X-RAY PROPERTIES OF HIGH-Z RADIO-QUIET QUASARS: *ASCA* OBSERVATIONS

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Abstract. The first-ever high energy ($\sim$ 1-30 keV) X-ray spectra of three z $\sim$ 2 radio-quiet quasars (RQQs) are presented. If confirmed, the most interesting result is the marginal, but consistent, evidence for FeK_α emission lines in at least two of the sources. Further *ASCA* observations of high-z RQQs are needed for firm conclusions.

1. *ASCA* Preliminary Results

To date, most of the available X-ray data from high-z objects concerns radio-loud quasars (RLQs) while spectral information for radio-quiet quasars (RQQs) are quite scarce. Recent *ROSAT* and *ASCA* results allow us to derive a fairly well defined characteristic X-ray spectrum of high-z RLQs (Cappi et al. 1997). However, most spectral properties of high-z RQQs have been derived using color techniques based on *ROSAT* PSPC hardness ratios and assuming no intrinsic absorption (Bechtold et al. 1994, Fiore et al. 1997). Given these general considerations, we have started a collaborative effort between Japanese and Italian researchers with the aim of obtaining *ASCA* X-ray spectra of a representative sample of high-z RQQs, thus filling this gap. Preliminary results obtained from 3 out of 8 quasars observed (see Cappi 1998 and Vignali et al. in preparation for a more detailed study) of these quasars are shown here.

Best-fit spectral parameters are given in Table 1 for three z$\simeq$ 2 radio-quiet quasars. The average $\sim$ 1-30 keV rest-frame spectrum has $< \Gamma >$ $\simeq$ 1.75 $\pm$ 0.2 and there is no indication of excess-absorption. A Compton reflection component (as commonly observed in Seyfert 1 galaxies) or other

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TABLE 1. Best-fit models with an absorbed power law, with and without an emission line

name	z	N_H (10^{20} cm^{-2})	Γ	E_{line}[a] (keV)	EW[a] (eV)	χ^2/dof	logL[c] (2-10 keV
0300-4342	2.3	<7	$1.78^{+0.21}_{-0.14}$	.....	.....	73/72	46.4
.....		1.83 fix	$1.83^{+0.15}_{-0.14}$	.....	.....	73/73	.....
.....		1.83 fix	$1.76^{+0.16}_{-0.15}$	$3.76^{+0.03}_{-0.04}$	307^{+180}_{-168}	64/71	.....
1101-264	2.15	<34.1	$2.08^{+0.56}_{-0.45}$	.....	.....	32.3/25	46.3
.....		5.68 fix.	$1.90^{+0.24}_{-0.23}$	.....	.....	32.8/26	.....
.....		5.68 fix.	$1.93^{+0.27}_{-0.24}$	$6.50^{+0.18}_{-0.17}$	728^{+605}_{-577}	30.2/24	.....
1352-2242	2.0	< 11	$1.60^{+0.25}_{-0.14}$	.....	.....	60/74	46.4
.....		1.66 fix	$1.63^{+0.13}_{-0.14}$	.....	.....	60/75	.....
.....		1.66 fix	$1.64^{+0.15}_{-0.13}$	$6.54^{+0.12}_{-0.12}$	276^{+216}_{-201}	54/73	.....

[a] Energy and EW of the line in the source rest-frame; [b] in units of 10^{-13} erg cm^{-2}s^{-1}; [c] in units of erg s^{-1}

complex continuum emission models are not required by the data (see Fig. 1). If confirmed, the most significant result of this study is the marginal, but consistent, detection of an iron emission line. In two cases (1352-2242 and 1101-264), the line energy is consistent with a rest energy of 6.4 keV, thus can be interpreted as Fe K_α emission from neutral or mildly ionized matter. In the third quasar (0300-4342), the origin of the line is puzzling because its energy does not correspond to any expected instrumental or source feature.

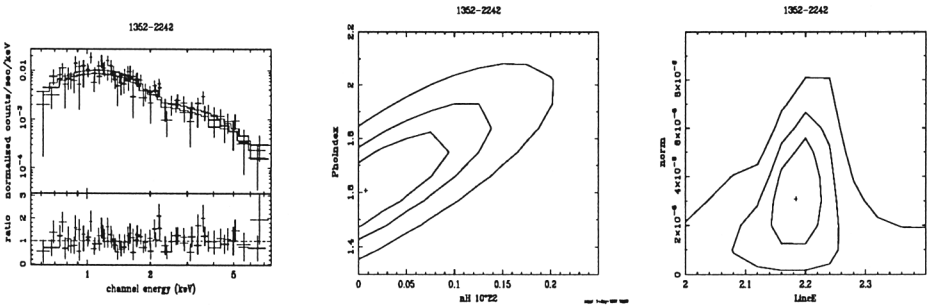

Figure 1. Best-fit spectrum, residuals and χ^2 contour plots (N_H-Γ and Line E-Intensity) for 1352-2242 (z=2), as an example.

2. References

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