

OBSERVATIONS OF NH₃ TOWARD DR21

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Figure 1 shows the (J,K) = (1,1), (2,2) and (3,3) spectra of NH₃ observed toward the continuum peak of DR21 and four positions offset 50" from the peak. These observations were made with the Effelsberg 100-m radio telescope, which has a half-power beam width of $\sim 43''$ at these frequencies.

PARA-NH₃: The (1,1) and (2,2) lines arise from para-NH₃ and both transitions are seen in absorption toward the peak and in emission elsewhere. Our results confirm those of Matsakis et al. (1977) in showing a non-equilibrium distribution of the hyperfine components of the (1,1) line toward the peak and south of the peak. The apparent optical depths of the (1,1) and (2,2) lines are 0.15 and 0.12, respectively; and the rotational temperature between the (1,1) and (2,2) levels is ~ 26 K.

ORTHO-NH₃: The (3,3) line arises from ortho-NH₃ and we see that this line is in emission at all positions, including the continuum peak. In addition, the line strength at the peak is ~ 3 times larger than at the off-peak positions. While the (3,3) line may come from a different region than the (1,1) and (2,2) lines due to formation or past history, we feel our data suggest a population inversion of the (3,3) level.

REFERENCE

Matsakis, D.N., Brandshaft, D., Chui, M.F., Cheung, A.C., Yngvesson, K.S., Cardiasmenos, A.G., Shanley, J.F., and Ho, P.T.P.: 1977, *Astrophys. J. (Letters)* **214**, L67.

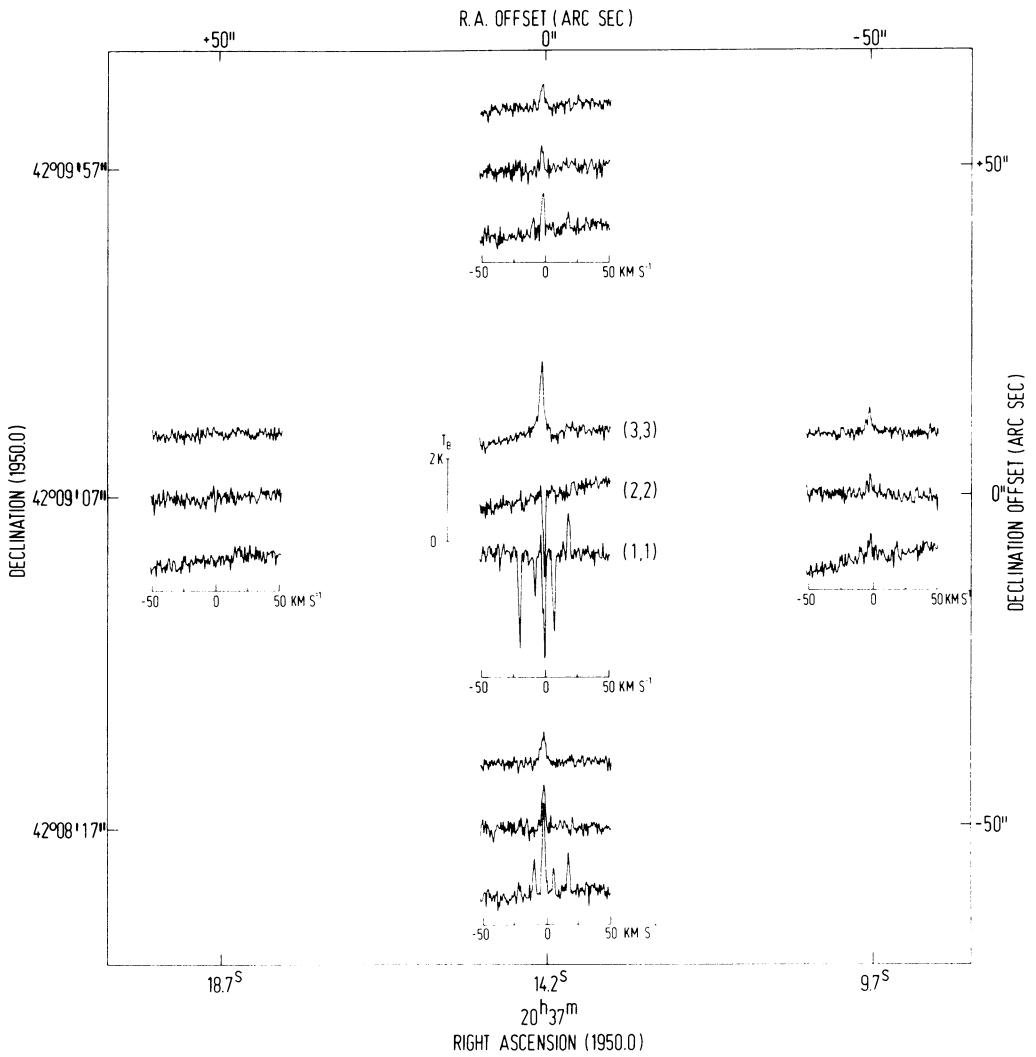


Fig. 1: NH_3 spectra toward DR21.