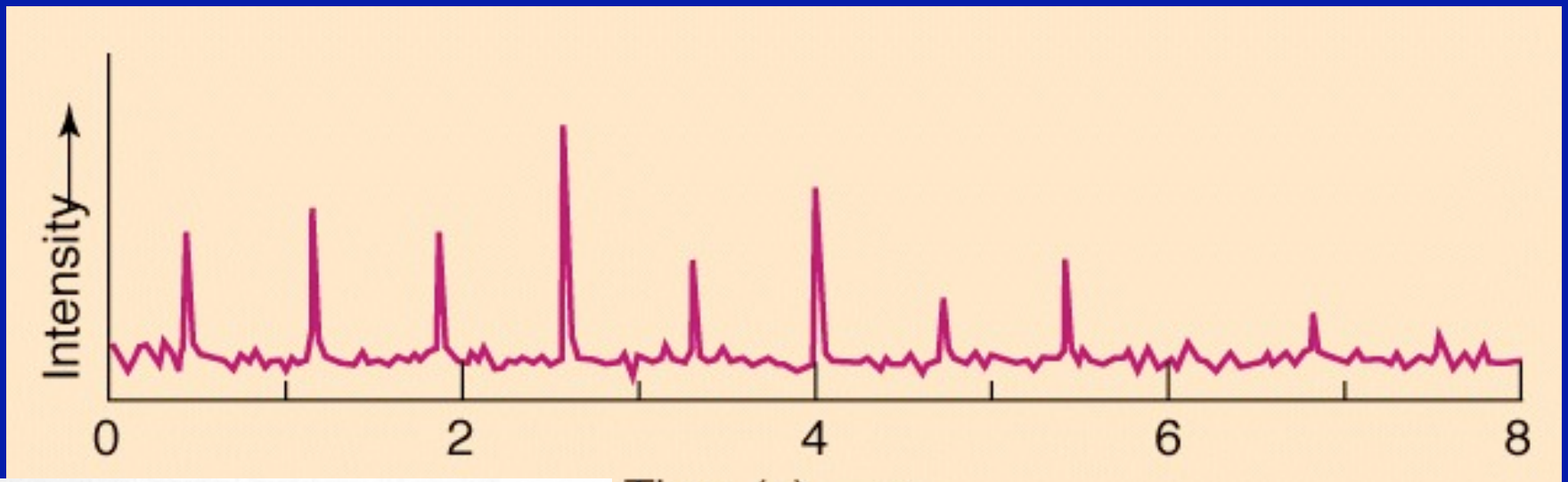
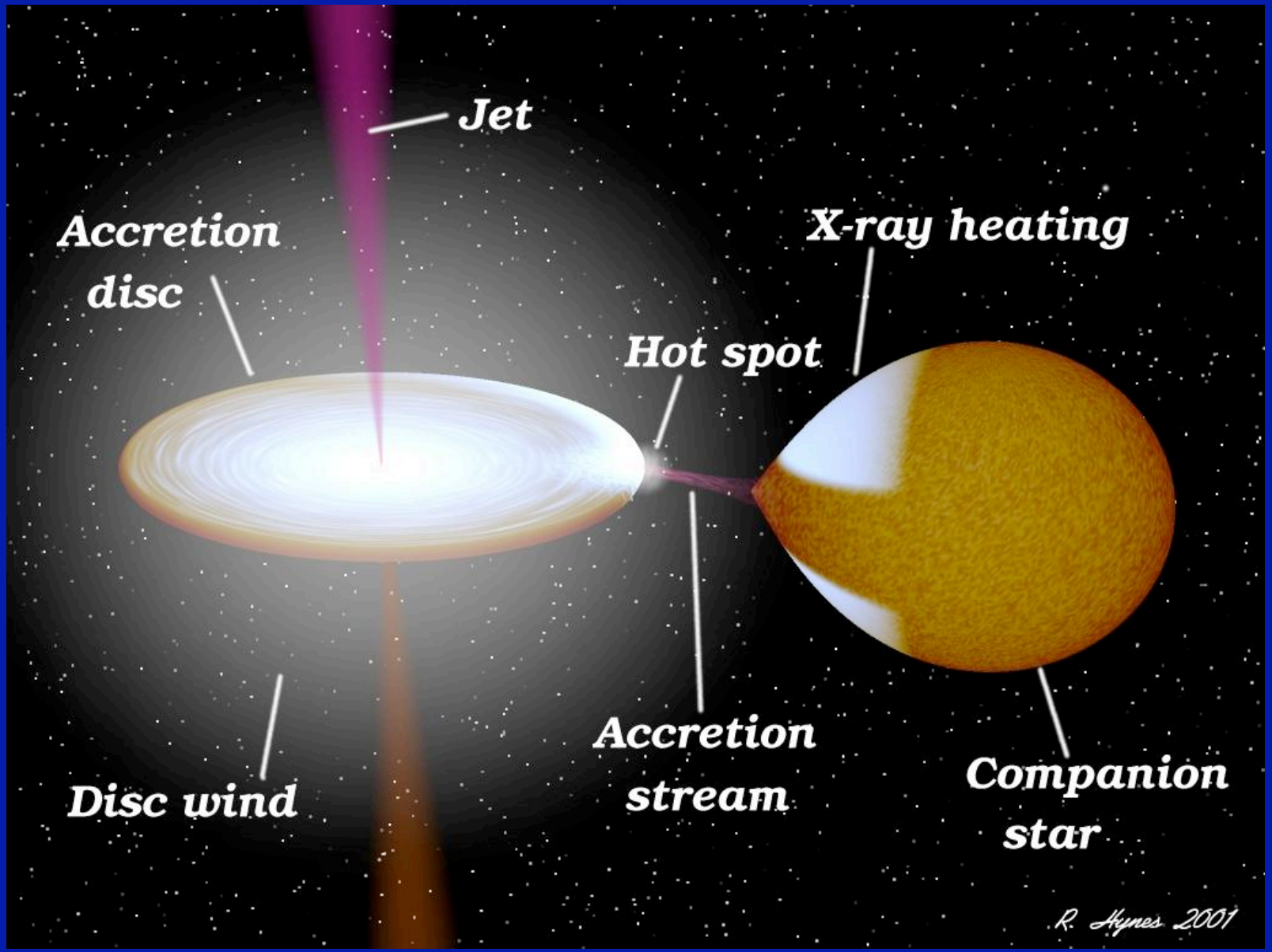
