ASTROSAT Baseline Science Meeting
IIA, 6 – 7 February 2014

AGN (Seyferts, Blazars etc.)

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1. Disc – Corona connection in AGN: looking for correlated optical and X-ray flux variations in radio-quiet AGN

2. Echo mapping of AGN (Spectroscopic reverberation)

3. Echo mapping of AGN (photometric reverberation)

4. SED modeling of blazars

5. X-ray flux variations in AGN

6. Optical/UV flux variations in AGN (colour variations, variability amplitudes and its correlation with various physical parameters, existence of lags between different bands,bluer when brighter v/s redder when brighter trend in blazars)

(1.) Disc – Corona Connection in AGN

- To probe relationship between cool optically thick accretion disk and hot optically thin corona

- Such as study was possible since the launch of RXTE in 1995

Few sources have been studied with varied results

- Correlation / No-correlation

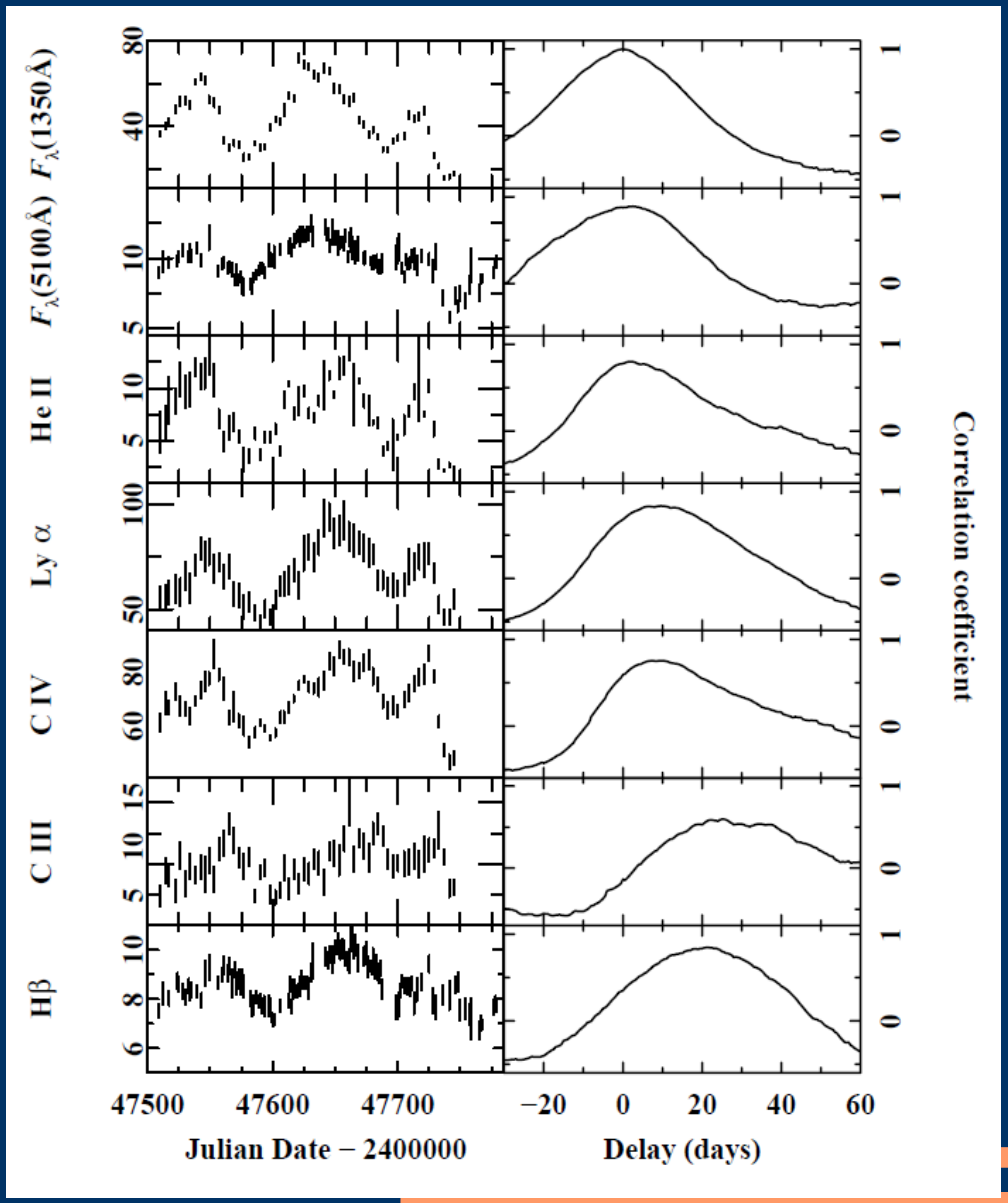
- X-ray leading optical

- Optical leading X-rays

Co-ordinating between different facilities tough. It will be easier with the simultaneous UV/X-ray capabilities of ASTROSAT

(2.) Echo-mapping of AGN (Spectroscopic reverberation)

Light curves and CCFs for NGC 5548 1988–89.



