IONIZED Fe K EMISSION-ABSORPTION IN MRK 509

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artially overlapping XMM-Newton (~260 ks) and Suzaku (~100 ks) observations of the iron K band in the nearby, bright Seyfert 1 galaxy MRK 509. The source shows a resolved neutral Fe K line, most probably produced in the outer part of the accretion disc or the innermost part of a stratified broad-line region. Moreover, the source shows further emission blue-ward of the 6.4 keV line due to ionized material. This emission is well described by a broad line produced in the accretion disc, while it cannot be easily explained by a broad line for moto-ionized material. This emission is well The summed spectrum of all XMM-Newton observations shows the presence of a narrow absorption line at 7.3 keV produced by highly ionized material. A spectral variability study of the XMM-Newton data shows an excess of variability at 6.6-6.7 keV. These variations may be produced in the red wing of the broad ionized line or by variation of a further absorption structure. The Suzaku data indicate that the neutral Fe K α line intensity is consistent with being constant on long timescales (of a few years) and they also confirm as most likely the interpretation of the excess emission in terms of a broad ionized Fe line. The Suzaku spectra differs from the XMM-Newton one for the disappearance of the 7.3 keV absorption line and around 6.7 keV, where even the XMM-Newton data alone already suggested variability. The comparison between the two data sets may suggest that the 6.7 keV variability is due to the appearance of an absorption line in the XMM-Newton spectrum only (as for the 7.3 keV line, absent during the Suzaku pointing).

Summed spectra of all XMM observations: the Fe K complex

XMM-Newton "total rms" variability



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a simple power law, absorbed by zaku spectrum shows a resolved neutral Fe moothly joining with a higher energy excess. The data indicate that the ionized line is indeed better ed by a broad line rather than a blend of narrow explained by a broa ionized Fe lines. More 7.3 keV are present.

Summary:

The analysis of the XMM-Newton and Suzaku data shows evidence for the presence of:

- i) a resolved (although narrowish, σ ~0.12 keV) neutral Fe K α line (and associated Fe K β emission),
- ii) a ionized Fe K emission inconsistent with emission from a distant scattering material at rest and most likely produced in the accretion disc; iii) an absorption line at ~7.3-7.4 keV, present in the XMM-Newton spectrum only;
- iv) an enhancement of variability both by considering the XMM-Newton data alone and by comparison between the two data sets at ~6.7 keV that could be either due to the high variability of the red wing of the broad ionized Fe K line (most probably, to a variation of the ionisation of the disc) or to a second ionized absorption line.