A GRAVITATIONAL LENS CANDIDATE BEHIND THE FORNAX DWARF SPHEROIDAL GALAXY

C.G. TINNEY

Anglo-Australian Observatory
PO Box 296, Epping. NSW. 2121 Australia.

CCD astrometry makes possible milli-arcsecond precision relative astrometry at faint magnitudes (Tinney 1994a). The measurement of proper motions for the nearest galaxies is therefore a project requiring only years – not decades. A prerequisite for such measurements, however, is a set of unresolved, extragalactic reference objects – ie. QSOs. While searching for such objects behind the Fornax dSph galaxy, Tinney (1995b) discovered the QJ0240-343AB system as a pair of bright, UV-excess objects (U–B $= -1.0$, B $= 19.0$ & 19.8) with a separation of $6.1''$. Spectra obtained with the 3.9 m Anglo-Australian telescope and the RGO+FORS spectrographs (Fig. 1) have shown both components of the pair to be at a redshift of $z = 1.4$, with a rest velocity difference consistent with zero at a 1-σ limit of 180 km/s. The spectra also show a definite metal-line absorption system at $z = 0.543$ and a possible system at $z = 0.337$. No bright lens is seen, but the strong similarities in the spectra suggest a gravitational lens nature.

If the system is a lens, then the large difference in the line-to-continuum-ratio of the components suggests either strong variability, or microlensing of the continuum source. A search has been made of the literature and astronomical archives for images of the QJ0240-343AB pair – the data obtained to date are shown in Table 1. (The data from the NTT is in the R band, but non-photometric. Stars in the field have been used to create a uniform, but arbitrary, zero-point. The zero-point of the UKST data is very uncertain.) It seems clear from this data that the system is genuinely variable, on time scales of a few years (the time scale for micro-lensing should be ~30 years). The existing data does not enable statements about time delays to be made, but suggest that monitoring will straightforwardly provide much information on this system.

C. S. Kochanek and J. N. Hewitt (eds), Astrophysical Applications of Gravitational Lensing, 351–352.
© 1996 *IAU. Printed in the Netherlands.*

https://doi.org/10.1017/S0074180900231781 Published online by Cambridge University Press

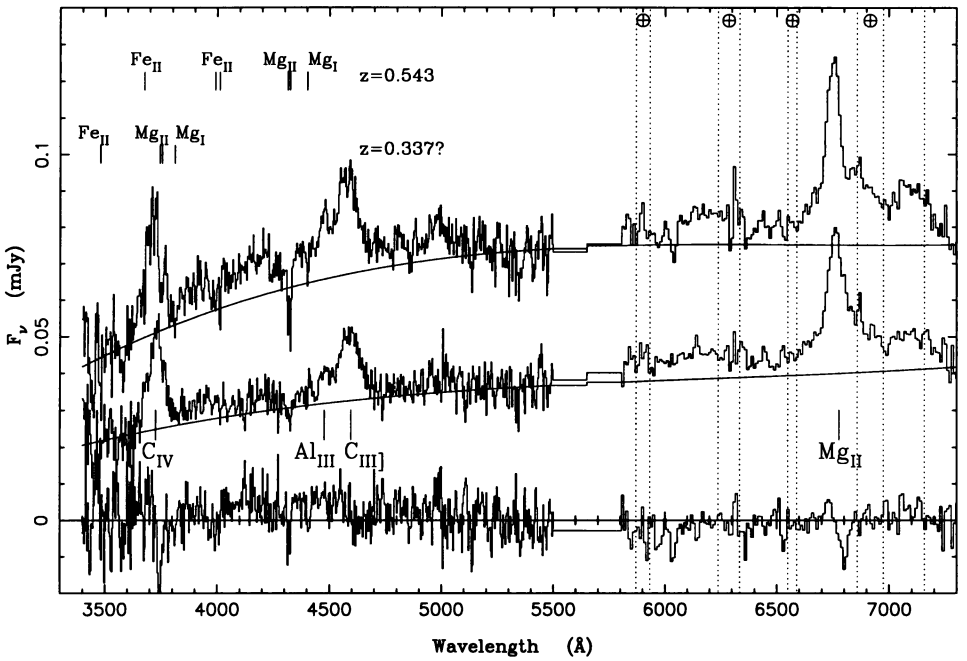

Figure 1. Spectra obtained with the 3.9m AAT and RGO+FORS of QJ0240-343A *(upper trace)* and QJ0240-343B *(middle trace)*, and the difference between the line spectra *(lower trace)* after the subtraction of a continuum. Notice that the lines have roughly equal strength in the two components, while the continuum of A is twice that of B.

TABLE 1. QJ0240-343AB Photometry

Source	Epoch	A	B	Unc	A–B
Demers *et al.* 1994	20 Dec 1974	B_j=19.72	B_j=19.97	±0.1	ΔB_j=–0.38
	20 Dec 1974	V=19.71	V=20.43	±0.1	V=-0.72
UKST/COSMOS	16 Nov 1979	B_j=17.5	B_j=17.5	(±0.2)	ΔB_j=0.0
ESO/NTT Archive	5 Aug 1991	R_{91}=19.95	R_{91}=20.54	± 0.03	ΔR_{91}=-0.59
ESO/NTT Archive	24 Oct 1992	R_{91}=19.94	R_{91}=20.35	± 0.03	ΔR_{91}=-0.41
Tinney 1995	27 Oct 1994	B=19.00	B=19.77	± 0.05	ΔB=-0.77

References

Demers, S., Irwin, M. & Kunkel, W. 1995, AJ, 108, 1648
Tinney, C.G. 1995a, in Science with the VLT, eds. J.R. Walsh & I.J. Danziger, (Springer-Verlag: Heidelberg)
Tinney, C.G. 1995b, MNRAS, in press

https://doi.org/10.1017/S0074180900231781 Published online by Cambridge University Press