ASTR 5590 - SN 1987a

Observed on Feb. 24th, reached $m = 3$ by mid-May

Classified as Type II, but weird

- blue supergiant progenitor: Sanduleak 69202
  - B star, ~20 $M_\odot$
- model to explain weirdness requires $\frac{1}{3}$ solar abundance, consistent w/ LMC

Also 2 experiments running to detect proton decay, detected ν_e

12 @ Kamiokande in Japan

8 @ IMB in an Ohio salt mine

6–39 MeV, $\Delta t \sim 12$ s

★ SN 87A light curve

Dust forms, decay switches from ^{56}Co to ^{57}Co

Lights up ring (previous ejecta), gives

$d = 51 \pm 3$ kpc based on [OIII] emission peak in ring, which gave light travel time & thus physical size

Blast wave hits ring ~2002,

↑ X-ray & radio synch. emission

Ring & outer rings due to bipolar outflow

★ SNR slide

SNR observable for 100,000 yr
- affect 50 pc regions
- heat them to 10^6 K
- accel. rel. particles: CR source

Radioactive decay

$-\frac{dN}{dt} \propto N$: Poisson prob. of element decaying

$$-\frac{dN}{N} = \lambda\, dt \rightarrow N(t) = N_0\, e^{-\lambda t}$$