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Close Separation Triple System QSO 1009-0252 with Discordant Redshifts: Is the Spectrum of One Component Blueshifted?

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Abstract. 1009-0252 is a Quasi Stellar Object (QSO) with three components A, B, C. A, B are thought to be the result of gravitational lensing of one object, and A, C constitute a close pair with redshifts 2.74 and 1.62 respectively. Close separation pairs of QSOs with discordant redshifts have received special attention in recent years, probably because of the possibility that they may be physically associated, implying non-cosmological redshifts. Attempts have been made to explain their occurrences due to the effect of gravitational lensing. However, gravitational lensing has not offered a completely satisfactory explanation for this triplet. Furthermore, examination revealed some inadequacies and inconsistencies in the redshift identification of the observed lines in the component A. Observational results of 1009-0252 therefore remain puzzling. We propose an alternative explanation by suggesting that A, B actually constitute a close pair and C is an unrelated object in the field. We show that the observed spectrum of A can be interpreted as blueshifted. This implies that A, B are two separate objects, one (A) approaching us and the other (B) receding from us, and are not the result of gravitational lensing of a single object. The oppositely directed pair A, B may have been ejected due to the merger of two galaxies.

Key words. Quasars: emission lines, absorption lines—individual: Q 1009-0252—cosmology: miscellaneous.

1. Introduction

Several close pairs of Quasi Stellar Objects (QSOs) have been observed in recent years, some with identical redshifts and others with discordant redshifts. The former includes 1429-008A, B (Hewett *et al.* 1989), 2153-2056A, B (Hewett *et al.* 1998) and the latter includes 1009-0252A, B (Hewett *et al.* 1994; Claeskens *et al.* 2001; Sluse *et al.* 2003), 1148+0055 (Claeskens *et al.* 2000; Sluse *et al.* 2003), 1548+114A, B (Wampler 1973; Claeskens *et al.* 2000; Sluse *et al.* 2003). Such pairs have attracted considerable extra interest and attention, one reason being the possibility that the pairs may be physically associated implying a non-cosmological origin of QSO redshifts, and attempts have been made to explain the occurrences of the close pairs in terms of gravitational lensing (see references later in this section).

1009-0252 is one such system with three components (Hewett *et al.* 1994, hereafter H94). The system was independently discovered by Surdej *et al.* (1994) with the ESO Key Project. Components A and B have identical redshifts 2.74 and are separated from one another by $1''.55$. The third component C has a redshift 1.62 and is separated by $4''.6$ from A and B. Further, both A and B exhibit absorption lines which have been identified for two redshift systems, viz., 0.869 and 1.622, the latter happens to be equal to the emission redshift of the component C, and is thought to be due to gas clouds associated with a cluster hosting C (Claeskens *et al.* 2001, hereafter C01). Objects A and B, resulting from the gravitational lensing of one QSO, are regarded as the same object, and the object C is regarded differently. As such, the triple system has been considered to form a close pair QSO between components A (which is same as B) and C with discordant redshifts (C01; Sluse *et al.* 2003).

However, extensive studies of gravitational lensing for the occurrences of close pairs of QSOs with discordant redshifts have been carried out for several pairs. These studies did not find any potential luminous deflector for 1120+019 (Maylan & Djorgovsky 1989), 1429-008 (Hewett *et al.* 1989), 1635+267 (Djorgovsky & Spinard 1984) or 2345+007 (Weedman *et al.* 1982), and any geometrical analysis between an observer, a deflector and the source was not considered worthwhile. Again, observational evidences in 1148+0055 and 2143-2056 did not support the gravitational lensing hypothesis, although the possibility that the pair in the latter may have resulted from gravitational lensing has not been ruled out (Hewett *et al.* 1998). Furthermore, no secondary lensed image, expected due to gravitational lensing effect, was detected in 1548+114 (Claeskens *et al.* 2000; Sluse *et al.* 2003).

