



The Chemical Evolution of Novae during Outbursts

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Novae in outburst may become the brightest sources of soft X-ray emission in the sky. During this so-called super-soft source (SSS) phase (some weeks or months after the outburst), it is possible to perform high-resolution and high-S/N spectroscopy with X-ray satellites like eROSITA. These spectra require then adequate, state-of-the-art NLTE model atmospheres for a reliable analysis.

Nova in Outburst – V4743 Sgr

A detailed analysis of a nova, V4743 Sgr, was recently presented by Rauch et al. (2010). They used plane-parallel, hydrostatic, fully metal-line blanketed models calculated with the Tübingen NLTE Model-Atmosphere Package (TMAP, please see poster of Ringat et al.) to analyze *Chandra* and *XMM-Newton* grating spectra.

Although the velocity field and the expansion of the nova's atmosphere was neglected, the overall slope of the continuum flux was well reproduced (Fig. 1). Moreover, the strengths of prominent photospheric absorption lines (C V, C VI, N VI, N VII, O VII) as well as the strengths of absorption edges were in very good agreement with the observation.

It appears likely, that the mass-loss rate has already decreased strongly at the beginning of the SSS phase and, thus, the photospheric lines appear blue-shifted (Ness et al. 2003) but the impact of the stellar wind on the continuum flux etc. is not significant.

Rauch et al. (2010) have shown that the C/N abundance ratio in V4743 Sgr was increasing from March to September 2003 (Fig. 1). This may be an indication that accretion has restarted.

Simple XSPEC fits of TMAP SEDs revealed that the white dwarf's surface temperature is high for at least half a year (Fig. 2).

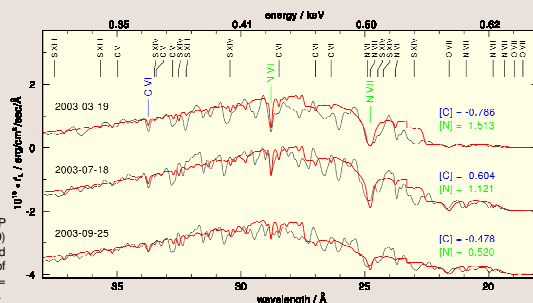


Fig. 1. Comparison of TMAP spectra ($T_{\text{eff}} = 0.7$ MK, $\log g = 9$) and different C/N ratios compared with *Chandra* observations of V4743 Sgr at different times. [X] = $\log(\text{abundance} / \text{solar abundance})$.

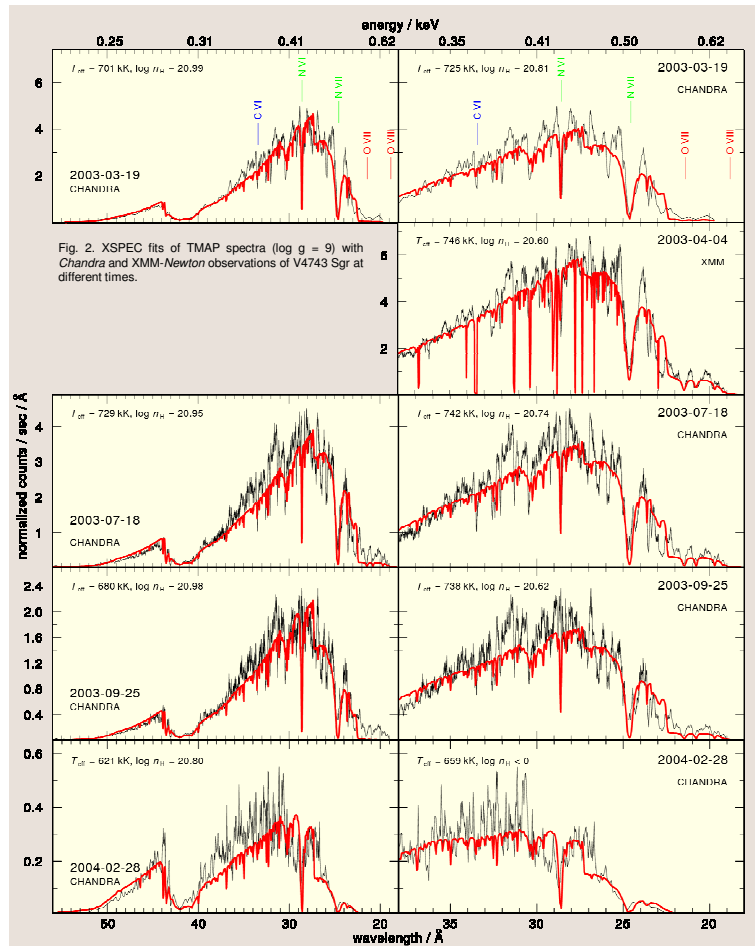


Fig. 2. XSPEC fits of TMAP spectra ($\log g = 9$) with *Chandra* and *XMM-Newton* observations of V4743 Sgr at different times.

SSS Observations

X-ray observations of SSS should not only be scheduled close to their flux maxima. The early phases are important to find indications of decreasing stellar mass loss, the later of increasing accretion.

References

Ness, J.-U., et al. 2003, *ApJ*, 594, L127
Rauch, T. et al. 2010, *ApJ*, 717, 363

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