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## OPTICAL OBSERVATIONS OF SN 1996C IN MCG+08-25-47

Supernova (SN) 1996C in MCG+08-25-47 was discovered on 1996 Feb. 15 (UT) by J. Mueller (1996) on a IV-N plate obtained by herself and K. M. Rykoski in the course of the second Palomar Sky Survey. Precise positions were measured by Sicoli (1996) on UT Feb. 22.99 and by Balam (1996) on UT Feb. 24.47. The offset from the center of the galaxy was determined to be 13".4 north and 1".6 west of the galaxy's nucleus. Garnavich et al. (1996) provided confirmation of SN 1996C from an image obtained by J. Luu with the 1.2-m telescope at Mt. Hopkins on UT Feb. 17.5. The supernova was estimated to be V = 16. In addition, a spectrogram of SN 1996C was obtained by D. Koranyi (1996) using the 1.5-m Tillinghast telescope, showing SN 1996C to be a type-Ia supernova near maximum. Weak H $\alpha$  emission from the host galaxy indicated a redshift of z = 0.027.

Photometric and astrometric observations of SN 1996C were obtained on four nights using the 1.82-m Plaskett telescope and SITe-1 charge-coupled device (CCD) of the Dominion Astrophysical Observatory. All CCD frames were bias subtracted and flat fielded,



Figure 1. Secondary standard stars near MCG+08-25-47

Star	(2000)	(2000)	V	B-V
А	$13^{h}50^{m}47.81$	+49°18′38″9	$14.93 \ (0.01)$	+0.56(0.01)
В	13 <sup>h</sup> 51 <sup>m</sup> 07 <sup>s</sup> .46	+49°18′28″.9	16.76(0.01)	+0.55(0.02)
С	$13^{h}50^{m}52^{s}.79$	$+49^{\circ}17'05''_{}5$	16.59(0.03)	+1.00(0.03)
D	$13^{h}50^{m}56.47$	$+49^{\circ}16'01''_{\cdot}0$	$17.31 \ (0.06)$	+0.93(0.06)

using median filtered twilight flats, in the usual manner using IRAF<sup>1</sup>. Local photometric standard stars from the Guide Star Photometric Catalog (Lasker et al., 1988) were observed at the same airmass as the supernova field. The data has been brought to the standard system using color transformation coefficients that were determined by observation of the M92 standard stars of Christian et al. (1985).

A photometric sequence of secondary standard stars (Figure 1) was established in the field of MCG+08-25-47 and are listed in Table 1. The astrometric positions of the secondary standard stars were calculated from a frame constants solution involving six Guide Star Catalog (GSC) stars (Jenkner et al., 1990). The mean error, within the polygon of GSC stars, was determined to be 0".6. A detailed description of our astrometric reduction techniques can be found in Tatum et al. (1994).

Differential magnitudes and colors of SN 1996C are listed in Table 2 for four nights (UT Feb. 24, 25, March 1, and March 14). The photometry was performed using the (IRAF) PHOT routine with a measuring aperture of 2".8 and sky annulus of 19" radius. The FWHM of the stars was determined as 2".4. The comparison and check stars are labelled as stars A and B in Table 1 and Figure 1. The standard deviation of all nightly comparison – check star differential magnitudes was 0.012 and 0.011 magnitudes in the B and V filter images.

Supernova 1996C is located 14" north of the core of its host galaxy. The host galaxy can be detected as far as 23" north of the galaxy core. Contamination of the supernova observations by the host galaxy has been minimized by building models of the host galaxy using elliptical isophotal fitting (Jedrzejewski, 1987), as implemented with the IRAF routines ELLIPSE and BMODEL in the STSDAS package, and subtracting the model galaxies from the original images. Errors, induced by the modelling process, have been estimated by placing artificial SNe in areas of the host galaxy that have similar surface brightness and gradient to the region containing SN 1996C. The mean error induced by the modelling process is 0.02 in the B images and 0.01 in V images. The resultant galaxy subtracted observations are listed in Table 2 as  $V_{sub}$  and  $B - V_{sub}$ .

Preliminary fitting (Figure 2) of the V band light curve template of Leibundgut (1988) to the galaxy-modelled observations of Table 2 implies that (B) maximum occurred on UT 1996 Feb. 15 (JDT 2450128) when SN 1996C was apparent magnitude V = 16.65.

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JDE	$V_{Sub}$	$B - V_{Sub}$	V	B-V
(2450000+)				
137.97	16.87 (0.01)	+0.08(0.02)	$16.72 \ (0.02)$	+0.11(0.02)
138.90	$16.91 \ (0.02)$	+0.14(0.03)	$16.73 \ (0.02)$	+0.16(0.03)
143.89	$17.21 \ (0.01)$	+0.33 $(0.02)$	$17.00 \ (0.02)$	+0.37 $(0.03)$
156.90	18.09(0.01)	+0.81 (0.05)	17.94(0.02)	+0.92(0.04)

Table 2. Observations of SN 1996C



Figure 2. Light curve (V) of SN 1996C

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