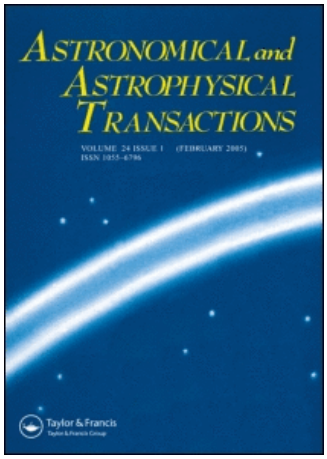

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A review of: "Supernova"

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BOOK REVIEW

SUPERNOVA 1987A, by V. S. Imshennik & D. K. Nadezhin

All relevant observational data for SN 1987A have been carefully collected by the authors, such as the identification of the Presupernova, spectral and photometric optical observations, X-ray and gamma radiation including the discovery of ^{56}Co gamma-lines, radio emission and neutrino emission. Modern theoretical understanding is summarized simultaneously.

The Presupernova proved to be a massive (15–25 $M_\odot$) B3 supergiant. The observed light curve can be explained in terms of the gas cooling behind a shock wave propagating through the stellar atmosphere during first 50 days and the envelope heated by radioactive cobalt afterwards.

The optical spectra show many overlapping emission and absorption lines, broadened by the Doppler effect, as well as narrow interstellar absorption features in the wavelength range 1200–2500 Å. The shape of the line profiles in the region $\lambda\lambda$ 3500–9500 Å is typical of a gas expanding with a radial velocity gradient. The optical and near-infrared spectra can be explained by the presence of hydrogen lines as well as those of neutral and singly ionized Na, Mg, Si, Ca, Ti, Cr, Fe and Ni. No evidence has been found for higher than normal relative abundances of these elements. The analysis of the line shapes provides information about the density gradient inside the envelope. Infrared observations revealed CO and SiO emission bands in the 4–13 μm range, and rather highly ionized FeIII, S III, and S IV in $\lambda\lambda$ 16–29 μm.

The X-ray emission was discovered in the photon energy range 20–300 keV and at 4–30 KeV. It can originate from the decay of ^{56}Co and from a young pulsar.

The radio emission from SN 1987A was detected nearly two days after the optical flare at frequencies 0.843 GHz, 1.4 GHz, 2.3 GHz, and 8.4 GHz. The radio pulse has carried away approximately $8 \cdot 10^{38}$ ergs during nearly 5 days. The brightness temperature exceeded 10^7 K, implying a non-thermal origin of the radio emission. Radio flares with such properties have never been observed in other extragalactic supernovae.

The observations of the neutrino pulse are consistent with the model of 2 $M_\odot$ iron-oxygen stellar core collapsing onto a neutron star.

K. V. BYCHKOV