IRAS 00521-7054, A PECULIAR TYPE-II AGN WITH A VERY BROAD FEATURE AT 6 KEV

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Context

IRAS 00521−7054 is a Seyfert 2 in which the presence of an extremely large Fe Kα line has been recently claimed (Tan et al. 2012, ApJ, 747, L11). We report here the results obtained by studying a 100 ks Suzaku observation of the source (Ricci et al. 2014c, submitted to ApJ), with which we confirm the existence of a very strong excess over the power-law X-ray continuum at E ~ 6 keV (EW ≈ 860 eV, see Fig. 1). This excess extends down to ~ 4.5 keV, and besides being one of the largest ever observed, is a unique feature in Seyfert 2s.

The X-ray spectrum of the source can be explained by two different and statistically indistinguishable models: blurred reflection and ionized absorption.

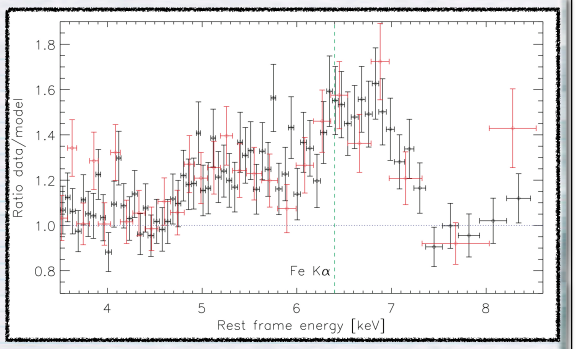

Fig.1 Ratio between Suzaku/XIS data and the fit to the spectrum obtained by applying a simple absorbed power-law model to the data in the 2-4.5 keV and 7.5-10 keV range. The black and red points represent the data obtained by FI-XIS and BI-XIS, respectively.

Ionized absorption scenario

The complex X-ray spectrum of IRAS 00521−7054 could be explained by a model in which the X-ray source is obscured by two fully-covering ionized absorbers, a strong reflection component from neutral material (R ~ 1.7), a black body component and four narrow Gaussian lines, corresponding to Fe Kα, Fe Kβ, Fe XXV and Fe XXVI (chi squared= 734.0 for 742 degrees of freedom).

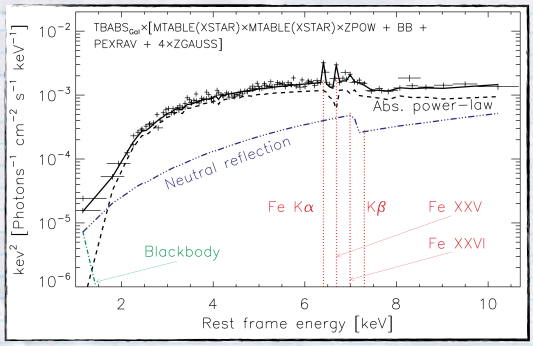

Fig.2 Suzaku spectrum of IRAS 00521−7054 and the ionized absorption model

Blurred reflection scenario

A scenario in which the X-ray emission is dominated by blurred reflection, produced in an ionized disk surrounding a supermassive black hole rotating with a spin of a ≥ 0.73, and significantly affected by light-bending (R ~ 2.7), could also explain very well the X-ray spectrum of IRAS 00521−7054 (chi squared= 733.6 for 743 degrees of freedom).

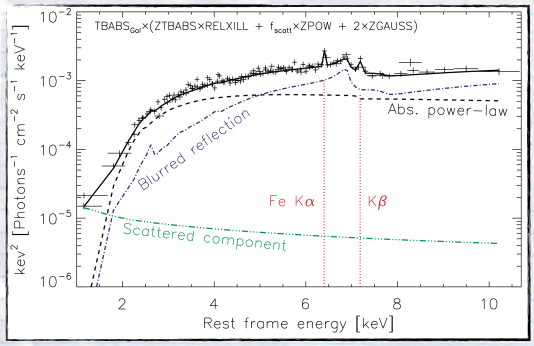

Fig.3 Suzaku spectrum of IRAS 00521−7054 with the blurred reflection model

Variability

While the X-ray continuum is rather variable (Fig. 4), the broad feature at 6 keV appears to be constant. Creating time-resolved spectra considering the three flux levels shown in Fig. 4, we find that we can reproduce well the X-ray emission by assuming that only the normalization of the power-law emission varies (Fig. 5).

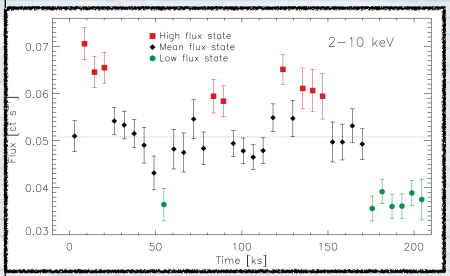

Fig.4 2-10 keV light curve of IRAS 00521−7054

This is consistent both with the reflection and the absorption scenario. In the former the non-variability of the broad Fe Kα line is due to light bending, while in the latter it is due to the fact that the neutral reflection and the emission lines are produced far away from the variable X-ray source.

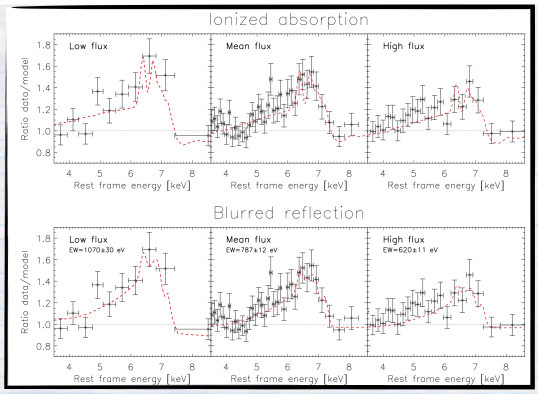

Fig.5 The broad feature of IRAS 00521−7054 for the flux levels shown in Fig. 4. The red lines represent the ratios obtained by applying the blurred reflection and ionized absorption models, fixing all the parameters and leaving only the normalization of the power-law free to vary.

Conclusions

For both the absorption and reflection scenarios we obtain a steep power-law emission (Γ ~ 2.3). We speculate that the source might be an obscured narrow-line Sy1, and in particular, given its characteristics at 6 keV, it might be the obscured counterpart of objects such as IRAS 13224−3809 and 1H 0707−495.

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