Nonetheless, some of the observed properties of 1009-0252 can be explained by the gravitational lensing hypothesis for A and B. But, under this hypothesis, several factors must be responsible for the differences observed in the properties of the continuum and emission features of individual components, viz., differential flux or differential extinction by dust from the lens to each component, or variability of the QSO that has been lensed, or the effect of differential microlensing due to a compact object, all of which have been ruled out (H94). However, a lensing galaxy has recently been claimed to be detected at a redshift ≈ 0.8, which can be associated with the absorbing cloud at the redshift 0.869, and flux variability has also been claimed to be observed for both A and B (C01). But these authors would not make any definite conclusion with the present data, and have suggested further observations.

It appears that a completely satisfactory explanation with the gravitational lensing hypothesis may not have been established for 1009-0252. The remarks of H94 is noteworthy in this connection: "None [no explanation] provide an entirely satisfactory quantitative match to the observation" and also, "components A and B may be physically distinct quasars". Moreover, the redshift identification of the observed lines in A shows some inconsistencies and inadequacies (see section 3). Observational results of the triple system QSO 1009-0252 with discordant redshifts thus remain puzzling. We were therefore prompted to look for an alternative explanation. We suggest that the occurrence of A and B is *not* due to the gravitational lensing of a single object. Instead, in our opinion, A and B are separate objects forming a close pair and C is another *unrelated* object in the field.

The pair is probably produced on being ejected in opposite directions. This would imply that one component in the pair is approaching us and would exhibit a blueshifted spectrum, while the other component is receding from us, and would exhibit a redshifted spectrum. As discussed in section 3, the rest frame equivalent widths of the major emission lines of the component A identified for the redshift determination are too small for these lines, and as such, this redshift may have been determined due to misidentification of the lines. The same lines in the component B are 1.2 to 1.3 times stronger, and their identifications appear correct. The purpose of this paper is to show that the spectrum of the component A can be better interpreted as blueshifted.

In what follows, we review observations of blueshifts in extragalactic objects in section 2. In section 3 we demonstrate some inadequacies and inconsistencies in the current interpretation of the spectrum of 1009-0252A involving redshifts. Section 4 deals with our interpretation of the spectrum in terms of blueshifts. Results are discussed in section 5. In section 6 we propose an ejection mechanism scenario to explain the close pair production involving the observed blueshift. Finally, some concluding remarks are presented in section 7.

2. Blueshifts

It is the usual practice of the astronomers to identify search lines with observed spectral lines located at the red side and determine redshifts in extragalactic objects. Identification programmes are, almost as a rule, prepared for determining redshifts *only*, and blueshifts are not considered at all.

On the other hand, the ejection process is a well recognized mechanism for the birth of QSOs. However, the ejection mechanism, applied by researchers so far, has *always* assumed ejection *away* from the observer and thus producing redshifts, although, the ejection should occur in all directions with *equal probability*. Gordon (1980) and Popowski & Weinzierl (2004) have shown that, under suitable conditions, an appreciable fraction of the vast number of currently known QSOs should exhibit blueshifted spectra if originated through ejection from parent galaxies, as conditions cannot *always* be satisfied for redshifts *only*. This basic notion appears to have been ignored in *all* models so far, and the ejection has *always* been considered *away* from us *only*, based on the assumption that blueshifted spectra do not exist. The latter, in its turn, is based on the fact that all line identification programmes are geared to the redshift determination *only*, as mentioned above.

