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The space distribution of QSOs

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Abstract We present a study of the space density of the quasi stellar objects (QSOs) expressed in the form of the optical luminosity function (OLF) and its cosmological evolution with redshift using over 9600 QSOs n the 10k catalogue of the 2dF QSO Redshift Survey (2QZ) of the Anglo Australian Telescope (AAT) Two Degree Field (2dF)

Keywords Luminosity function QSO lookback time comoving volume

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1 Introduction

The QSOs being a sub-class of the active galactic nuclei (AGN), the QSO OLF and its evolution with redshift provide valuable information on the study of the AGNs, in general In this paper we present the OLF of over 9600 QSOs in the 2QZ 10k catalogue in the magnitude range $-13 < M_B < -28$ The evolutionary scenario of the QSOs with redshift is also discussed We have analysed the 2QZ 10k catalogue using the Data Interface Tool developed under the Virtual Observatory India (vo-i) initiative Details of the catalogue can be found in [1]

2. Results

2 1 Cumulative number-magnitude distribution, $N(b_j)$:

The cumulative number-magnitude distribution of the QSOs is shown in Figure 1 The steeper slope at the brighter end ($d\log N(b_j) \approx 1\ 72$) indicates that the population of QSOs is evolving with time

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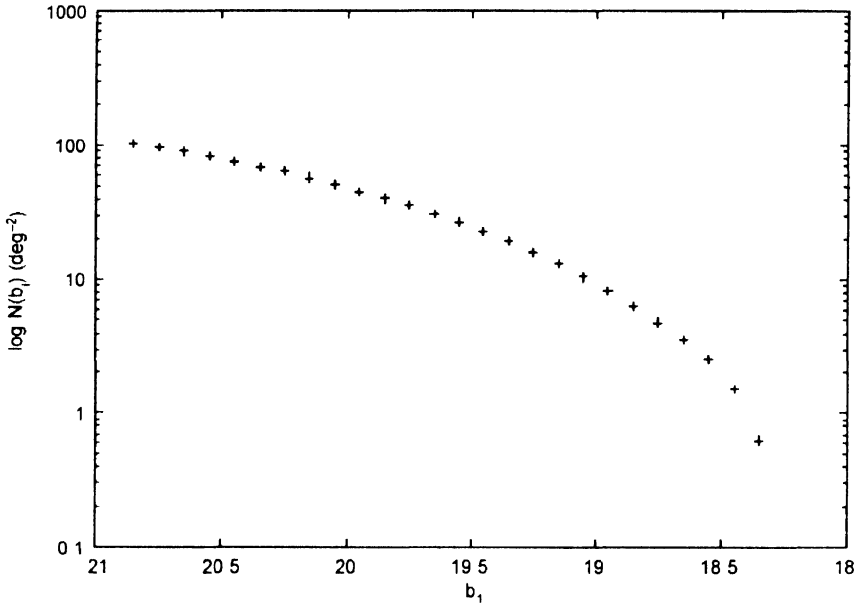

Figure 1. Cumulative number-magnitude distribution, $N(b_j)$ of 2QZ 10k QSOs with $0.01 < z < 4.0$

2.2. Number-redshift distribution

The number-redshift distribution shown in Figure 2 also shows that the QSO population is evolving with time with maximum number of QSOs at $z \sim 1.6$. It may be inferred that either we have seen an epoch of QSO formation (density evolution), or the OLF of the QSOs evolves with time (luminosity evolution), or both. The number of QSOs in the

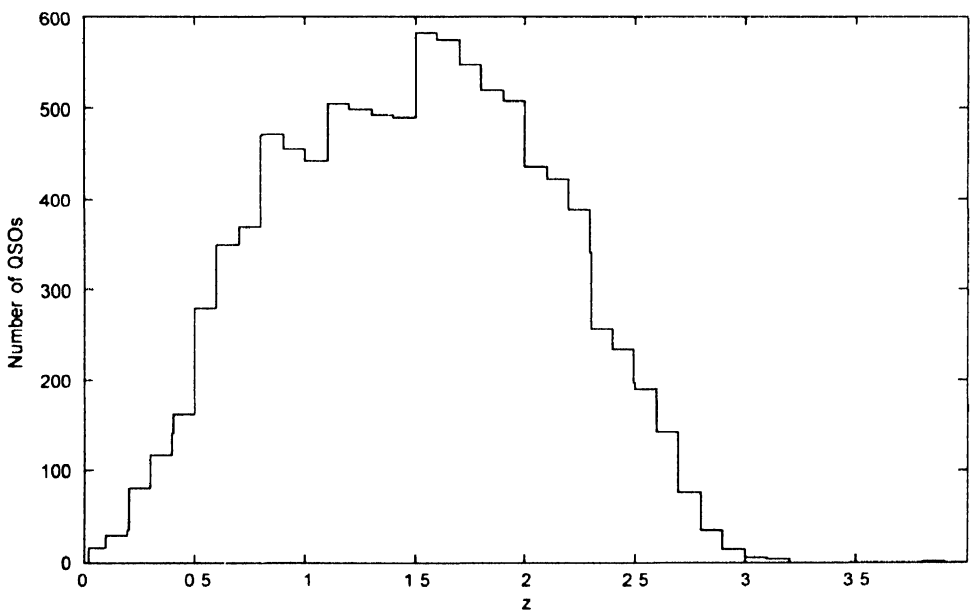

Figure 2. Number-redshift distribution for 2QZ 10k catalogue QSOs with $0.01 \leq z \leq 4.0$.

