→ THE EXTREMES OF BLACK HOLE ACCRETION

8-10 June 2015

ESAC, Villafranca del Castillo, Madrid, Spain

XMM-Newton Science Workshop 2015

xmm-newton

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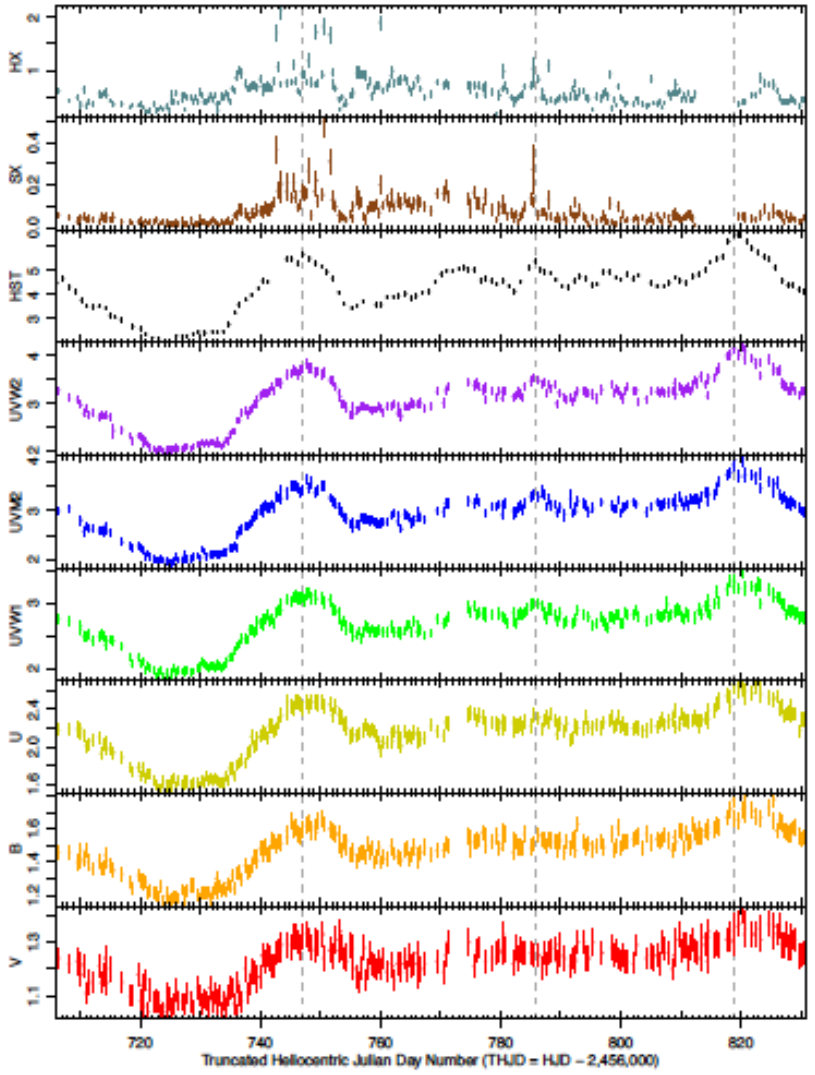
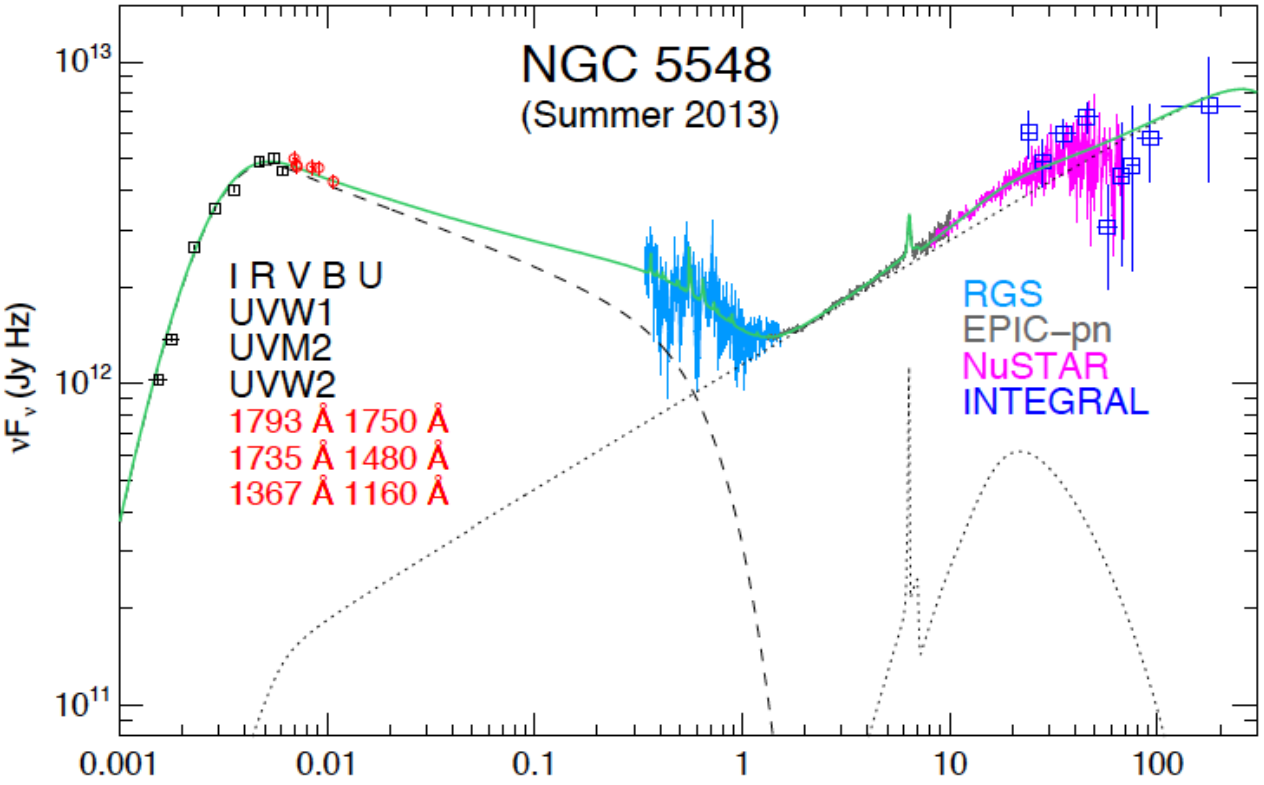
AGN Accretion - multiwavelength