Recent analyses have demonstrated that blueshifts can explain the observed spectra of extragalactic objects. Spectra of 15 high redshift galaxies were re-analysed and their spectra were shown to be blueshifted, redshifts assigned to them are probably misidentifications of observed lines (Basu 1998). The unusual spectrum of STIS 123627+621755 (Chen *et al.* 1999) could not be explained when further observations were presented by Stern *et al.* (2000), leaving the redshift "undetermined" (Chen *et al.* 2000), and the spectra has subsequently been interpreted in terms of blueshifts (Basu 2001a). Re-examination of host galaxy spectra of four Supernovae Ia (Basu 2000) and those of four Gamma Ray Bursts (Basu 2001b) have led to the determination of their blueshifts. Furthermore, spectra of 25 QSOs were also reanalysed and search lines of longer wavelengths were identified with their observed lines to compute blueshifts (Basu & Haque-Copilah 2001), redshifts may have been assigned to these objects due to misidentification of the observed lines. Spectra of three additional QSOs, viz., SDSS 1533-00, PG 1407+265 and PKS 0637-752, which could not be explained in terms of redshifts, were interpreted successfully in terms of blueshifts (Basu 2004). Another QSO, viz., PKS 2149-306 and an AGN CXOCDFS J033225.3-274219, each exhibit an emission feature in its X-ray spectrum which could not be explained in terms of the redshift determined from its optical spectrum (Yaqoob *et al.* 1999; Wang *et al.* 2003), and blueshift has succesfully interpreted the complete spectra (optical and X-ray) for each of these objects (Basu 2006a). Again, the X-ray source 1E 1207.4-5209 thought to be an isolated neutron star associated with the SNR G296.5+10.0, exhibits several absorption lines in the optical spectrum and also three confirmed variable absorption features in the X-ray spectrum at apparently harmonically related wavelengths, the latter being interpreted as due to cyclotron resonance. However, this interpretation has been found to show many inconsistencies, and both spectra have now been successfully interpreted as blueshifted (Basu 2006b). Further, several pairs of QSOs have been observed, with the two objects in each pair lying *across* an active galaxy, and the spectrum of each QSO in the pair has been interpreted as redshifted, apparently based on the assumption that both are moving away from the observer after being ejected from the parent galaxy. However, more logically, the two objects in the pair should be ejected in opposite directions and one spectrum should exhibit redshift moving *away* from the observer and the other should exhibit blueshift moving *toward* the observer. Spectra of four such pairs have been re-analyzed and one spectrum in each pair has been shown to exhibit blueshift (Basu 2006c). Objects like close pairs of QSOs with discordant redshifts, explanations of whose occurrence are inconclusive, should be particularly considered in this respect for the possibility of blueshifted spectra.

Moreover, GRB 011211 exhibits a redshift 2.14 computed from several absorption lines in its optical afterglow (Fruchter *et al.* 2001; Holland *et al.* 2002), while its X-ray afterglow shows several emission lines that yield a mean redshift 1.862 (Reeves *et al.* 2003). The energetics of the GRB has been explained by a supernova model on the basis of the mean redshift of the GRB as 2.141 (Reeves *et al.* 2003). However, some severe inconsistencies exist in the determination of the redshift of the spectra. It has been demonstrated that the observed spectra cannot be explained in terms of redshifts and, instead, the complete spectra comprising the optical and the X-ray, have been interpreted in terms of blueshifts (Basu 2009).

3. The current interpretation

The emission spectra of A and B demonstrate that these are 'reasonably similar', but certainly *not* identical. There are several discrepancies between the two components. The equivalent widths of the lines are significantly different for A and B, B is fainter than A, the continuum slope of B is redder than that of A. Moreover, the spectra exhibit an unexpected feature at 6550 Å, identified as 'the extremely rare' search line [NIII] 1750. The feature is prominent in the component B, 'while component A may contain a weak, somewhat broader feature at 6550 Å' (H94), and the feature 'is faintly visible in the spectrum of both components' (C01). Furthermore, examination of the spectrum of 1009-0252A revealed an additional emission line around 7723 Å which is not mentioned in C01, but appears real.

On the other hand, the redshift identification of observed lines in 1009-0252A shows several inconsistencies and inadequacies. It is known that Lyα + NV, CIV, CIII are three of the strongest lines in the search list for the redshift identification. Rest frame equivalent widths 28.4 Å, 24.6 Å, 6.4 Å obtained for these lines respectively (see Table 1), are too small for these lines.

Table 1. Redshifts and blueshifts observed in 1009-0252A.

