

Project Note # 1: Supernova Light Curve

The following table is the observed log of the apparent visual magnitudes V of SN 1987A for several dates. The dates are given in decimal days since Julian date 2446800, corresponds to January 4, 1987, so the first date in the table is March 4, 1987 at 0238 U.T.

JD 2446800+	V	JD 2446800+	V
58.61	4.45	135.53	2.97
65.63	4.27	143.47	3.02
73.59	4.13	154.49	3.39
81.58	3.97	160.49	3.71
86.60	3.83	165.46	4.03
91.53	3.67	172.47	4.29
97.51	3.49	179.46	4.03
103.55	3.33	181.92	4.43
108.49	3.22	206.90	4.71
113.49	3.11	213.90	4.79
120.50	3.03	237.89	5.03
129.49	2.98	238.84	5.13

1. What type of supernova is SN 1987 A from the shape of the light-curve?
2. What is the absolute visual magnitude of this type of supernova at maximum from Weiler & Sramik (1988. **ARAA** 26:295), Table-1 ?
3. What is the apparent visual magnitude of SN 1987A at maximum ?
4. How long does it take for the brightness of SN 1987A to drop by half of its maximum brightness ?
5. What is the distance to the Large Magellanic Cloud estimated from SN 1987A with the results of (2) and (3) ? Use the distance modulus formula:

$$m - M = 5 \log d - 5 ,$$

where m = apparent magnitude, M = absolute magnitude, and d = distance (pc).

6. The distance to LMC from some other studies yield d = 55 kpc. Compare this with your result from (5).
7. Let say, you believe d = 55 kpc, then, what is the absolute visual magnitude of SN 1987A at maximum ?
8. What conclusions can you draw from the discrepancy between the two results?