- Long time series optical reverberation Edelson, Kriss, McHardy
- Gravitational microlensing Chartas
- Optical disc too big for SS– but too much reprocessing for SS – not quite SS!!
- X-rays smaller - Eclipses (sanfrutos, risaliti, braito,bianchi)



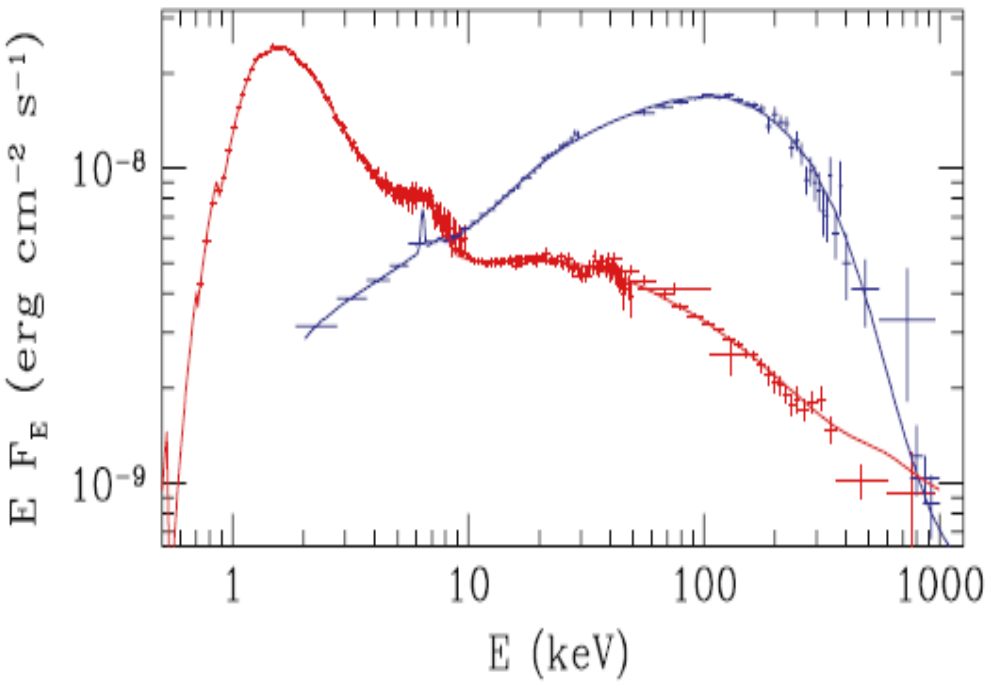
AGN Accretion – X-rays

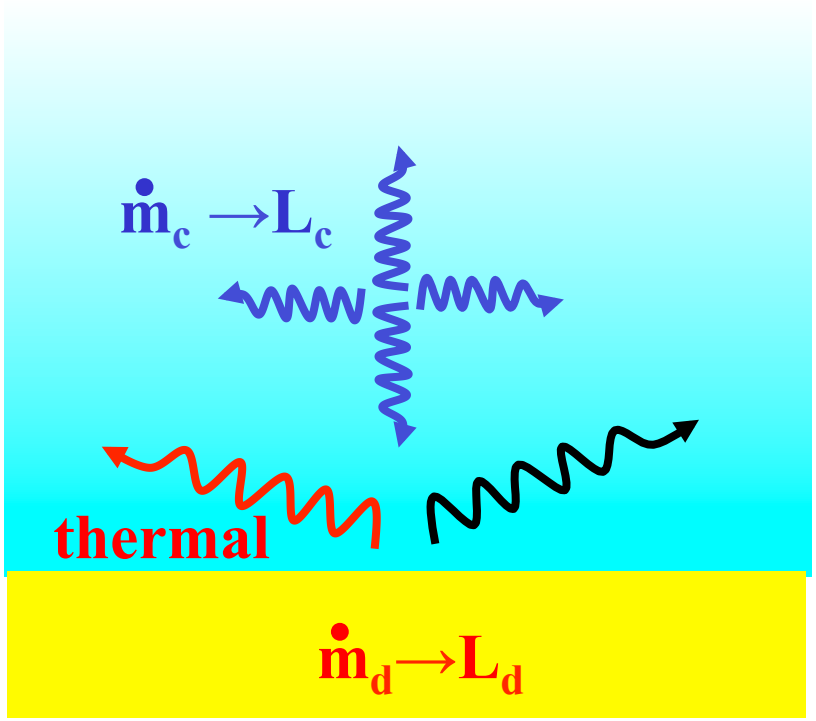
- Shape and variability: Ursini, Marinucci, Hogan, Connolly, Walton, Reynolds
- Lower L/Ledd <0.1 have Γ<1.8
- Akn120, IC4239a, NGC5548



BHB Accretion – X-rays

- Hard spectra can't have disc underneath – Malzac
- Compton energetics – Haardt & Maraschi 1991

