# A large sample of quasars observed with XMM-Newton

**The X-ray spectral analysis of 21 low redshift quasars (narrow line, radio-quiet and radio-loud) observed with XMM-Newton EPIC are reported *(Porquet et al. 2004, A&A, 422, 85)*. All sources are Palomar Green quasars with redshift between 0.05 and 0.4 and have low Galactic absorption along the line-of-sight.**

In Active Galactic Nuclei (AGN), the analysis of spectral X-ray features help us to probe the central regions of these powerful objects:

- The so-called soft excess seen below 2-3 keV is thought to be the high energy part of the optical-UV "big blue bump" extending down to 1 μm, which contains a large fraction of the bolometric luminosity. Soft X-ray excesses were detected for most AGN with ROSAT (e.g., Brinkmann 1992, MPE report 235, 143). Current interpretations of the soft excess range from direct thermal emission from the accretion disk to reprocessing of harder radiation absorbed in the thin disk.
- Emission and/or absorption features (mainly in the soft X-ray range, i.e. 0.1-2 keV) are observed. They are attributed to the warm absorbing-emitting medium (Warm Absorber) supposed to be located between the Broad Line Region and the Narrow Line Region (e.g., Porquet et al. 1999, A&A, 341, 58).
- The Fe Kα emission line observed in the 6-7 keV energy range is also an important spectral diagnostic tool to probe dense matter from the inner disk (e.g., Tanaka et al. 1995, Nature, 375, 659) to the Broad Line Region and the molecular torus (e.g., Reeves et al. 2001 A&A, 365, L134).

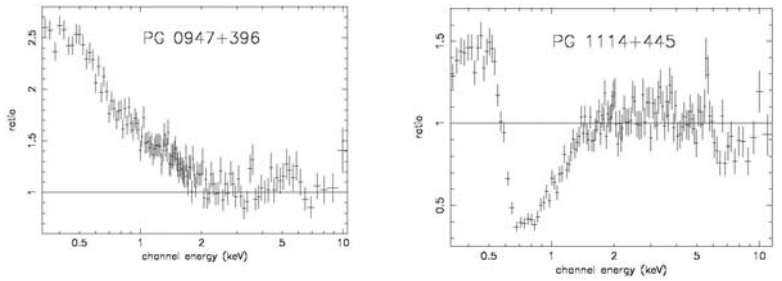


Figure 1: Data/model ratios of an absorbed power law in the 2-5 keV (observer frame)

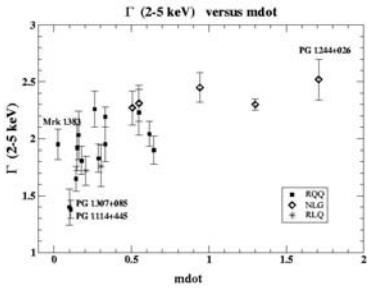


Figure 2: Correlation between $\Gamma_{2\text{-}5\ keV}$ and the accretion rate.

## Main results:

- A significant majority of these quasars (90%, 19/21) exhibit a significant soft excess below ~ 1-1.5 keV (e.g., PG 0947+396; figure 1, *left*), except two objects showing a strong deficit due to the presence of a warm absorber: Izw1, PG 1114+445 (figure 1, *right*).
- Contrary to previous studies with ASCA and ROSAT (lack of soft response and limited spectral resolution, respectively) , the presence of absorption features near 0.6-1 keV is common in this sample (~50%).
- Significant detections of Fe Kα emission lines in at least twelve objects. Highly ionized lines tend to be found in the quasars with the steepest X-ray spectra.
- A strong correlation exists between the soft and hard X-ray continuum power law and the optical Hβ width, as well as with the accretion rate (Fig. 2). Soft and hard X-ray photon indices are strongly correlated as well, i.e. the steepest soft X-ray spectra correspond to the steepest hard X-ray spectra. We propose that a high accretion rate and a smaller black hole mass is likely to be the physical driver responsible for these trends.

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