

THE DETECTION OF EXTENDED HI ABSORPTION IN ABELL 2597

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ABSTRACT

We have detected HI in absorption towards the bright radio source PKS 2322-123 associated with the central cD galaxy in the rich cluster A2597.

We detect a 'narrow' velocity width component with $\text{FWHM} \sim 220 \text{ km s}^{-1}$ (towards the nucleus only) which is spatially unresolved and redshifted by $\sim 200 - 300 \text{ km s}^{-1}$ from the systemic velocity. We suggest that this component may be associated with ongoing cannibalism in the cD galaxy.

We detect a 'broad' velocity width component with $\text{FWHM} \sim 410 \text{ km s}^{-1}$ which is spatially extended over the $\sim 3''$ extent of the radio source and which is at the systemic velocity of the optical emission lines. We suggest that this component is associated with the bright $\text{H}\alpha$ nebula (Crawford & Fabian 1992; Heckman *et al.* 1989). Our derived parameters suggest that there is much more mass in the HI than in the $\text{H}\alpha$ implying that the nebula is photon bounded.

The basic observational parameters of the broad component, (e.g. systemic velocity, low optical depth, broad line width) are very similar to the absorption found in NGC1275 (3C84) in the Perseus cluster.

OBSERVATIONS AND RESULTS

The VLA results are summarized in Tables 1 and 2. For details, see O'Dea, Baum, & Gallimore (1994).

Table 1. Results

| Broad Component | |
|--------------------------------|-----------------------------|
| Peak | 3.0 ± 0.3 mJy |
| FWHM | 412 ± 40 km s $^{-1}$ |
| Center velocity (heliocentric) | 24604 ± 17 km s $^{-1}$ |
| $\Delta S/S$ | 0.0056 |
| Narrow Component | |
| Peak | 7.7 ± 0.3 mJy |
| FWHM | 221 ± 10 km s $^{-1}$ |
| Center velocity (heliocentric) | 24886 ± 5 km s $^{-1}$ |
| $\Delta S/S$ | 0.0187 |

Table 2. Derived Parameters of the HI

| Parameter | Broad Component | Narrow Component |
|---|---|----------------------|
| Optical Depth τ | 0.006 | 0.019 |
| Covering factor | $0.006 < c_f < 1$ | $0.019 < c_f < 1$ |
| Column Density N_H/T_s cm $^{-2}$ K $^{-1}$ | 4.5×10^{18} | 8.2×10^{18} |
| Mass M/T_s M $_{\odot}$ K $^{-1}$ | 7×10^5 | 3.5×10^5 |
| Cloud radius pc | $2.6 \times 10^{-2} < r_{cl} < 4.4$ | |
| Number of clouds | $4 \times 10^3 < N_{cl} < 2 \times 10^{10}$ | |

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