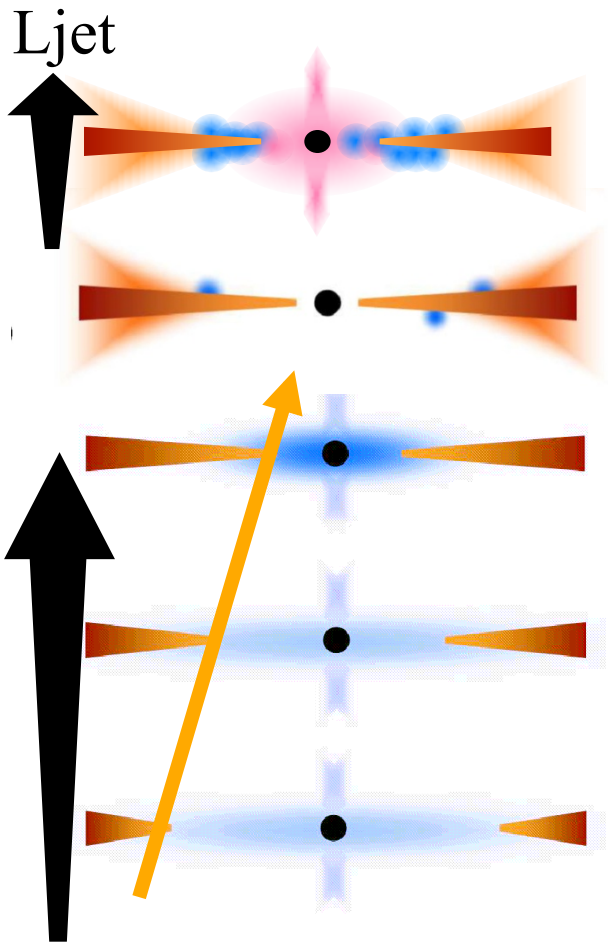




Truncated disc/hot flow at low L

- Energy spectra need disc to move from 50-6ish Rg as make transition
- Power spectra: low frequency break and QPO move to higher f
- Jet (Γ~1.5) correlates with hot flow (Malzac, Fender, Russell)

- Truncated disc models give:
- Transitions
- Spectral evolution in LHS (Kolehmainen, Shaw, Clavel)
- Variability evolution (Heil, Rapisada)
- Resonating cavity for QPOs (Motta, Ingram, Stevens, Kalamkar)

