ABSORPTION LINES AND THE RADIO STRUCTURE OF QUASARS

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ABSTRACT. We have investigated a possible relationship between the radio structure of quasars and their absorption line systems with velocities, V , in the range 3000-18000 km s^{-1} and find a marginal trend for such quasars to have compact radio structures (Swarup et al. 1986).

From a survey of heavy-element narrow absorption lines in the spectra of 66 quasars of low and intermediate redshifts,Weymann et al.(1979; W^{2}PT) found that the distribution of velocities between the absorption clouds and quasars showed a narrow peak at 0 km s^{-1}, a nearly uniform distribution from 0 to $\sim$ 60000 km s^{-1} and an excess in the range $3000 \lesssim V \lesssim 18000$ km s^{-1} .They suggested that the first component is due to absorption by clouds and galaxies in the host cluster, the second is due to 'intervening' galaxies between the quasar and us and the third is caused by material ejected from the quasar. The excess of systems in the range 3000-18000 km s^{-1} was not seen in an independent sample of high redshift quasars by Weymann, Carswell and Smith (1981) and neither this excess nor the peak near 0 km s^{-1} was seen in an unbiased sample by Young,Sargent and Boksenberg (1982). Nevertheless, there is a clear evidence of the presence of intrinsic absorbing material ejected by the central source in Broad Absorption Line quasars and in a class of radio loud quasars that exhibit closely spaced multiple features near the emission redshift (Briggs, Turnshek and Wolfe 1984). It seems interesting, therefore, to investigate radio structure of quasars having sharp absorption lines with $3000 \lesssim V \lesssim 18000$ km s^{-1}.

We have compiled available radio and optical observations for the 66 quasars of W^{2}PT, incuding new VLA A-configuration observations obtained by us for 20 sources at 6 cm. Only 45 of the 66 quasars are radio-selected, of which 20 are found to show absorption line features. Of these 20 sources, 7 have absorption systems in the range 3000-18000 km s and 5 out of 7 show compact radio structures. Of the other 13 sources, only 2 are compact.Out of 45 radio-selected quasars, 25 show no absorption lines. Of these, only 2 are compact,

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20 are extended and radio structure is not known for 3 sources. Only 4 of the 21 optically selected quasars are radio loud, 3 being compact including 1 of them having absorption lines in the above V range.

We have also studied available information about the radio structure for 59 out of 109 radio selected quasars listed by Hewitt and Burbidge(1980) which show absorption line systems. Of the 59 quasars, V lies between 3000 and 18000 km s^{-1} for 23 of them, of which 14 ($\sim$60 per cent) are compact. Among the remaining 36 only 9 (25 per cent) are compact. The above trend of quasars with V between 3000 and 18000 km s^{-1} having compact radio structure seems independent of redshift.

The results indicate that either the beams supplying energy to the outer lobes are disrupted in quasars with $3000 \lesssim V \lesssim 18000$ km s^{-1} leading to compact radio structures or the direction of ejection of absorbing clouds as well as the beam axis are inclined at small angles to the line of sight so that the relativistic beaming leads to compact radio structures. However, these results are based on hetrogenous data. In order to confirm the results, it would be desirable to obtain absorption line data of uniform sensitivity and resolution for unbiased samples of compact and extended radio sources in the same redshift range.

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