Introduction

- Broad Fe Kα line is significantly detected in ~50% of AGN (e.g., Nandra et al. 2007).
- It is important in measuring the BH spin, understanding the growth of BH as well as the accretion history.
- The reason for the lack of apparent relativistic broad Fe Kα line in the X-ray spectra of some AGN is still unclear.

Abstract

The dependence of the broad Fe Kα line on the physical parameters of AGN is investigated by applying the X-ray spectra stacking method to a sample of Type 1 AGN. A broad line is detected in the stacked spectra of the high λEdd sub-sample (log λEdd > −0.9). The profile of the line can be well fitted with relativistic broad line model. We found hints that the Fe K line becomes broader as the λEdd increases. A broad line might be present in the narrow-line Seyfert 1 (NLS1) galaxies. Our results indicate that the detection/properties of the broad Fe Kα line may strongly depend on λEdd, which can be explained if the ionization state and/or truncation radius of the accretion disc changes with λEdd. The non-detection of the broad line in the BLS1 sub-sample can be explained if the the average EW of the relativistic Fe Kα line is weak or/and the fraction of sources with relativistic Fe Kα line is small in BLS1 galaxies.

Sample & Method

- 8862 Type 1 AGN selected from SDSS-DR4 data (Dong et al. 2012).
- 156 sources are detected by XMM-Newton with high signal-to-noise ratio.
- The sample is divided into different sub-samples, see Fig. 1.
- The X-ray spectral stacking method (Corral et al. 2008) is applied to each sub-sample.

Results I: stacked spectra of λEdd sub-samples

- A significant broad Fe Kα line is detected in the high λEdd sub-sample.
- The line width of the Fe Kα line increases with λEdd, consistent with Inoue et al. 2007.

Results II: stacked spectra of NLS1/BLS1 sub-samples

- A broad Fe Kα line might be shown in the NLS1 sub-sample, consistent with Liu et al. 2015.
- No broad line is shown in the BLS1 sub-sample.

Conclusion

- Our results indicate a dependence of properties of the broad FeKα line on the λEdd.
- Ionization state of the accretion disk changes with λEdd?
- Disk truncation?
- A broad line is shown in the NLS1 sub-sample, though with low significance.

References