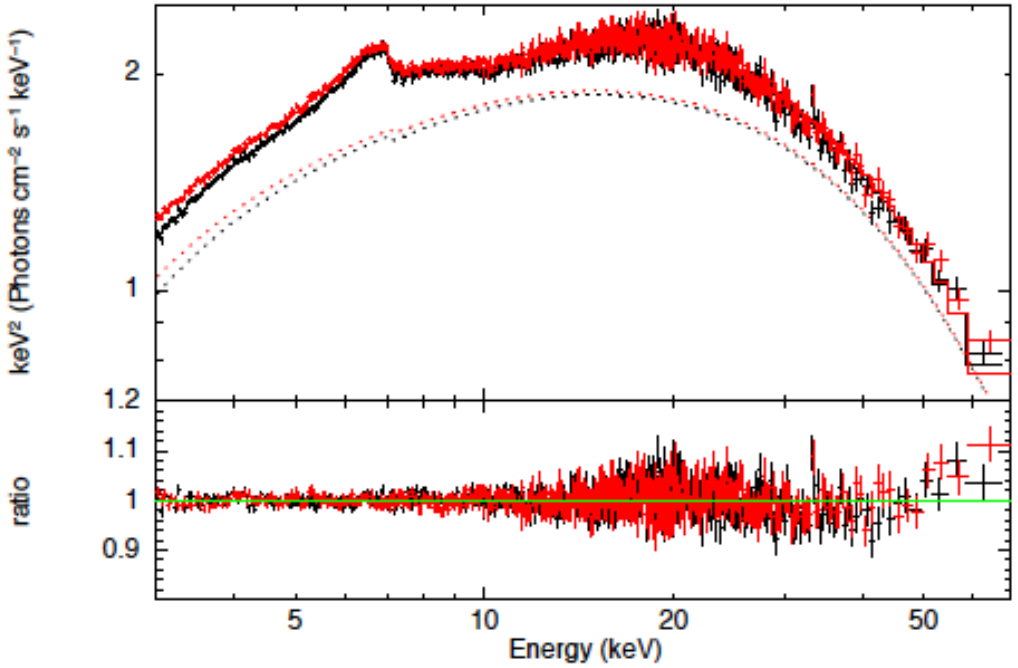


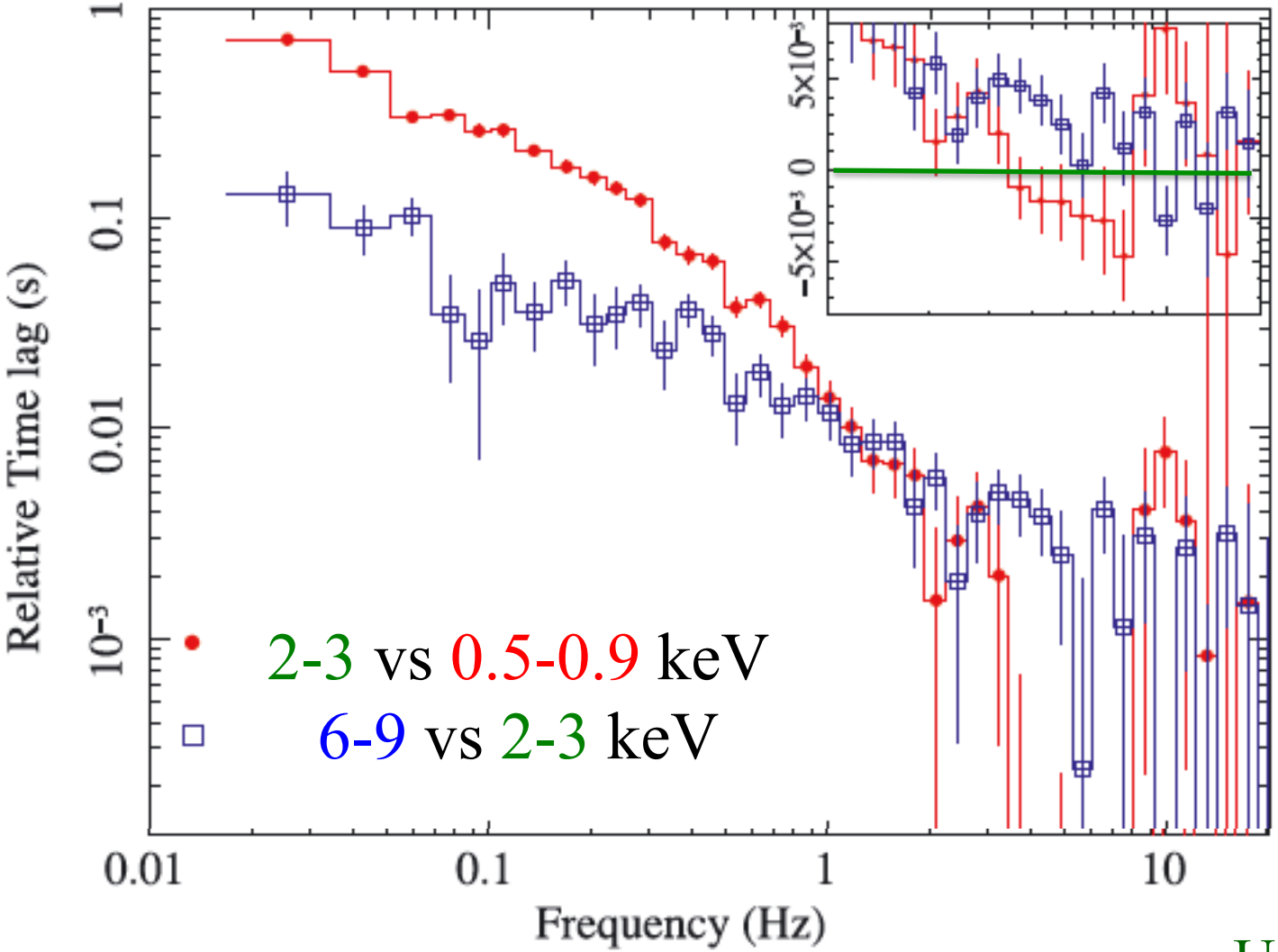
New techniques for variability

- Flux-rms – propagating fluctuations (Vaughan, Uttley)
- Lag-frequency / lag energy (Uttley, de Marco)
- Reverberation lag LHS truncated (de Marco – in which case something wrong with broad lines eg Miller et al 2015 NuSTAR extreme emissivity at smallest radii, high spin LHS)

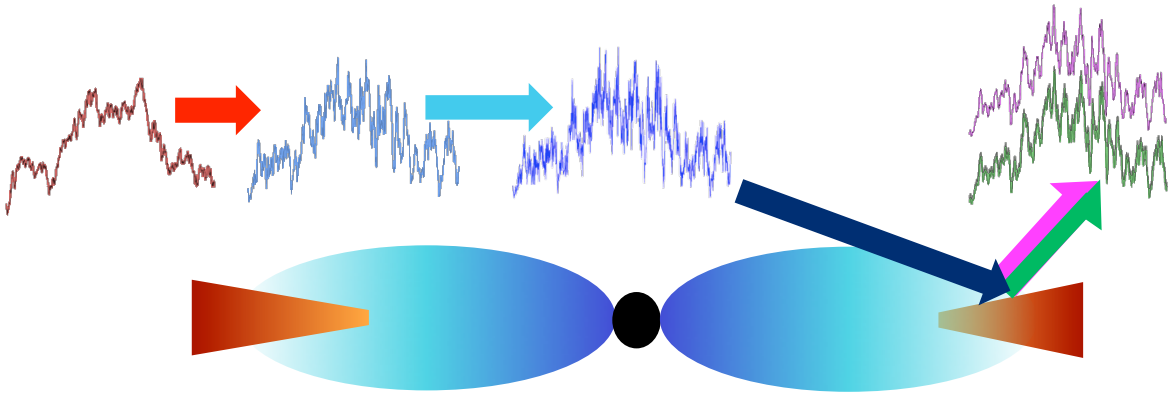
- Resolution (??)