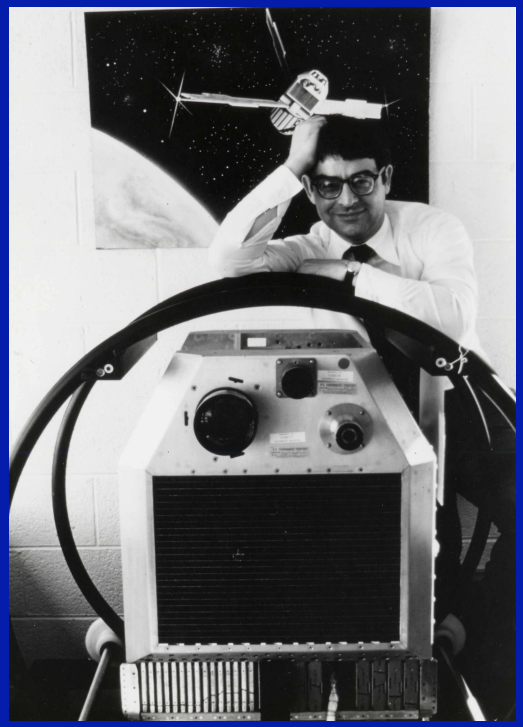
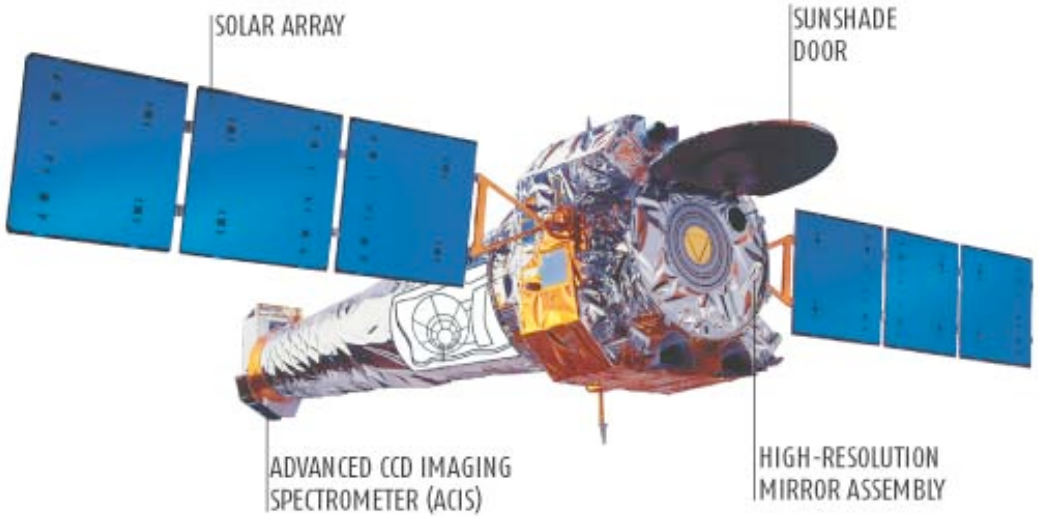

