

PHOTOMETRIC MONITORING OF THE LENSED QSO 0957+561

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We present our first results of a photometric monitoring project of the twin quasar 0957+561. This project aims mainly at the improvement of the determination of the time delay $\Delta T(A,B)$ for this gravitational lens, since the “time delay controversy on QSO 0957+561 (is) not yet decided” (Pelt et al. 1994). In addition, the quite large field of the CCD used allows also a long-term astrometric and photometric study of stars and galaxies in the field within a radius of about 10 arcminutes around the lens.

The present results are based on observations made with the 1m Cassegrain telescope of the Hoher List Observatory, its focal reducer (about f/4) and its 2048 × 2048 pixel CCD camera ($15 \times 15 \mu^2$), with a useful field of 20×20 arcmin² around this GL. A Bessel R filter has been used for the observations, but some V exposures have been taken as well in order to determine the color of the objects in the field. The exposure times were 3, 4 or 5 minutes. Longer exposures were excluded in order to avoid the guiding errors of the telescope.

Useful CCD data were obtained in two nights in April and three more nights in May 1995. Seeing was between 2.5 and 3.6 arcsecs. We have used DAOPHOT as well as ESO - MIDAS data fitting procedures for the data reduction. We fitted simultaneously two two - dimensional Moffat functions to the QSO images A and B, determining the PSF defining parameters

during fitting. One gets in this way the magnitude difference between the two QSO images. We combined this with aperture photometry of the total flux of the two QSO images and derived the magnitudes for each one of the images. We used star S3 (or ϵ) as a local standard star, adopting $R = 14.77$ mag from Schild and Weekes (1984, see there for a detailed discussion of the accuracy of this value). The magnitude difference between the two images and the astrometric results obtained from the two methods are the same at a 99% confidence level. To calculate the magnitude of the image B we adopted $R(G_1) = 18.7$ mag (Vanderriest et al. (1989)) for the lensing galaxy G1. According to them the accuracy of this value is about 0.1 mag.

Results of our observations are presented in Table 1. Accuracies listed correspond to the mean error of the nightly mean.

The pixel size is $0.81 \pm .01$ arcsecs; the accuracy of the photocenter determination of one exposure is about 0.04 arcsecs.

TABLE 1. TwQSO Nightly Mean R Magnitudes

Date	R_A	σ_{R_A}	R_B	σ_{R_B}	$N_{exp.}$
24-APR-95	16.43	.01	16.29	.01	19
28-APR-95	16.47	.02	16.33	.02	10
22-MAY-95	16.39	.01	16.29	.02	10
23-MAY-95	16.49	.03	16.43	.03	5
27-MAY-95	16.41	.02	16.29	.01	3

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References

- Pelt, J., Hoff, W., Kayser, R., Refsdal, S., & Schramm, T., 1994, *A&A*, 286, 775
 Schild, R.E. & Weekes, T., 1984, *ApJ*, 277, 481
 Schild, R.E. & Cholfn, B., 1986, *ApJ*, 300, 209
 Vanderriest C., et al., 1989, *A&A*, 215, 1