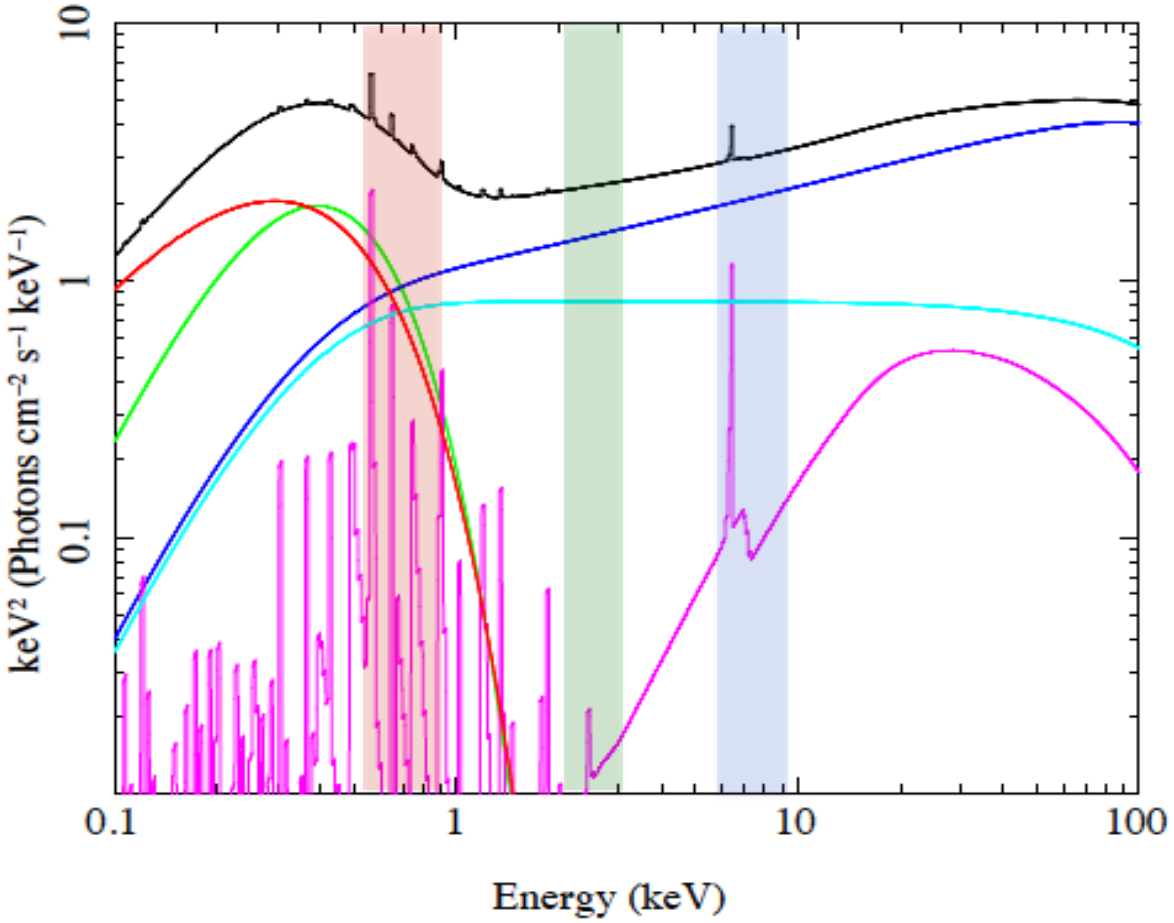
  Complex continuum



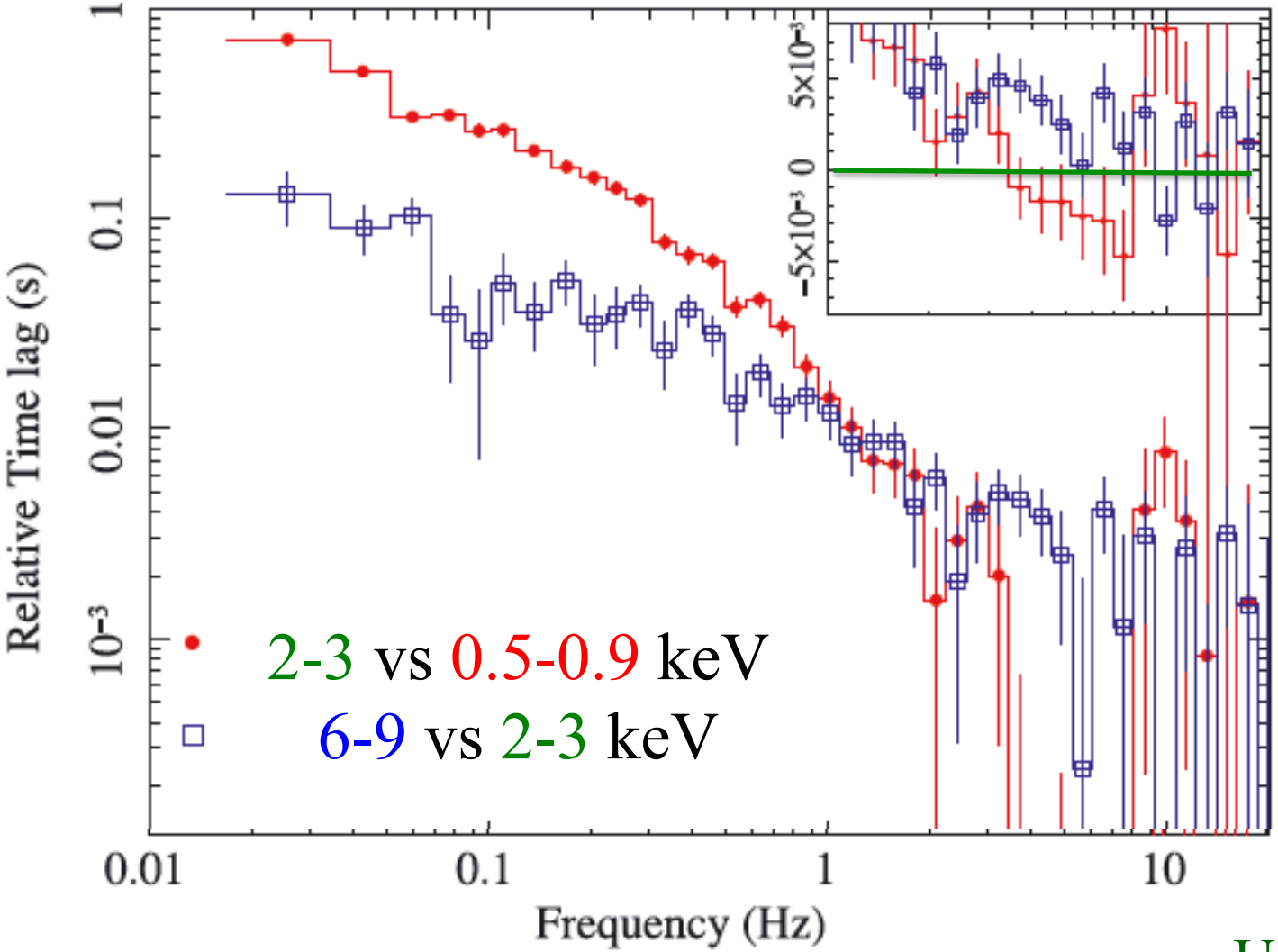

Relative Time lag (s)
1
0.1
0.01
10⁻³
0.01
0.1
1
10
Frequency (Hz)
5×10⁻³
0
-5×10⁻³
2-3 vs 0.5-0.9 keV
6-9 vs 2-3 keV

Uttley





Uttley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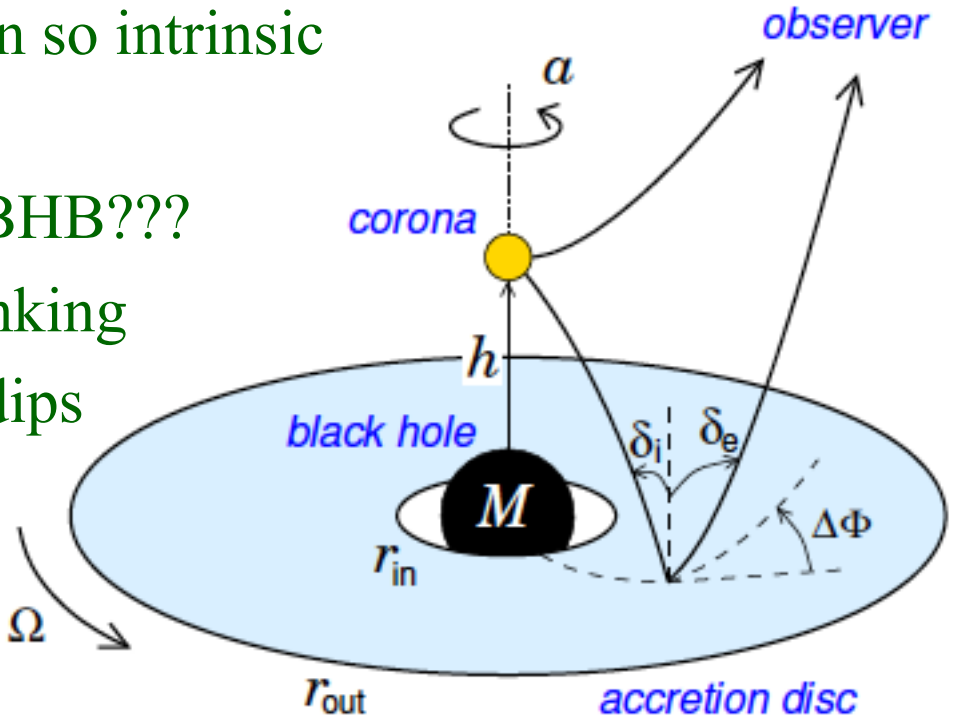
Uttley

Lag-frequency/Lag-energy in AGN

- Lag-frequency / lag energy (Fabian, Uttley, Cackett, Alston, Kara, Papadakis, Epiropakis)
- Reflector and geometry (Dauser, Garcia, Gooseman, Wilkins, Dovciak, Mantovani, Bonson)
- On axis source – R constant, L constant, h changing
- But now see reverberation so intrinsic variability
- But we don't see this in BHB???
- Disc corona – radial shrinking rather than h drop to get dips (Wilkins)