EM/ABS(1)	λ_o(2)	W_o(3)	λ_r(4)	z_r(5)	W_{er}(6)	λ_b(7)	z_b(8)	W_{eb}(9)
EM	4539*	106	Lyα 1216	2.7327	28.4	Hα 6563	0.3084	153.3
	4585*	–	NV 1240	2.6976	–	[NII] 6584	0.3036	–
	5784	92	CIV 1549	2.7347	24.6	OI 8446	0.3154	134.4
	6523?	–	[NIII] 1750	2.7274	–	[SIII] 9532	0.3157	–
	7123	24	CIII] 1909	2.7313	6.4	HeII 10124	0.2964	34.1
	7723?	–	–	2.7247?	–	HeI 10830	0.2869	–
ABS I	4834.06	1.22	FeII 2586	0.8689	0.65	OI 8449	0.4279	2.13
	4859.63	2.33	FeII 2600	0.8689	1.25	CaII 8498	0.4281	4.07
	4868.61	1.22	FeII + MnII	–	–	CaII 8542	0.4300	2.14
	4890.04	0.45	FeII	–	–	CaII 8662	0.4355	0.80
ABS II	4962.77	0.32	–	–	–	H2 19570	0.7464	1.26
	5032.48	0.41	MgII 2796?	0.7992	0.23	H2 20338	0.7526	1.66
	5043.08	0.86	MgII 2803?	0.7992	0.48	H2 20587	0.7550	3.51
	5239.41	2.45	MgII 2803	0.8689	1.31	H2 20735	0.7432	9.51
	5255.93	3.16	MgII 2796	0.8798	1.69	H2 21218	0.7523	12.76
	5332.78	0.6	MgI 2853	0.8692	0.32	H2 21542	0.7525	2.42
	5505.50	0.37	CrI 2096	–	–	H2 22233	0.7524	1.49
ABS III	6793.63	1.91	FeII 2586	1.6264	0.73	Pδ 10049	0.3239	2.83
	6829.30	4.38	FeII 2600	1.6265	1.67	HeII 10124	0.3254	6.49
	7345.56	6.52	MgII 2796	1.6268	2.48	HeI 10830	0.3217	9.61
	7363.27	6.79	MgII 2803	1.6264	2.59	Pγ 10938	0.3268	10.09
	7494.70	1.33	MgI 2853	1.6270	0.51	OI 11210	0.3314	1.99

References: All emission lines are from Fig. 5 of C01, and all absorption lines are from Table 2 of H94.

$*$ Combined values for W_o, W_{er} and W_{eb}.

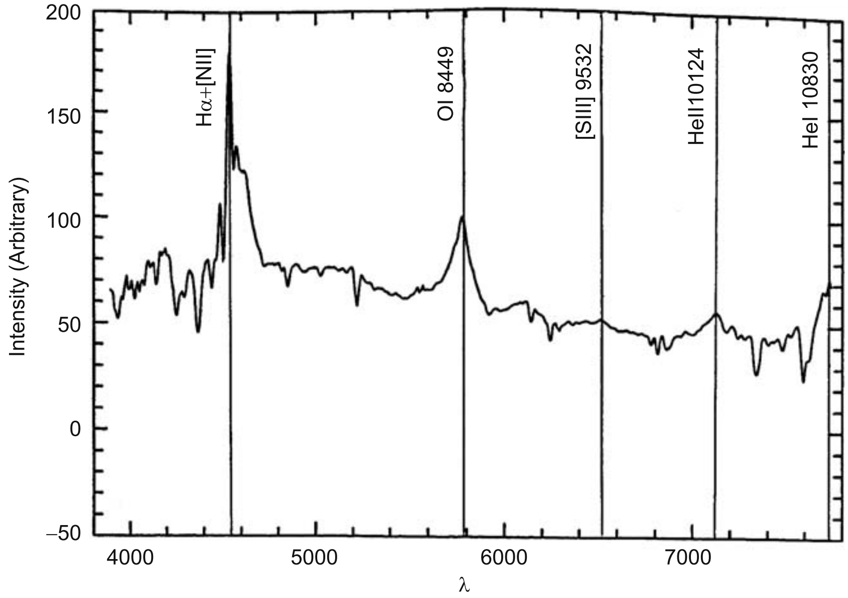

Figure 1. Spectrum of the component A of the triple system QSO 1009-0252A, B, C, adopted from Claeskens *et al.* (2001), with positions of identified lines, blueshifted as shown in Table 1, marked. The abscissa denotes the observed wavelengths. The spectrum has been extracted using the MEM method as presented in C01. Also, the data are smoothed slightly using five pixels filter box.

