QSO ABSORPTION-LINE SYSTEMS AND STAR FORMATION

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The properties of the QSO absorbing systems have been established by several large scale surveys. Observational results concerning the metal content, the distribution of the systems as a function of the redshift, and clustering, lead to two populations of intervening objects: (a) intergalactic clouds (Ly α systems), and (b) galaxies (heavy-element systems). More recently, observations have shown an analogy between QSO absorbers and gas-rich dwarf galaxies (York et al. 1990).

We have analyzed the origin for the QSO metal line systems by comparing observed blue lines to theoretical calculations of absorption in star forming HII regions. The HII region characteristics are obtained from the high excitation lines of C^{+3} and Si^{+3}; the low excitation line intensities (as CII, OI, NV, AlII, AlIII, SiII, SiIII and FeII) are used to check and constrain the model. Of the 20 systems analyzed (with $1.50 < z_a < 3.30$), 18 can be explained by this model. These 18 systems are associated with HII regions, ionized by an *O*4 star, with a hydrogen density $n_H \leq 10\ cm^{-3}$ and chemical abundance $Z < Z_\odot/10$ (Viegas and Gruenwald 1991).

Now we present the results for 21 absorption systems at lower redshift ($1.20 < z_a < 2.30$) where the MgII and MgI lines are observable, in addition to CIV lines and (when available) CII lines. For 19 systems, the absorption line spectra can be fitted by HII region models with the same characteristics found in the previous sample.

The absorption spectra of gas-rich dwarf galaxies closely resemble those shown by QSOs (York et al. 1990). The absorption features of 11 galaxies have been analysed by the same method. For only 3 objects HII region models can reproduce the observed spectra if a higher density is assumed ($\sim 10^2 cm^{-3}$). For most of the galaxies there must be a stellar contribution to the CIV absorption line.

Since the interstellar medium of the host galaxy seems to be mainly ionized, it is possible to make a rough estimate of a lower limit of $2M_\odot/yr$ to the star formation rate. This value is close to the average star formation rate for HII galaxies.

Although the model can be improved in its details, it is already clear that it offers a promising alternative origin for the QSO absorbing systems. They may provide a potential tool to probe the rate of star formation at high redshift as well as the chemical evolution of galaxies.

References

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