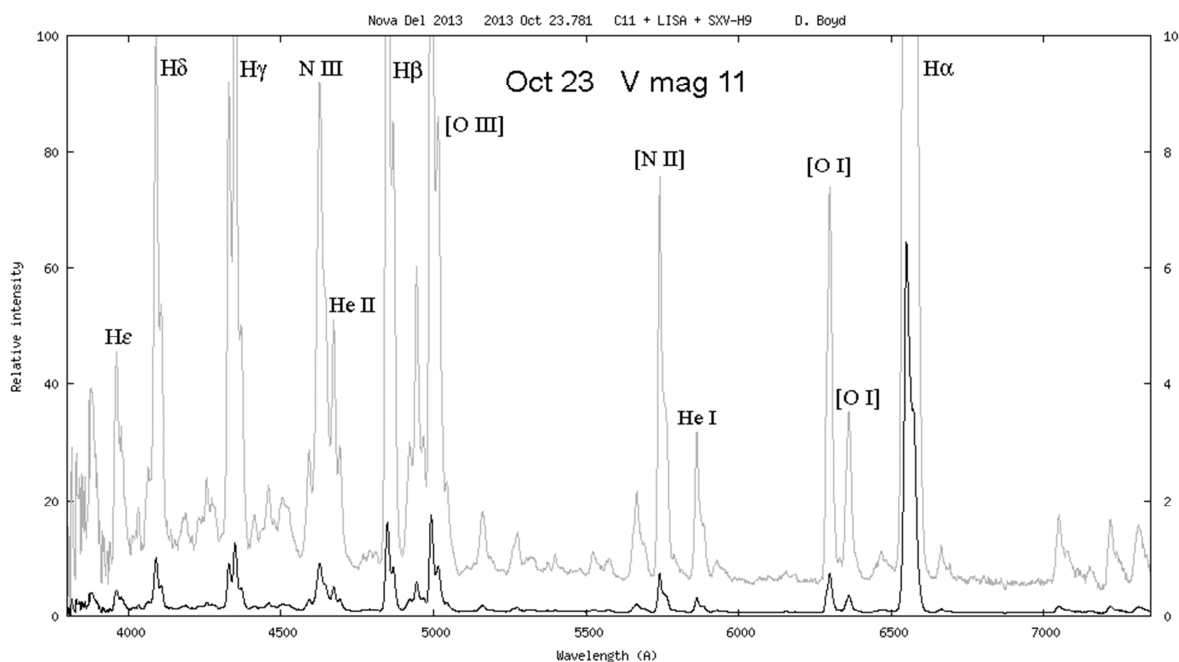
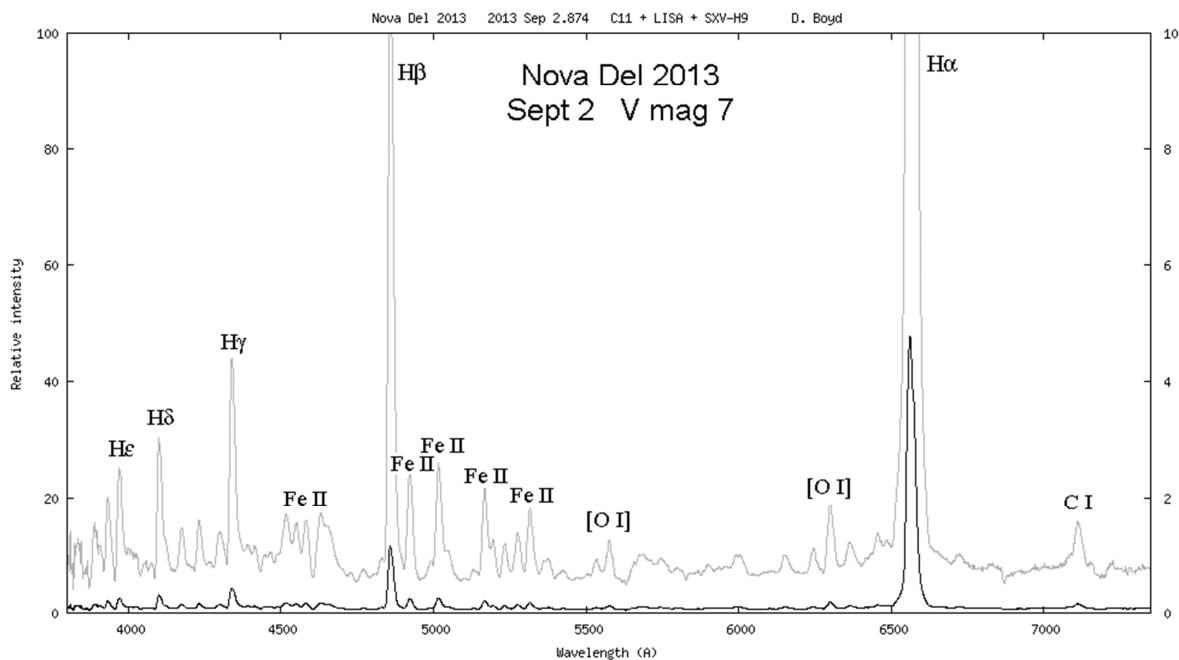


Spectral evolution of Nova Delphini 2013 (V339 Del)

David Boyd

I have been taking spectra of this classical CO type nova approximately weekly as it has faded using a LISA spectrometer with a resolution of ~ 1000 on a C11 scope. This is part of an on-going campaign to study the evolution of this nova in unprecedented detail involving amateurs contributing spectra at various resolutions to the ARAS database (http://www.astrosurf.com/aras/Aras_DataBase/Novae/Nova-Del-2013.htm) and professional astronomers observing with ground-based instruments, the Swift X-ray satellite and the Hubble Space Telescope.



The diagram shows two spectra of the nova, one taken on Sept 2nd when the V magnitude was 7, and one taken about seven weeks later on Oct 23rd when it had faded to magnitude 11. I have identified the most prominent lines in each spectrum. Initially the ejecta were opaque at optical wavelengths. The most prominent features in the spectrum on Sept 2nd were hydrogen Balmer emission lines from the expanding shell of hot hydrogen gas blown off the surface of the white dwarf in the nova explosion, plus lines due to a “curtain” of ionised iron. By Oct 23rd the ejecta had cooled and become sufficiently transparent that the photosphere of the white dwarf was becoming visible. The nova had recently been detected as a supersoft X-ray source indicating that nuclear burning was continuing on the surface of the white dwarf. The surface temperature was estimated to still be several 100,000K. At this stage hydrogen lines remained strong and several emission lines of helium, nitrogen and oxygen had appeared.

In these diagrams, both of which are at the same relative scale, the grey spectra are 10x magnifications of the black ones.

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