Additionally, three absorption lines, viz., those at 4962.77 Å, 5032.48 Å and 5043.08 Å, have either no or doubtful identifications. The lines at 5239.41 Å and 5255.93 Å have been identified with MgII doublet with wavelengths in the reverse order. The lower wavelength 5239.41 Å has been identified with the higher wavelength MgII 2803 and the line at 5255.93 Å has been identified with MgII 2796. Also, there is a serious error in the redshift computation of the line at 5255.93 Å which should be 0.8798 and not 0.8688.

4. The blueshift interpretation

We have interpreted the observed spectrum of 1009-252A, both emission and absorption, in terms of blueshifts, by identifying the observed lines with search lines of longer wavelengths as shown in Fig. 1 and Table 1.

In Table 1, column (1) gives the type of spectrum whether emission (EM) or absorption (ABS), column (2) is the observed wavelength (λ_o), column (3) is the observed equivalent width when available (W_o), column (4) is the search line used for identification for the redshift measurement (λ_r), column (5) is the redshift value (z_r), column (6) is the emitted equivalent width corresponding to the redshift (W_{er}), column (7) is the search line used for the identification of blueshift measurement (λ_b), column (8) is the blueshift value (z_b) and column (9) is the emitted equivalent width corresponding to the blueshift (W_{eb}).

It will be seen in Table 1 that we have identified *all* the observed lines, emission and absorption, exhibited by the spectra. The identified lines include usual Balmer, oxygen,

Table 2. Mean redshifts, blueshifts and spreads.

EM/ABS (1)	z_{rm} (2)	Δz_{r} (3)	z_{bm} (4)	Δz_{b} (5)
EM	2.7252	0.0371	0.3044	0.0288
ABS I	0.8689	0.0109	0.4304	0.0097
ABS II	1.6266	0.0006	0.7506	0.0086
ABS III	0.7992?	0.0000?	0.3258	0.0076

nitrogen, sulphur and helium lines in emission, of reasonable rest frame equivalent widths. Figure 1 shows the actual emission line spectrum of 1009-0252A with the blueshifted features identified. We have identified the feature at 4539 Å (Lyα1216 + NV1240 in the redshift scenario) as Hα6563 and [NII]6584. Absorption features have been identified, in three systems, viz., an oxygen line and the calcium triplet for the first system (ABS I), molecular lines of hydrogen including the strongest H2 21218 feature for the second system (ABS II), and Paschen series, helium and oxygen lines for the third system (ABS III). These are all well recognized search lines observed in the extragalactic literature.

The standard procedure has been followed in computing blueshift values in emission and absorption, viz., a 'shift' (red or blue) can be confirmed only when a minimum of two observed lines exhibit the same value after being identified with two separate search lines, and any third or more observed lines have also to obey this value when identified with other separate search lines (Basu 1973a, 1973b). In some cases, the stronger component of a doublet and/or the lower order line(s) of a series have been identified but the weaker component of the doublet and/or the higher order line(s) may be too weak to be seen, or the weaker component of a doublet and/or the higher order line(s) of the series have been identified but the stronger component of the doublet and/or the lower order line(s) are outside the observed region of the spectrum.

Additionally, we have also computed the quantity 'spread' for both redshift and blueshift systems, which is a measure of the goodness of fit for the identification process (see section 5).

Table 2 summarizes the result and shows emission (EM) or absorption (ABS) systems (column 1), mean redshifts z_{rm} (column 2), spreads in redshift systems Δz_{r} (column 3), mean blueshifts z_{bm} (column 4), spreads in blueshifts Δz_{b} (column 5). 1009-252A has the blueshift 0.3044, and exhibits three blueshift systems in absorption, viz., 0.3258, 0.4304 and 0.7506.