Constrain BLR structure and BH masses by measuring emission line response to continuum variations

$R_{BLR} = c*\Delta T$

$MBH = f*RBLR*(\Delta V)^2/G$

The continuum fluxes are in 10−15 e/s/cm−2/°A

Line fluxes are in 10−13 e/s/cm−2.

The CCFs are computed relative to the UV continuum at the top; the top panel is the UV continuum ACF.

Reverberation based mass estimates known for about 40 AGN (using H_beta, H_alpha)

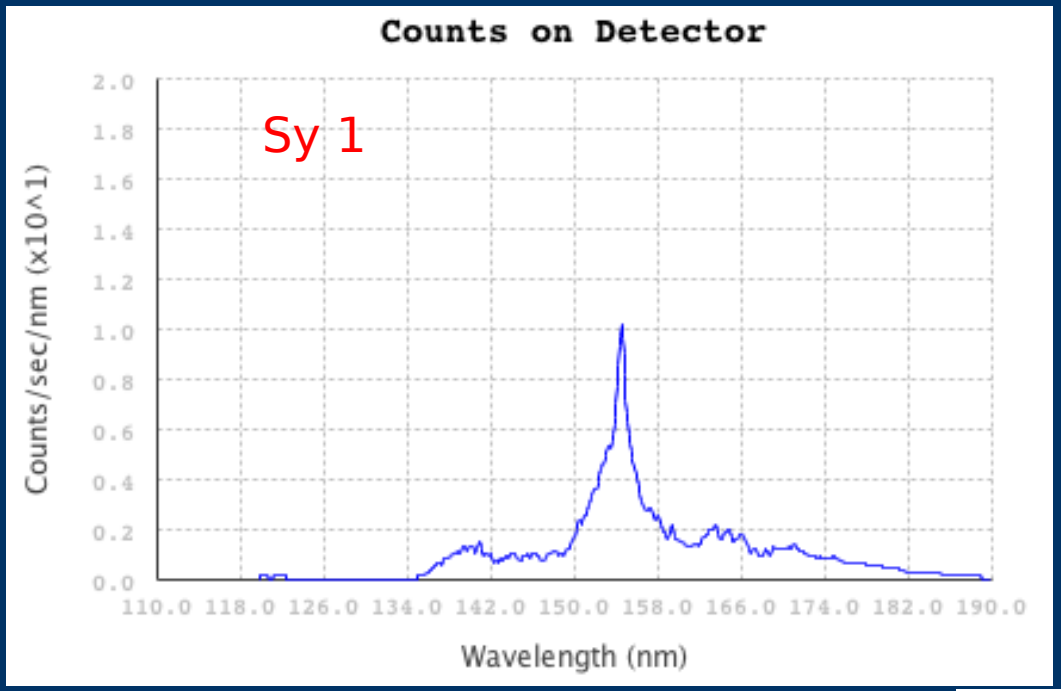
Can use CIV line

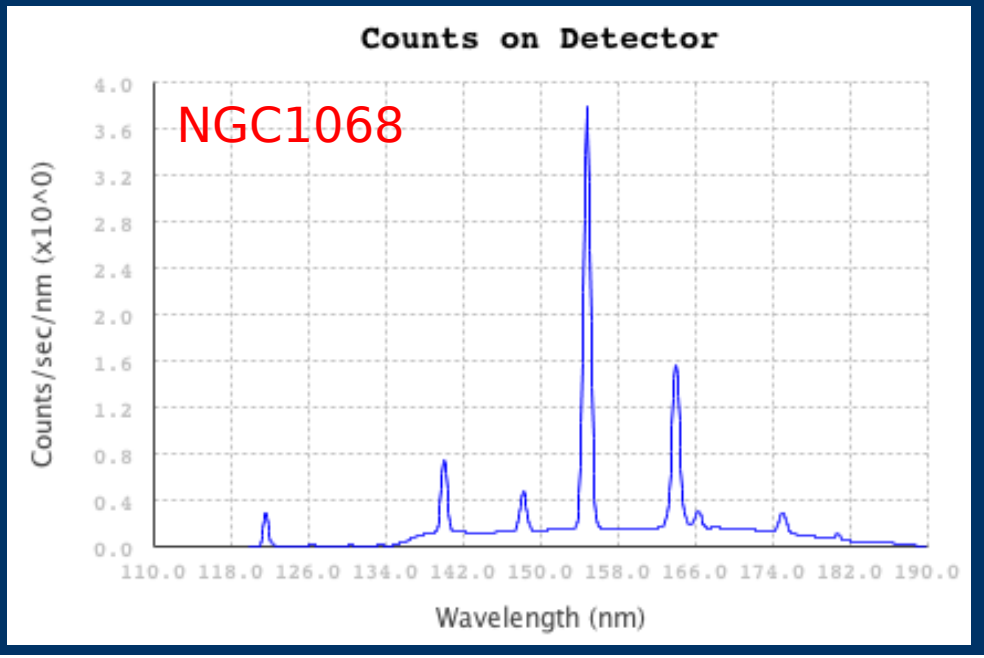
What if NGC 4395 is observed?

