

A bright QSO near 3C273

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Abstract. We present the discovery of RX J1230.8+0115 a QSO which is among the brightest known at optical wavelengths. The QSO was discovered because of both its ultra-violet excess and its X-ray emission as part of an identification programme of ROSAT X-ray sources. The QSO is only 54' and 200 Mpc from 3C273. The two QSOs have a projected separation of 10 Mpc (at $z=0.117$) making this object particularly interesting for studies of intervening absorption, and highlights the existence of incompleteness in existing surveys for bright QSOs.

Key words: galaxies: quasars: individual: RX J1230.8+0115 – X-rays: galaxies

1. Introduction

QSO RX J1230.8+0115 was first identified as a candidate quasar with ultra-violet excess (UVX) within the Edinburgh UVX quasar survey (Miller et al 1998). It was confirmed spectroscopically during the construction of a flux limited X-ray selected sample of AGN/QSOs in which the Edinburgh Multi-Colour Survey was used to identify candidate optical counterparts. Covering a contiguous area of 330 deg², the X-ray sample was based on sources taken from the ROSAT all-sky survey with spectroscopic follow-up being carried out at the Isaac Newton Telescope between 1993 and 1995 (Read et al 1998).

2. QSO RX J1230.8+0115.

2.1. Data

The data on RX J1230.8+0115 are given in Table 1. The X-ray flux was calculated assuming a neutral hydrogen column density $N_H = 2.2 \times 10^{20} \text{ cm}^{-2}$ and an X-ray spectral index $\alpha_X = -1.0$.

The optical magnitudes were taken from the Edinburgh Multi-Colour Survey and represent mean values derived from two CCD-calibrated UK Schmidt Telescope plates in each waveband. The UKST plates were obtained in 1985 and were measured on the COSMOS machine at Edinburgh (MacGillivray &

Table 1. Data on QSO RX J1230.8+0115

Parameter	Value
X-ray position(J2000)	12 30 50.2 + 01 15 15
optical position (J2000)	12 30 49.9 + 01 15 23
X-ray flux (0.5-2.0 keV)	$4.32 \times 10^{-13} \text{ erg s}^{-1} \text{ cm}^{-2}$
V, B-V, U-B	14.42, 0.02, -1.05
redshift	0.117

Stobie 1984). The accuracy of the averaged photographic magnitudes is 0.07 in U, B and V.

Adopting $H_0 = 50 \text{ km s}^{-1} \text{ Mpc}^{-1}$, $q_0 = 0.5$ and an optical spectral index $\alpha_{opt} = -0.5$ gives an absolute magnitude $M_B = -24.8$ and an X-ray luminosity, $L_X(0.5-2.0\text{keV})$, of $2.7 \times 10^{43} \text{ erg s}^{-1}$. The FWHMs of H_α and H_β present in the INT/FOS spectrum are approximately 1500 km s^{-1} .

The INT/FOS spectrum (obtained in 1993) and a finding chart are shown in Fig 1.

2.2. One of the brightest QSOs and neighbour to 3C273

Ordering the *Revised and Updated Catalog of QSOs* (Hewitt & Burbidge 1993) in terms of apparent V-magnitude shows that QSO RX J1230.8+0115 is the 9th brightest QSO known (7th brightest in the B-band). It has a clearly stellar appearance on the UKST plates and given its apparent brightness and significant UV excess this object should have been an ideal candidate for earlier UVX surveys. Indeed it appears that this region of sky has been covered by at least one previous survey (Green, Schmidt & Liebert 1986). Lying only 54 arcminutes away from 3C273 makes it more remarkable that this object remained undetected until now as presumably the surrounding area will have been the target of other surveys. Interrogating SIMBAD and NED has produced no matches for this object and it does not show up in any published radio catalogues.

The discovery of RX J1230.8+0115 provides further evidence for incompleteness in existing surveys for bright QSOs as previously discussed by Goldschmidt et al. (1992, 1998). In addition, its brightness and proximity to 3C273 fortuitously provides a means for studying the spatial extent and absorption features of any intervening matter (low redshift Lyman- α

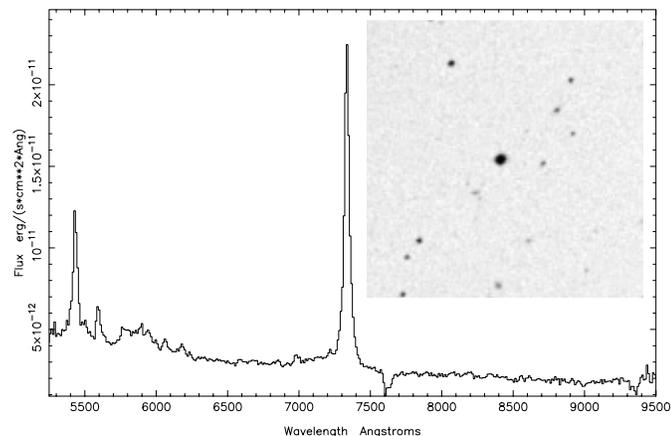


Fig. 1. INT spectrum and finding chart (from the Digitized Sky survey) for RX J 1230.8+0115. The finding chart is 4 arcmins x 4 arcmins with the north-east corner being top-left. the QSO RX J1230.8+0115 is at the centre.

systems). To this end QSO RX J1230.8+0115 was the target of HST observations carried out in 1996, the results of which will be published elsewhere.

3. Conclusions

Previously unknown, QSO RX J1230.8+0115 is currently one of the top ten brightest QSOs catalogued. Less than a degree away from 3C273 it affords a unique way of probing the universe to low redshift.

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