the line to “off” the line
 T_{sys} = system temperature

Is expected to be similar for the Galactic center and the anticenter (see memo #11). However, ΔT_A is expected to be much larger for the Galactic center making the measurement less sensitive to RFI from intermodulation products. On the other hand the antenna elevation looking at the Galactic center will be 18 degrees compared with 76 degrees for the anticenter. The following table compares the sensitivities:

Source	Elevation (deg)	T_{sys} (K)	ΔT_A (μ K)	Dipole response at horizon 1 (dB)	Array response at horizon 2 (dB)
Center	18	500	3000	-1	-13
Anticenter	76	75	450	-7	-19

Notes: 1] relative to maximum response
 2] typical array sidelobe relative to maximum response

Comments/conclusion

The array sidelobe levels away from the main beam are largely controlled by the beam pattern of the individual dipole elements. We can expect about 6 dB less susceptibility to RFI from the horizon with the array pointed at the Galactic anticenter, compared with pointing at the center. Any RFI which is the result of intermodulation products in the amplifier of the active antenna is likely to be at about the same intensity for both the center and anticenter since the antenna beam patterns for the frequencies which produce the intermodulation are not well controlled.

If the intermodulation RFI is not significant the RFI susceptibility is about the same to the Galactic center and anticenter.