		Cnts/sec	Exp (secs; for S/N of 5)
FUV	CaF2-1	5.47	4.57
FUV	BaF2	4.56	5.48
FUV	Sapphire	3.58	6.99
FUV	Silica	0.72	35.0
FUV	CaF2-2	5.26	4.75
NUV	Silica	35.89	0.70
NUV	B15	2.04	12.00
NUV	B13	14.35	1.74
NUV	B4	11.91	2.10
NUV	N2	3.38	7.39
VIS	3	41.20	0.61
VIS	2	11.14	2.24
VIS	1	11.66	2.14
VIS	ND1	0.96	26.00
VIS	BK-7	66.51	0.38

- Lag between X-ray and optical/UV variations
- Spectroscopic reverberation
- Using STIS 1 hour lag found between CIV and continuum (Peterson et al. 2006)
- Other targets; NGC 4151; known lag = 6.6 days
- For other targets, lags range between 3 – 300 days

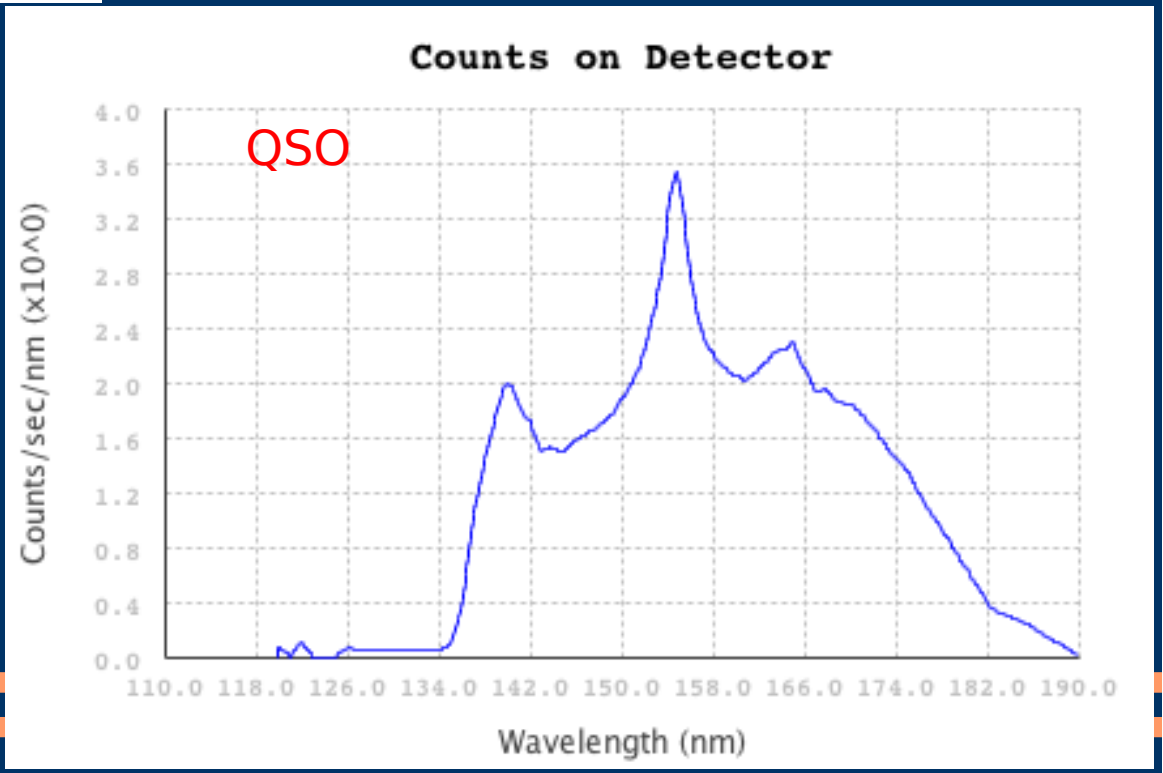
Spectroscopic reverberation: What UVIT will see?