catalogue plotted as a function of the lookback time is shown in Figure 3 It shows that the QSOs might have appeared when the age of the Universe was 10 per cent of the present age which is taken as $\frac{2}{3H_o}$, H_o being the Hubble constant

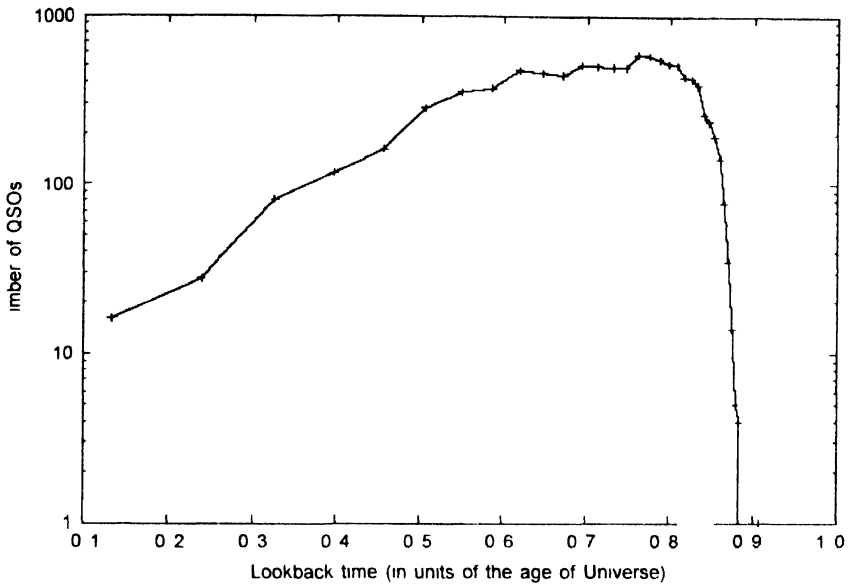

Figure 3 Number of 2QZ 10k QSOs as a function of lookback time (in units of the age of the Universe) for q_o = 0 5 , H_o = 50 km s ^{1} Mpc ^{1} The age of the Universe = $\frac{2}{3H_o}$

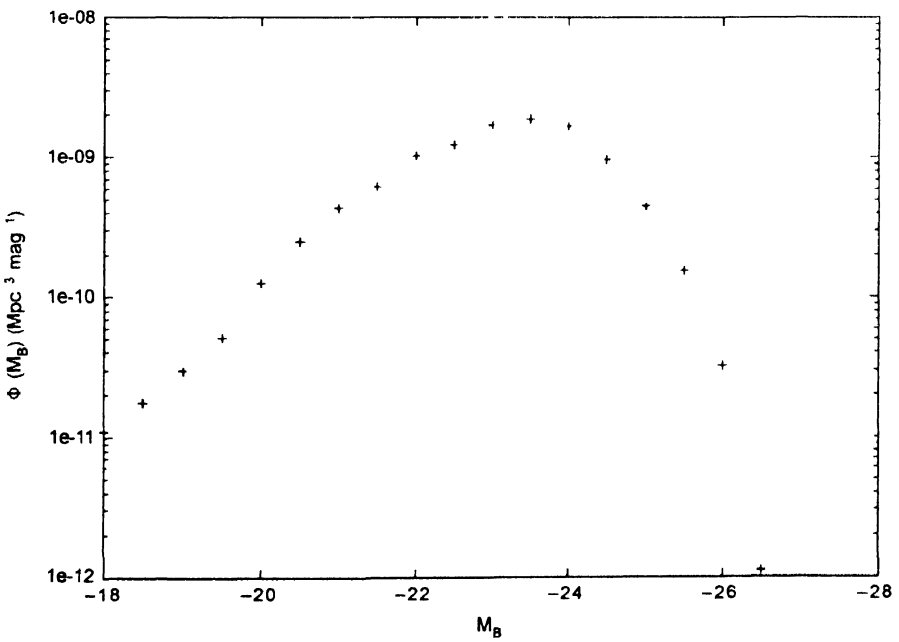

Figure 4. The optical luminosity function for 2QZ 10k QSOs with $-28 \leq M_B \leq -18$ and z upto 4 0

2.3 QSO optical luminosity function :

The optical luminosity function of the QSOs with $-28 \leq M_B \leq -18$ and z upto 4.0 is shown in Figure 4

3. Conclusion

The QSO population is evolving with time. A proper estimation of the OLF of the QSOs will help in understanding the nature of its evolution and of the AGN population as a whole

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References

[1] S M Croom, R J Smith, B J Boyle, T Shanks, N S Loaring, L Miller and I J Lewis *MNRAS* **322** L2 (2001)

[2] B J Boyle, T Shanks, S M Croom, R J Smith, L Miller, N S Loaring and C Heymans *MNRAS* 317 1014 (2000)