5. Discussion

The spread (Δz) is a measure of the range of values in each system, redshift (r) or blueshift (b), and is computed as the difference between the maximum and minimum values in the 'shift' (red or blue) in each system.

It should be noted that, in principle, the spread should be small – close to zero. However, the spread depends on the values of the 'shift' (red or blue) of individual lines, and the latter, in its turn, depends on the exact value of the observed wavelength (λ_{o}), which is the centroid of the line profile used for the determination of the 'shift'. λ_{o} is very difficult to be determined accurately in practice even in high s/n and high resolution records, as the profile may be double- or multi-peaked, broad, blended, of complex nature due to various physical reasons. Hence, at least upto a certain extent, the spread may be due to some real physical effect rather than any error.

Table 2 demonstrates that the spread varies between 0.0006 and 0.0371 for redshift systems (without considering the third doubtful system), and between 0.0076 and 0.0288 for blueshift systems, the latter being somewhat smaller than the former. Furthermore, redshift literature would reveal that for absorption systems $\Delta z_{\mathrm{r}} < 0.01$. Table 2 shows that, for at least one system, $\Delta z_{\mathrm{r}} > 0.01$. The blueshift systems (ABS) have all $\Delta z_{\mathrm{b}} < 0.01$.

Furthermore, the spectrum of the component A also exhibits a series of absorption features, the so-called 'forest' blueward of the emission line at 4539 Å. In the blueshift interpretation, these features constitute the Hα forest which corresponds to the Lyα forest in the redshift interpretation. However, Hα forest implies that these absorptions originate from higher levels which, in turn, implies that these levels should be populated. This, again, in turn, necessitates that the particle density of the intergalactic medium (IGM) should be large. Unfortunately, this is not well known in the existing literature. Nevertheless, it is known that soft X-ray detection is an indicator of such particle density, and further investigation is suggested in this respect. It is interesting to note in this connection that Lyβ, OVI, and CIII forest (Danforth *et al.* 2006), and also X-ray forest (Nicastro *et al.* 2005) have been reported recently to suggest absorption in IGM.

Finally, it should be noted that the blueshift determined here for the spectrum of 1009-0252A is the shift in the wavelengths of the lines emitted by the component A to the wavelengths measured on earth by the earth-bound observer. The blueshift value is not the result of the Doppler effect alone, but is the result of superposition of the cosmological redshift produced by the general expansion of the universe and the Doppler shift due to the component A approaching the observer produced by the ejection mechanism as described in section 6 below. 1009-0252, A and B both components are therefore cosmological objects and not local ones.

Furthermore, it is known that Doppler shifting of the continuum is expected to give rise to an enhancement of the optical luminosity of the QSO for large blueshifts, since the infrared (IR) part of the continuum spectrum is shifted to the optical part and the IR continuum of QSOs exhibits a steep rise in the spectrum (Burbidge & Burbidge 1967). However, as seen in Table 1, the identified lines are located in the near-infrared (NIR) region and not in the IR region. The same is therefore true for the continuum involved. As such, the optical luminosity of A is expected to be somewhat large but certainly not very large for the blueshifted spectrum, as it is the less strong NIR part of the continuum and not the much stronger IR that is being blueshifted to the optical part. This is supported by the observational evidence (H94) which shows that the component A (blueshifted spectrum) is really somewhat more luminous than the component B (redshifted spectrum), the *B, V* magnitudes of A and B being 18.2, 17.9 and 20.3, 20.5, respectively.

6. The close pair production: a proposed scenario

The analysis presented here shows that the close separation pair QSO 1009-0252A, B comprises two separate objects – one approaching us and thus exhibiting blueshifts, the other moving away from us and thus exhibiting redshifts – and is not produced by the gravitational lensing of a single object. We propose a scenario in terms of the ejection mechanism to explain the production of the close pair involving the observed blueshifts.