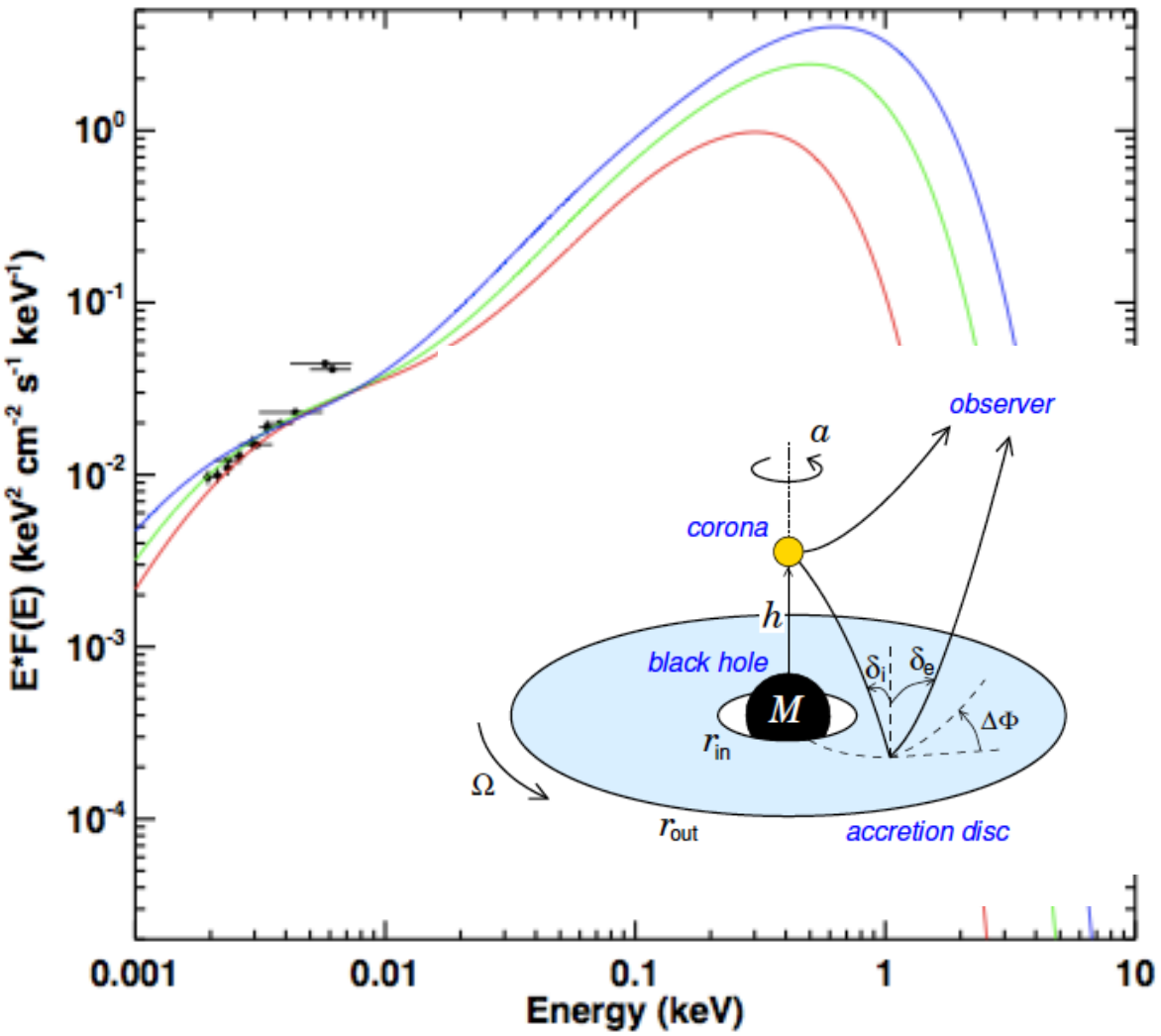


Do we have a clean view - Winds

- BHB winds– mostly thermal but could be MHD (Hori, diaz trigo, Ponti, Chakravorty)
- External winds HMXRB – Grinburg, Hirsch
- AGN winds – warm absorbers could be thermal, but UFOs must be diskwind in AGN (Silva, Cappi, Tombesi, Reeves, Matzeu, Pounds, Braito)
- And in UV – BALs, miniBALs (Mathews, Guistini, Saez)
- Diskwind velocity in PDS456 (NuSTAR) means launched close in – impact on lags?? And on broad iron line red wing – Braito, Mizumoto

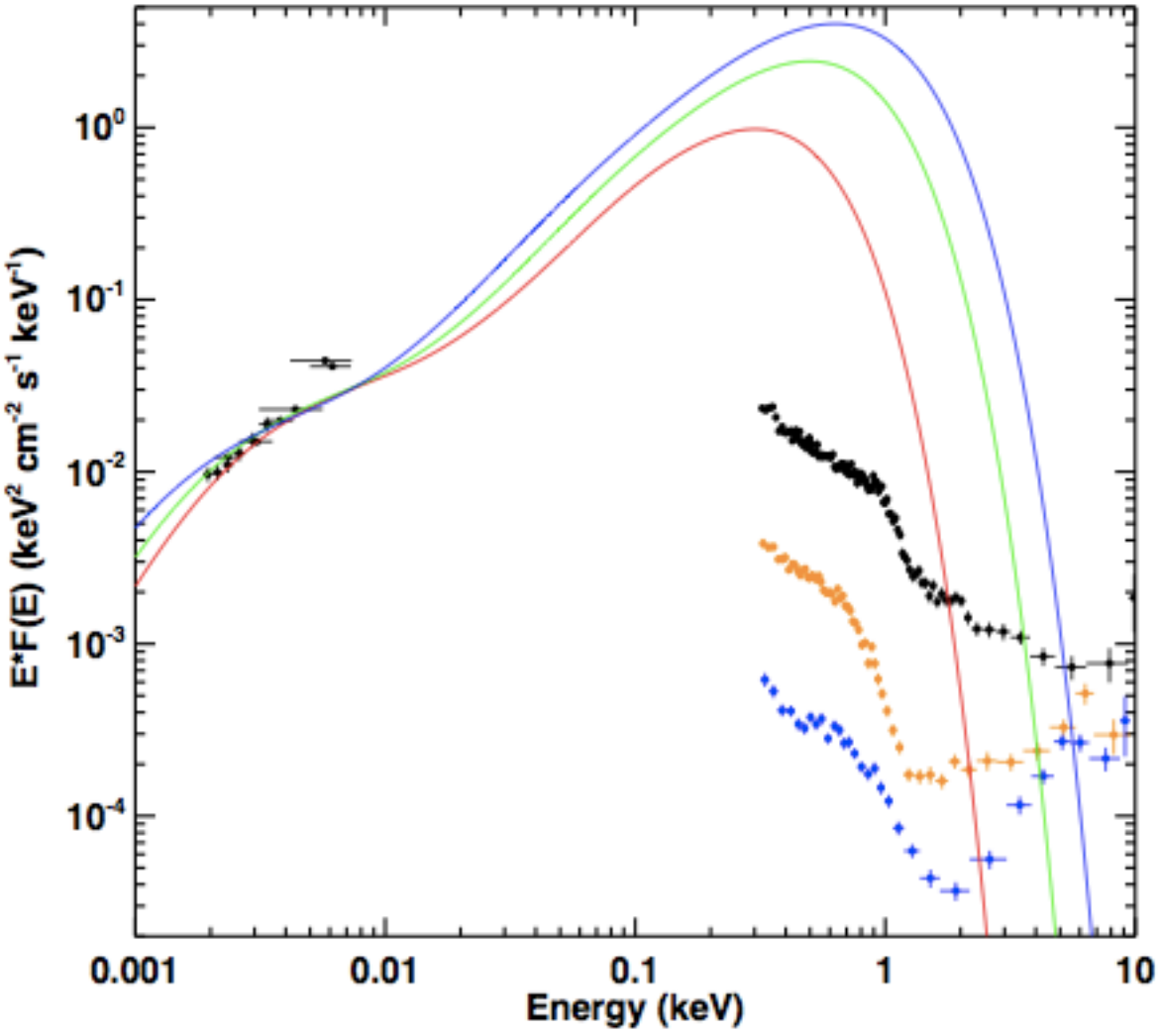
Do we have a clean view - Winds

- 1H0707
- 2e6M a=0, 0.9, 0.998
- Done & Jin 2015
- Clean disc??



