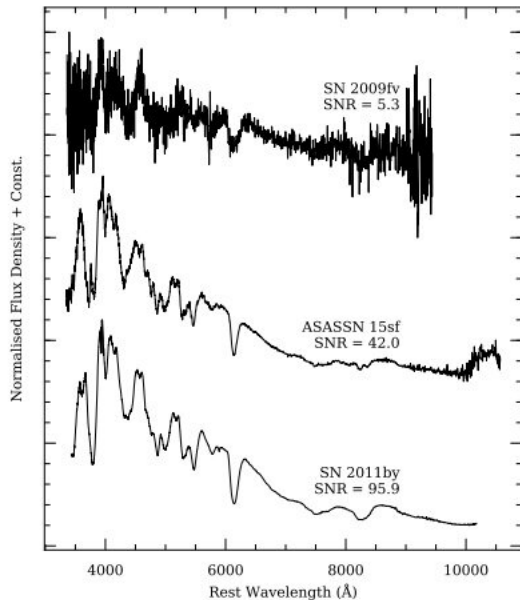


BSNIP project releases spectra of more than 200 Type Ia supernovae

20 January 2020, by Tomasz Nowakowski



Representative SN Ia spectra from the sample showing low, medium, and high SNRs (progressing downward). Credit: Stahl et al., 2020.

The Berkeley Supernova Ia Program (BSNIP) has released a dataset containing over 600 spectra of 242 Type Ia supernovae (SNe Ia). The new data release, available for astronomers worldwide, was presented in a paper published January 9 on the arXiv pre-print repository.

Type Ia supernovae can be found in binary systems in which one of the stars is a white dwarf. They are important for the [scientific community](#) as they offer essential clues into evolution of stars and galaxies.

BSNIP is a large-scale project aimed at studying properties of SNe Ia at low redshift (below 0.05), based on optical spectroscopic and photometric observations. As part of the program, astronomers try to observe as many SNe Ia as possible,

concentrating on frequent spectral coverage of peculiar objects.

In a recently published paper, a team of researchers led by Benjamin Stahl of University of California, Berkeley, describes the latests dataset from BSNIP. The new release delivered a wealth of data collected by the Shane 3-meter telescope at Lick Observatory and the Keck-I 10-meter telescope at the W. M. Keck Observatory, between 2009 and 2018. The new catalog complements previous BSNIP data releases.

"In this paper, we present 637 [optical spectra](#) collected by the Berkeley Supernova Ia Program using the Kast double spectrograph at Lick Observatory and LRIS at the W. M. Keck Observatory between 2009 and 2018. Careful observation and processing techniques perfected over the last 20+ years are employed to prepare the [spectra](#) in a manner that is (i) self-consistent and (ii) consistent with earlier BSNIP spectral data releases (S12a)," the scientists wrote in the paper.

The initial sample contains 637 spectra of 247 objects. However, after analysis of the data, the final set includes 626 spectra of 242 objects unambiguously classified as SNe Ia. Of the full set of spectra, 546 were published for the first time.

The largest number of spectra, 20, was obtained for SN 2016coj. For SN 2011fe, 17 spectra are available, while SN 2009ig and SN 2017erp have 16 spectra each. Nine other objects have more than 10 spectra presented, while 109 objects out of the whole sample are covered by at least two spectra. In general, an average of 2.6 spectra for one supernova was calculated for the dataset.

Moreover, 79 SNe from the sample that have a light-curve-determined time of maximum brightness, the astronomers found a median (rest-frame) phase of the first spectrum of 1.1 days. The spectrum with the earliest phase, 17.2 days, belongs to SN

2011fe, while the spectrum with the latest phase is assigned to SN 2013dy. A median redshift for the full sample was calculated to be 0.0208.

The researchers have analyzed their dataset, studying the early-time and late-time properties of the objects. In particular, they measured the expansion velocities, pseudo-equivalent widths, and fluxes at the boundaries of nine absorption-feature complexes.

Summing up the results, the authors of the paper noted that taking into account all the BSNIP releases, the whole dataset now contains nearly 2,000 optical spectra. They encourage other astronomers to further investigate this data.

More information: Berkeley Supernova Ia Program: Data Release of 637 Spectra from 247 Type Ia Supernovae, arXiv:2001.03235 [astro-ph.SR] arxiv.org/abs/2001.03235

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