It is known that merger of black holes may lead to their ejections in oppositely directed pairs due to the inherent instability of the systems – the so called 'sling-shot' mechanism (Saslaw *et al.* 1974; Valtonen 1976a, 1976b). This situation may arise when two galaxies, each hosting a supermassive black hole at its centre, merge. Supermassive black holes are known to be seats of activities at the centres of galaxies (Basu *et al.* 1993; Capetti *et al.* 2005). A binary system is believed to be initially formed by the two central black holes (Valtaoja *et al.* 1989). Such systems have indeed been detected in NGC 6240 (Kommossa *et al.* 2003), probably in OJ 287 (Valtonen *et al.* 2006) and in SDSS J153636.22+044127.0 (Boronson and Lauer 2009). Further progress in the merger process would lead to the ejection of supermassive black holes (primaries) at relativistic or non-relativistic speeds (Mikkola & Valtonen 1990). It is noteworthy here that Haehnelt *et al.* (2006) have recently presented evidence of ejection of a supermassive black hole by the 'sling-shot' mechanism resulting from merger of galaxies. In addition, satellite black holes of intermediate masses are also believed to be usually accompanying the central supermassive black holes in galaxies (Carr 1978; Carr *et al.* 1984) and are ejected during the merger process, some of them assuming eccentric orbits around the primary ones (Valtonen & Basu 1991).

Again, a black hole at the centre of a galaxy is also known to possess a gaseous accretion disk around it, which survives the tidal disruption that accompanies the ejection process (Rees & Saslaw 1975; Lin & Saslaw 1977; De Young 1977). The interaction between the disk with the black hole and the surrounding may lead to the formation of a QSO (Rees 1984; Osterbrock & Mathews 1986; Valtonen & Basu 1991; Spriegel *et al.* 2005). It is reasonable to envisage that the satellite black holes, presumably also possessing gaseous disks, would undergo the same process of interaction with the gaseous disks around them and the surroundings, as their primary counterparts, albeit at reduced scales owing to their smaller masses, and would end up as faint or nascent galaxies.

The final result of the ejection process due to the merger of two galaxies is the birth of two QSOs ejected in opposite directions each accompanied by several galaxy-like objects, the latter acting as absorbing clouds if and when lying along the line of sight. To this respect, it was shown earlier (Basu 1982) that absorbing clouds are probably linked with the birth of a QSO itself. Also, faint or nascent galaxies associated with QSO-like objects have been observed (Dressler *et al.* 1993; Tripp *et al.* 1999; Teresse *et al.* 1999).

In principle, of course, it is possible for the ejection to occur in any direction. However, the probability of the occurrence toward the observer is non-zero. Hence, it is conceivable that 1009-0252A is the result of the ejection process and is approaching us exhibiting blueshifts in emission and absorption lines, the latter being produced by the accompanying three absorbing clouds. The other member of the pair, viz., 1009-0252B is also ejected by the same process, viz., the 'sling-shot' mechanism, and is receding from us exhibiting the redshifted spectra.

7. Concluding remarks

Possibility of blueshifts in extragalactic spectra has been ignored in modern line identification programmes. On the other hand, advances in modern observational technology are making new discoveries, which, at least in some cases, cannot be explained and interpreted by the traditional redshift process. Occurrence of close pairs of QSOs is one such phenomenon, which appears to lack satisfactory explanations, although serious attempts have been made to explain it in terms of gravitational lensing of a single object. In this paper, we have studied one such pair, viz., 1009-0252A, B and have demonstrated that the spectrum of one of the objects in the pair can be interpreted in terms of blueshifts. Based on our analysis, we suggest that the pair consists of two separate objects originated by the ejection mechanism resulting from the merger of two galaxies. The third component, viz., C, of the triple system 1009-0252A, B, C is an unrelated object in the field.

Finally, it should be noted that the blueshift does not contradict the redshift but complements it, since only a fraction of extragalactic objects, not all, are probably exhibiting blueshifted spectra. We recommend that unusual cases, which appears difficult to be explained when spectra are interpreted in terms of redshifts, should be particularly looked for the alternative blueshift interpretation.

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