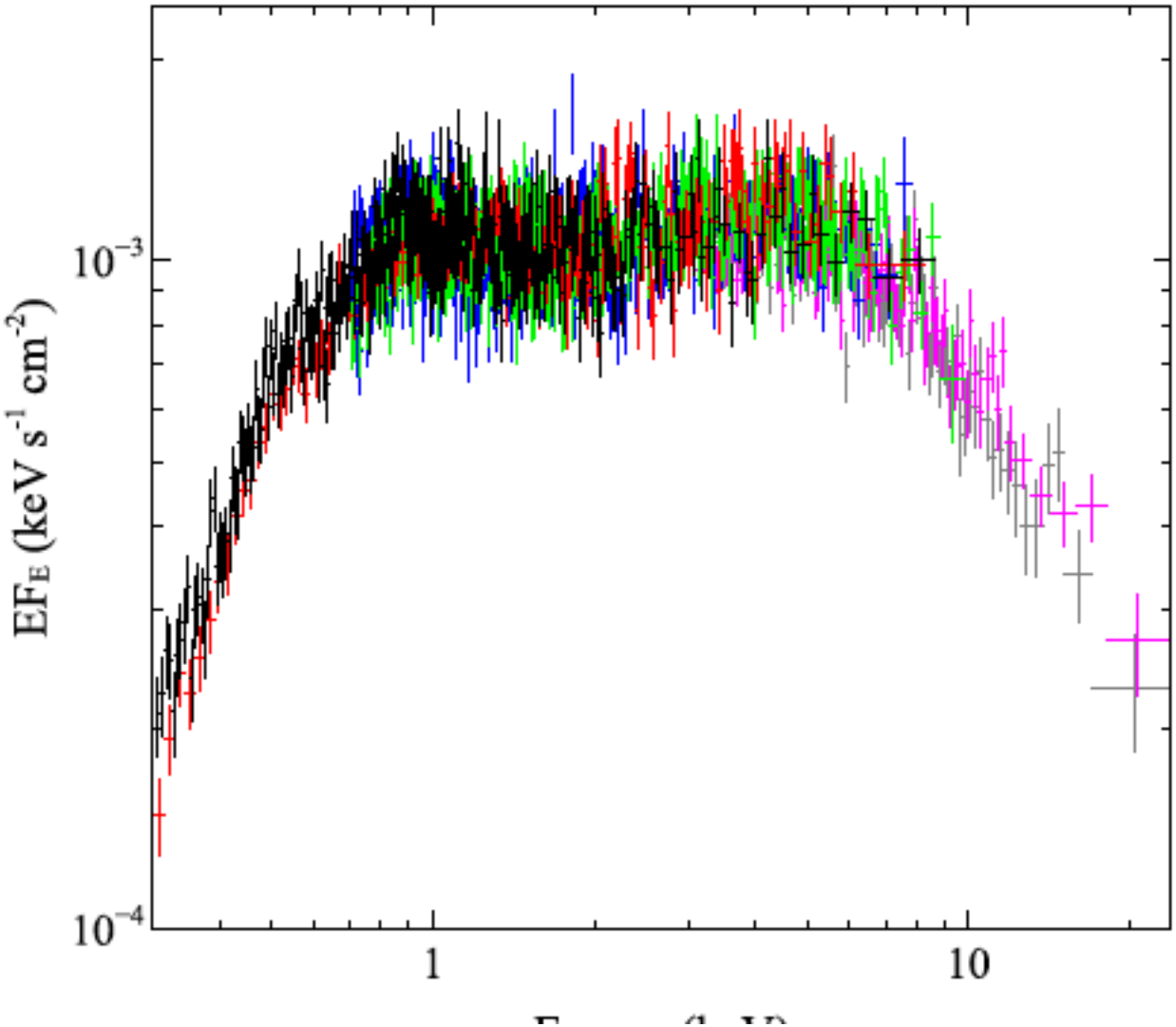
Do we have a clean view - Winds

- 1H0707
- 2e6M a=0, 0.9, 0.998
- L/Ledd = 20, 63 150
- Done & Jin 2015
- L>>Ledd and L>>Lobs so losing most of the accretion power
- disc NOT FLAT
- WINDS – eclipses by clumps can shorten intrinsic lags to match obs Gardner & Done 2015



ULX

- ULX - Nustsar
- L/Ledd>>1 NOT IMBH (Bachetti, Roberts, Earnshaw Kobayashi, Walton et al 2015)



Conclusions

- Nustar (ULX, AGN)
- Long monitoring, multiwavelength (OM/UVOT) campaigns
- Large surveys (tidal disruption: Saxton)
- New techniques – lag-frequency, lag-energy LONG XMM but also look at multiwavelength context!!
- UFOs – LONG XMM, NuSTAR
- USE ALL THE INFORMATION

- Astro-H (Sanchez-Fernandez), Astrosat, Athena….Amazing!


REAL MADRID C.F.
bwin
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Thanks to YOU!! And the SOC but most especially the LOC

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