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On the Rebrightenings of Classical Novae during the Early Phase

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We report on the spectral evolution of 6 classical novae, V1186 Sco, V2540 Oph, V4745 Sgr, V5113 Sgr, V458 Vul, and V378 Ser, based on the low-resolution spectra obtained at the Fujii-Bisei Observatory and the Bisei Astronomical Observatory, Japan. In the light curves, these 6 novae show several rebrightenings during the early phase lasting ~10 days after the first maximum in fast novae, and ~100 days in slow novae. The early spectra of all of these novae had emission lines with a P-Cygni profile at the maximum brightness. The absorption component of the P-Cygni profiles then disappeared after the maximum, and reappeared when the novae brightened to the next maximum. We suggest that the re-appearance of the absorption component at the rebrightening is attributable to re-expansion of the photosphere after it once shifts sufficiently inside. From the light curves, we found that the time intervals of the rebrightenings of these 6 novae show a similar systematic trend, which is applicable to all types of novae: fast and slow, and Fe II type and hybrid type. Moreover, we note the difference between the spectra at the rebrightenings during the early phase and at the rebrightening in V2362 Cyg, and at the oscillation during the transition phase in V1494 Aql, which means difference of the physical mechanism of the rebrightening during the early phase and the later oscillations.

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