

*Letter to the Editor***UBVRI photometry of SN 1994D in NGC 4526****H. Wu¹, H.-J. Yan^{1,2}, and Z.-L. Zou¹**¹ Beijing Astronomical Observatory, Chinese Academy of Sciences, 100080 Beijing, China² Department of Physics, Tianjin Normal University, 300074 Tianjin, China

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Abstract. In this paper, we present UBVRI photometric results of SN 1994D which covers the period from March 11 to April 4. All these data were obtained with a Ford 2048x2048 CCD, which has been attached to the 60/90 cm Schmidt telescope in Xinglong station, BAO. The light curves indicate that the supernova is a normal type Ia, a good distance indicator of its parent galaxy. The distance modulus of NGC 4526 is given as 30.07 ± 0.42 .

Key words: Supernovae – SN 1994D – photometry – distance

1. Introduction

Treffers, Filippenko, Van Dyk, and Richmond (1994) first reported their discovery of SN 1994D on March 7 (UT) 1994. Shanks, Croom, and Tanvir (1994) found that its B-V color is close to the mean of type-Ia supernovae at maximum which was confirmed by later spectral obser-

a field of view of $58' \times 58'$. From March 11 to April 4, 1994, 17 nights were used to observe the source, covering the peak phase. In the first night, only the images in U, B and V bands were taken, while in some other nights the supernova was observed 2 to 3 times in all five filters, which allowed us to estimate the photometric accuracy. The exposure times ranged from hundreds to thousands of seconds, depending on the filter used and the weather condition.

Data reduction was made in the usual way: bias subtracted and flat field corrected. But no dark-current subtraction was carried out since it was insignificant for the CCD chip we used. Flat fields were taken each day. For the data of the first several nights (Mar 11 to Mar 18), dome flats were used for all bands. But due to technical reasons, twilight flats were used after Mar 19 as flat fields for the images taken in U, B and V bands, while dome flats were used for the images taken in R and I bands.

Since none of the 17 nights was photometric, we had to rely on differential photometry. The photometric results of ten stars in the vicinity of NGC 4526 were selected from

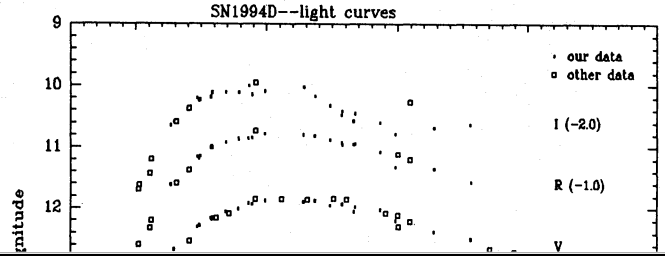
Table 1. Magnitudes of SN 1994D

UT (March)	U (mag)	UT (March)	B (mag)	UT (March)	V (mag)	UT (March)	R (mag)	UT (March)	I (mag)
11.72	12.61	11.70	13.01	11.69	13.00	-	-	-	-
12.72	12.22	12.68	12.76	12.64	12.75	12.61	12.61	12.63	12.64
12.77	12.23	12.82	12.71	12.85	12.67	-	-	12.88	12.59
14.67	11.78	14.65	12.30	14.64	12.31	14.63	12.16	14.63	12.20
14.73	11.73	14.76	12.30	14.77	12.28	14.78	12.18	14.78	12.24
14.82	11.73	14.84	12.25	14.84	12.29	14.85	12.15	14.85	12.23
15.61	11.60	15.65	12.12	15.66	12.16	15.67	12.01	15.68	12.18

3. Results

Table 1. presents the final photometric results. We simply give the magnitude for each image we have taken. Fig. 3 shows the plot of our data with that of others.

The error embedded in our data is mainly introduced by three sources. First, the flat-field corrections may bring about 2% uncertainty; Second, the magnitudes of our reference stars have an accuracy of 0.07, 0.03, 0.03, 0.03, and 0.02 mag in U, R, V, B, and I respectively. The third or



one magnitude below maximum is approximately 27 days. All these are not so much different from the value of the light curve templates for SNe Ia of Leibundgut (1988), where the decreases are 1.22 and 0.64 mag for B and V, and the width of V curve is about 33 days, and quite similar to SN 1989B (Barbon et al. 1990) in NGC 3627 and SN 1981B (Buta and Turner 1983) in NGC 4536, which are classified as normal Ia supernovae (Branch et al. 1993). We could not find out the change of decline rate, since we didn't observe the supernova long enough.

The light curves for U-B and B-V colors increased even after the maximum, while that for V-R and V-I colors de-

1979b), 30.49 ± 0.25 (de Vaucouleurs and Olson 1984), and 29.96 ± 0.5 which can be deduced from Hanes' (1977) paper by using the weighted mean apparent magnitude of the globular clusters in NGC 4526 and the mean absolute magnitude in our galaxy, but somewhat different from 31.47 ± 0.37 (de Vaucouleurs and Olson 1982), 31.13 (Tully 1988) and 29.30 (Bottinell et al. 1984). According to Branch and Miller (1993), its small distance to us and the low luminosity would classify SN 1994D as a member of the subluminous group.

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