DEUTERIUM ARRAY MEMO #059

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To: Deuterium Array Group

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Subject: Model of expected D1 emission from the "local arm"

While the direction near galactic anti-center at galactic longitude 183 degrees is likely to be the region of D1 emission which is the strongest for the D1 array it has been suggested other regions might be included in the schedule. One such region is looking along the local arm. There is a partial alignment of velocities looking in the Cygnus region at galactic longitude around 80 degrees. Figure 1 and 2 show the expected D1 emission, calculated using the method of memo 53, for this region along with the regions at galactic longitude 171, 183 and 195. The region at 80 degrees is expected to be very weak if the spin temperature is around 130 K because the continuum is strong in this direction so that the emission is partially cancelled by absorption. In figure 2 the assumed spin temperature was raised to 430 K this assumption reduces the emission at the anti-center slightly and raises the emission from 80 degrees longitude.

Using the same method I have also looked at the expected D1 absorption looking in the direction of the galactic center. Figure 3 shows the absorption profile (i.e. the sign of the ordinate is reversed) of D1 in the direction of the center. In this case the profile is also strongly dependent on the assumed spin temperature. If the assumed spin temperature is reduced from 130 K to 65 K the absorption is doubled. The accuracy on the modeled absorption is limited by the lack of H1 data while is missing in the Hartmann and Burton data cube for declination below – 30 degrees.

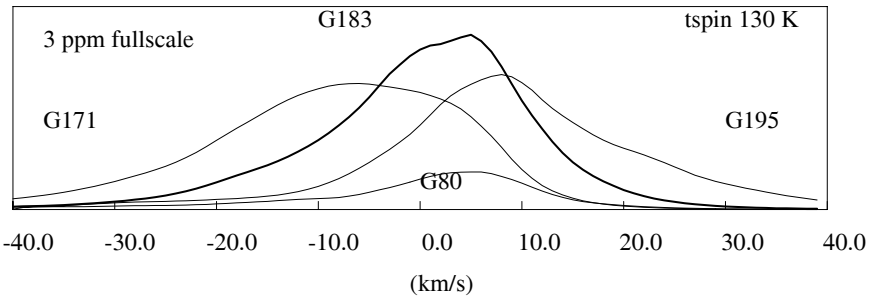

Figure 1.

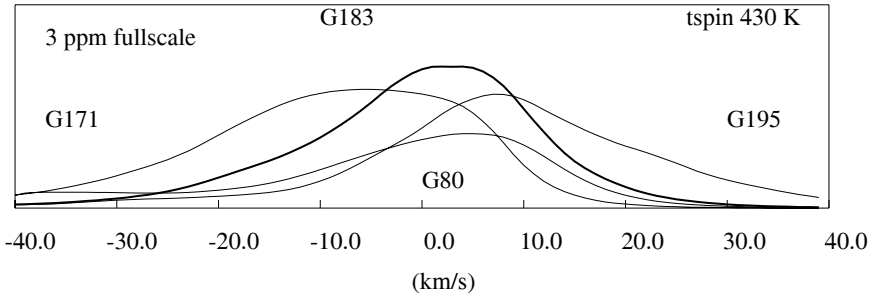

Figure 2.

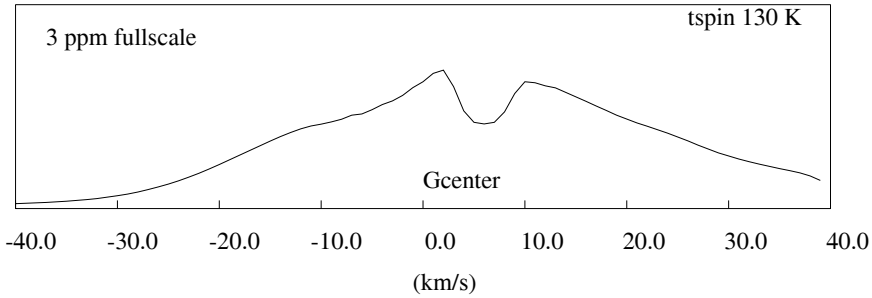

Figure 3.