Observations of SN2014J by the Harvard Observing Project

A Light Curve and Spectrum

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What is SN2014J?

A chance discovery on January 21, 2014 by Steve Fossey et al. of University College London during an undergraduate telescope training session revealed the closest Type Ia supernova in the past 42 years. Type Ia supernova are valuable distance measures and an explosion this close allows for accurate calibration.

What is HOP?

The Harvard Observing Project (see poster 320.05 by A. Bieryla) took over 100 images of SN2014J over four months and engaged both graduate and undergraduate students alike in learning about our universe. The program uses Harvard’s Clay Telescope, a 0.4m DFM design, and an Apogee Alta U47 imaging CCD.

Light Curves

For supernova, seeing brightness decrease quickly (Type I) or slowly (Type II) can lend insight to the progenitor's properties and hint at how it detonated. A Type I is usually modeled by a white dwarf star which exceeds the Chandrasekar limit. A Type II is usually modeled as an implosion of a massive star.

Observations & Reduction

HOP observed for 30 to 300 seconds in B, V, R, and I bands with Harvard’s Clay Telescope from January 24th to early May. Absolute photometry was performed using magnitudes from SDSS and with MaxImDL. Magnitudes transforms were done with equations listed by Jordi et al. (2006). These created the following uncertainties for the light curve: R ± 0.002 B ± 0.002; V ± 0.001; I ± 0.001. The spectrum was obtained by Astronomy 100, an undergraduate class at Harvard, with the FAST Spectrograph for the Tillinghast 1.5m Telescope at the Whipple Observatory.

Spectral Analysis

A spectrum of a supernova allows for a refined classification and an insight into the progenitor’s chemical composition. Type I have no hydrogen lines, Type Ia have a strong silicon line at 615nm, Type Ib have strong helium lines, and Type II have strong hydrogen lines. Our spectra was reduced with the RoadRunner program (See Tokarz and Roll 1997).

References: