

peratures appear slightly above ( $\approx 80 \pm 30$  mK) the COBE measurement of  $T_{\text{CBR}} = 2.735$  K (Fig. 1). A possible explanation of this excess would be the presence of local excitation mechanisms (such as collisional excitation). None of the data necessary to quantify these mechanisms are of sufficient quality to provide a clear explanation of the observed difference. Improved observations would be needed to obtain better data on local conditions in molecular clouds and on CN absorption line measurements to show if the excess in the CN excitation temperature is really a result of collisional excitation.

### Homogeneity within 50 Kpc

A very real possibility exists to determine  $T_{\text{CBR}}$  in the Magellanic Clouds if an appropriate sight line with sufficient CN column density can be found. Such a measurement is just within the possibility of the largest telescopes in the southern hemisphere.

We have initiated a programme for observing a sample of lines of sight towards bright and reddened O and B stars in the Magellanic Clouds. The observations were performed in October 1991 at the 3.6-m ESO telescope (La Silla, Chile) using the CASPEC spectrograph with the 31.6 line/mm grating plus the long camera in the wavelength range 3800Å–4500Å.

Preliminary results show that the Ca II H and K interstellar lines (both galactic and Cloud components) are present in all the observed stellar spectra (Fig. 2). Molecular absorption lines of CH and CN are marginally visible (Fig. 3), representing the first detection of the CN species in the Magellanic Clouds interstellar medium. Detection of interstellar CH and CH\* has been reported only towards supernova 1987 by Magain and Gillet (1987).

Additional observing time is needed for improving the molecular detection, in particular CN for the measurement of the  $T_{\text{CBR}}$  at 50 Kpc from us.

### Homogeneity on Large Scales

It may be possible to observe the excitation of other molecular rotation or atomic fine structure lines at quite large distances (Bahcall and Wolf, 1968). Indeed a few reports (Meyer et al., 1986; Wampler, 1990) of upper limits to  $T_{\text{CBR}}$  at redshift around  $z = 1.6$  and  $z = 2.5$  have been reported for the excitation of CI and CII fine structure lines.

In contrast to the measurements in the Magellanic Clouds the measurements at high redshift introduce a rather large uncertainty in the local condition of the species observed, for example local ex-

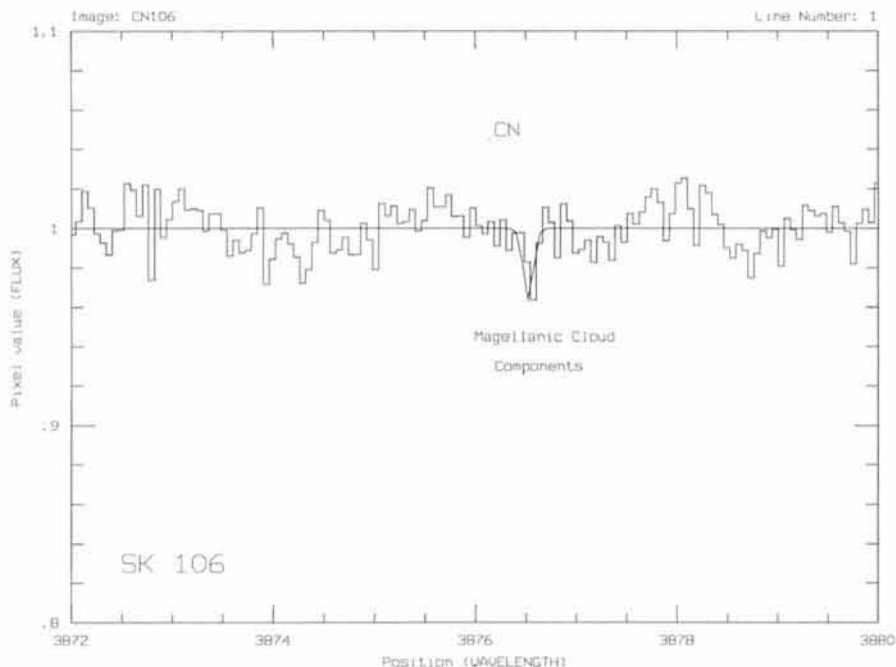


Figure 3: Interstellar CN towards the star SK 106 (SMC). The position of the line coincides with one of the stronger components of the interstellar Ca II K in the Small Magellanic Cloud. The upper limit for the CN column density is  $1 \times 10^{13} \text{ cm}^{-2}$ .

citation mechanisms such as collisional processes or local UV field are difficult to evaluate. Nevertheless, a determination of  $T_{\text{CBR}}(z) < (1+z)[T_{\text{CBR}}(z=0)]$  at any redshift would be very difficult to explain in the context of the standard cosmological scenarios. Though they are affected by large uncertainties, the existent upper limits to  $T_{\text{CBR}}(z)$  do not contradict the present theories.

In summary, exciting and important cosmological results are possible from a careful study of the interstellar thermometers available to us.

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