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A NEW VIEW OF THE SUPERSOFT X-RAY SOURCE CAL 87 OBSERVED WITH XMM-NEWTON

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Cal 87 was observed with with *XMM-Newton* in April of 2003. The source shows a rich emission spectrum, where lines can be identified if they are red-shifted by 700-1200 km s^{-1}. These lines seem to have been emitted in a wind from the system. The eclipse is observed to be shifted in phase by 0.03 $\phi_{\rm orb}$, where $\phi_{\rm orb}$ is the phase of the optical light curve.

1. THE OBSERVED X-RAY SPECTRUM

Cal 87 was observed with *XMM Newton* on April 18-19 2003, for 21.8 hours (two full orbital cycles). The background corrected count rate measured in the two *RGS-1* and *RGS-2* instruments in the 0.33-2.5 Å range is 0.0764±0.0012 and 0.0653±0.0011 cts s^{-1}, respectively. The spectrum clearly appears to be an emission line one. There is an obvious similarity with the X-ray grating spectra of this source, (Motch et al. 2002, Bearda et al. 2002), however Cal 87 displays a much softer spectrum. Tentative line identification for the emission features in the *RGS* spectra indicates a red shift of several identifiable lines with velocities in the 700-1200 km s^{-1} range. We conclude that these lines must be originated in a wind. The *EPIC* spectra, despite pile-up effects that cannot be completely corrected for, offer a broader energy range (0.2-10 keV), and allow us to conclude that the central white dwarf is not visible at any time, even outside of eclipse.

2. THE LIGHT CURVE

The eclipse already observed in X-rays is observed again with *XMM-Newton*. It is more definite and deeper in the *EPIC* in the *RGS* light curve, not only because of the better S/N, but also because the depth of the eclipse is greater at lower energy.

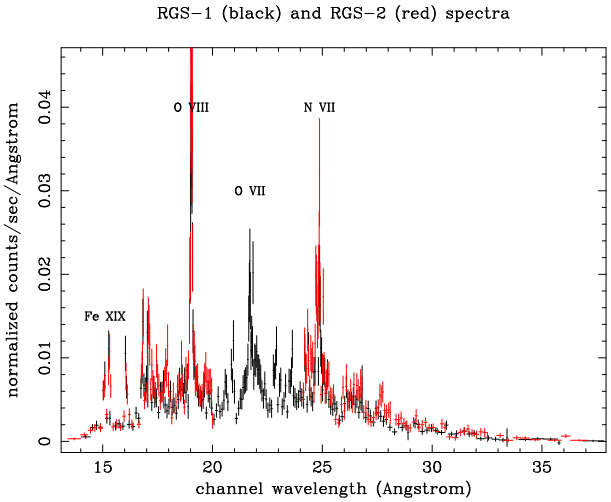

Fig. 1. The spectrum observed with the two *RGS* gratings. The *RGS-1* spectrum is shown in black, the *RGS-2* spectrum is in red. Some line identifications are labelled. No significant signal above the background is detected at wavelengths below 15 Å.

It is shifted by $\Delta\phi_{\rm orb}$=0.03 with respect to the eclipse observed at optical wavelengths. We speculate that this may be so because the X-rays are emitted by the Accretion Disk Corona, while the optical radiation originates instead from the disk.

REFERENCES

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