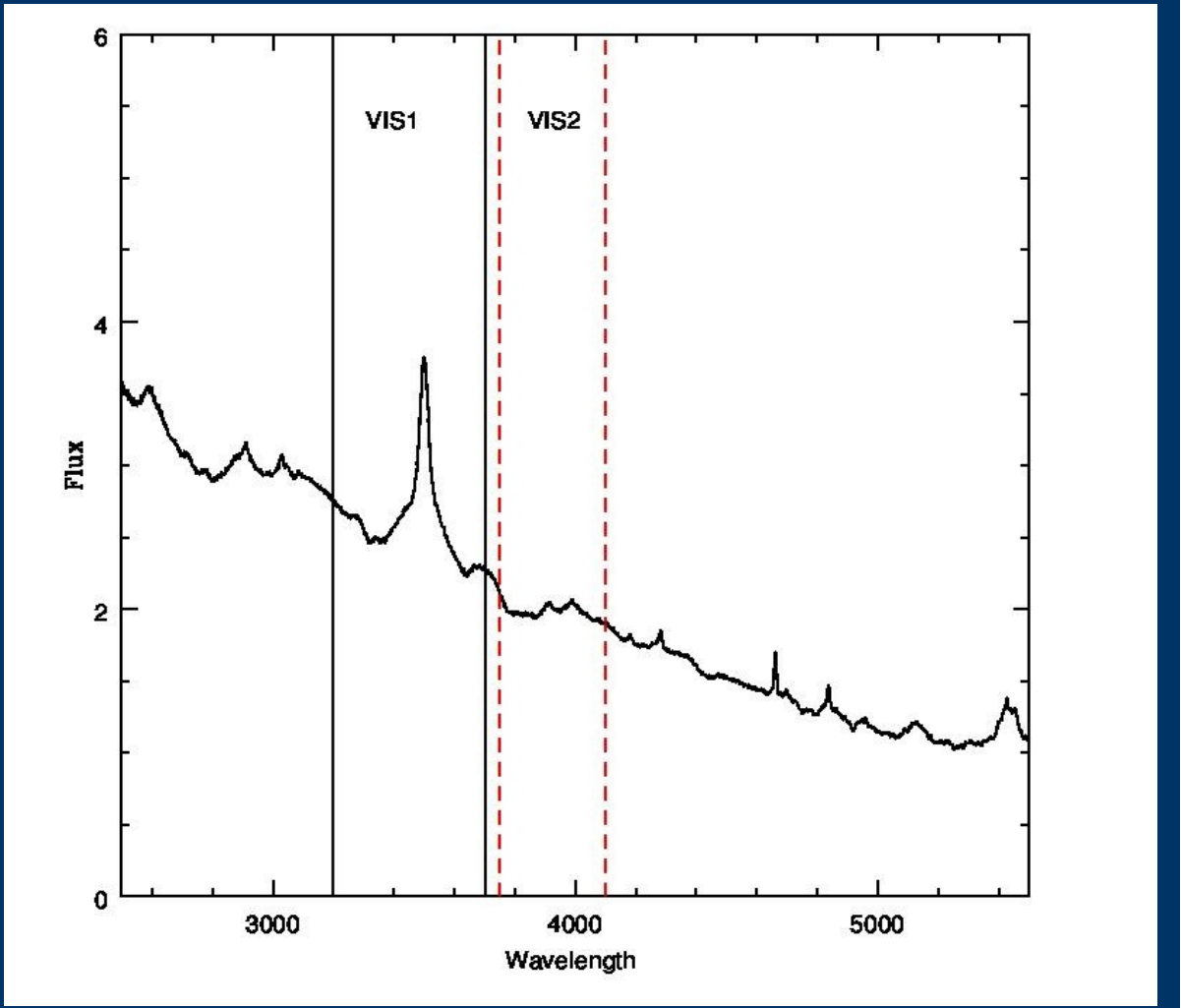
UVIT counts for FUV
For mv = 12.5

Grating counts about
40% of these



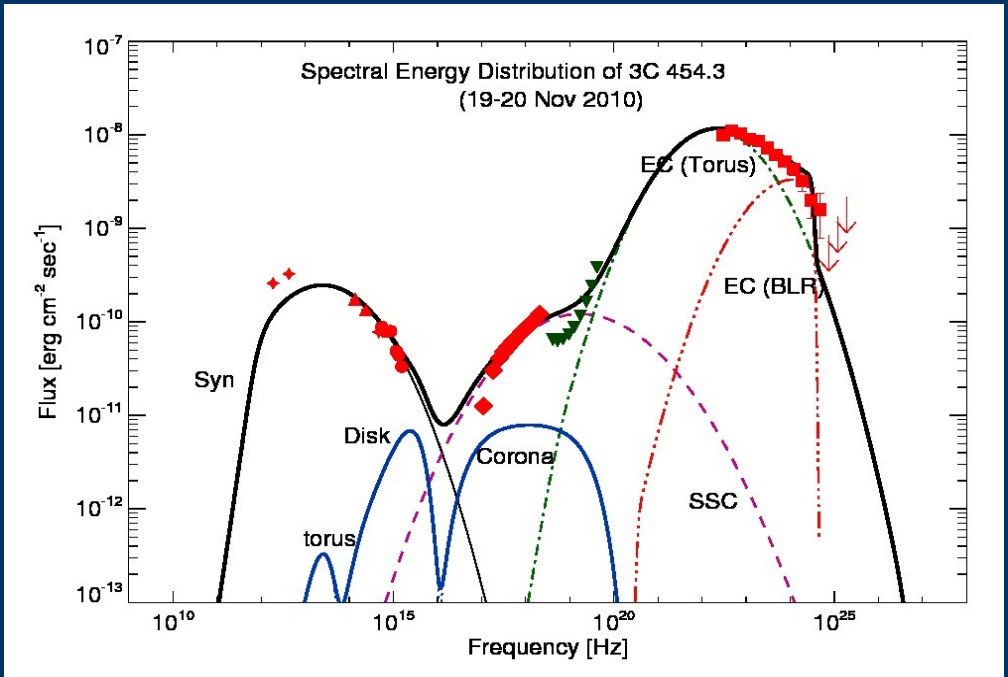
(3.) Echo Mapping (Photometric reverberation)

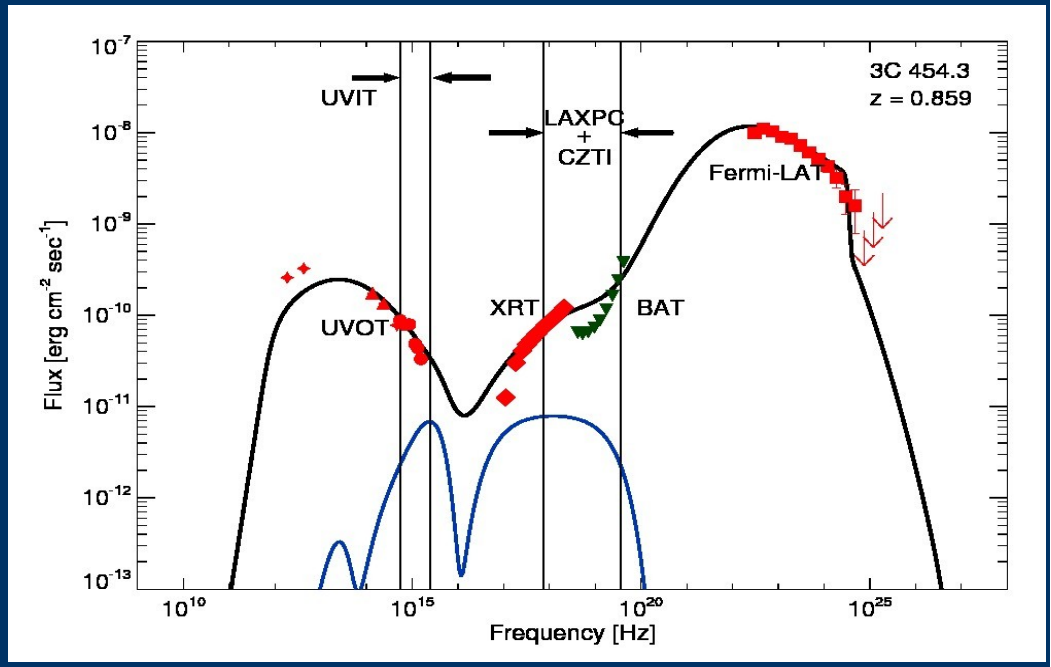
- An alternative to line resolved spectroscopy
- Photometric reverberation



Composite SDSS quasar spectra red-shifted to 0.25; VIS1 images the line and VIS2 images the continuum.

(4.) SED modeling of Blazars





(5.) X-ray variability:

(6.) UV variability (colour variations; correlation with various physical parameters of the AGN, bluer when brighter v/s redder when brighter)