Intensity
0
2
4
6
8
Time (s)


Jet
Accretion disc
X-ray heating
Hot spot
Disc wind
Accretion stream
Companion star
R. Hynes 2001

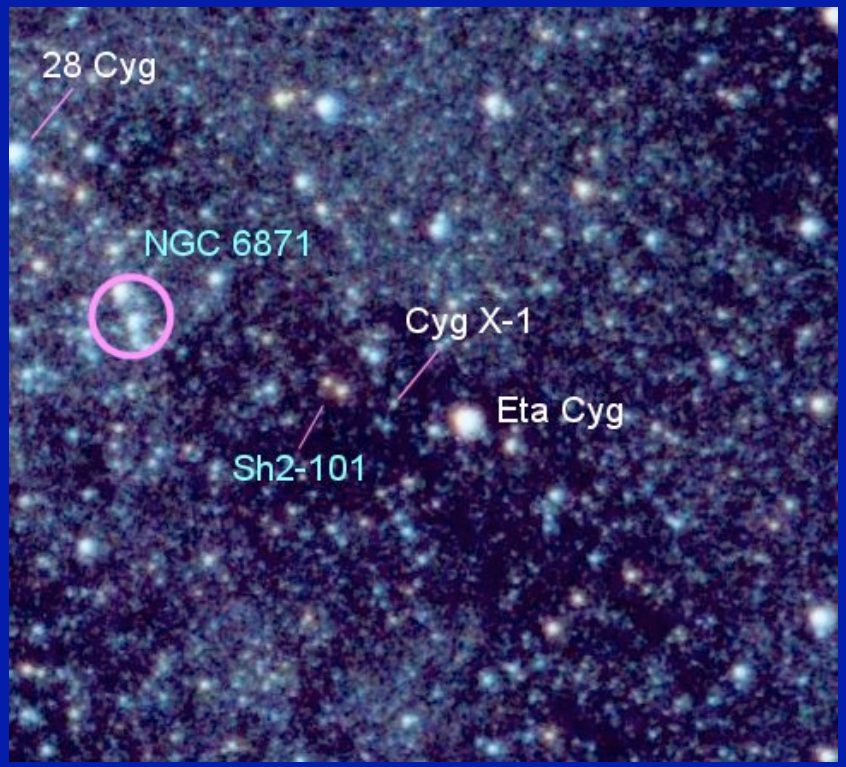


CHANDRA X-RAY TELESCOPE

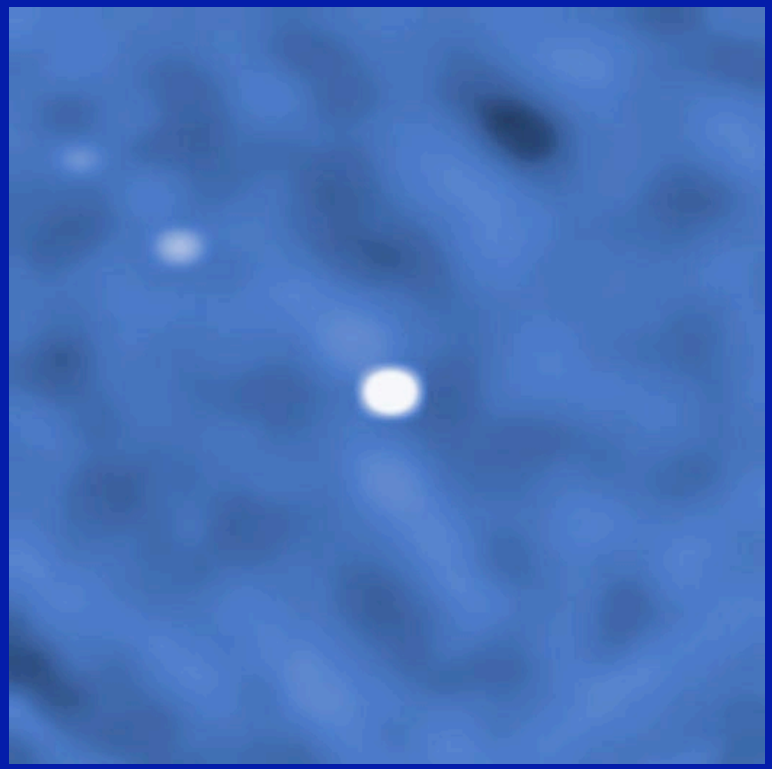
Grease coating a filter in front of the ACIS camera is blocking out almost half the light at low energies



Optical light



Gamma rays

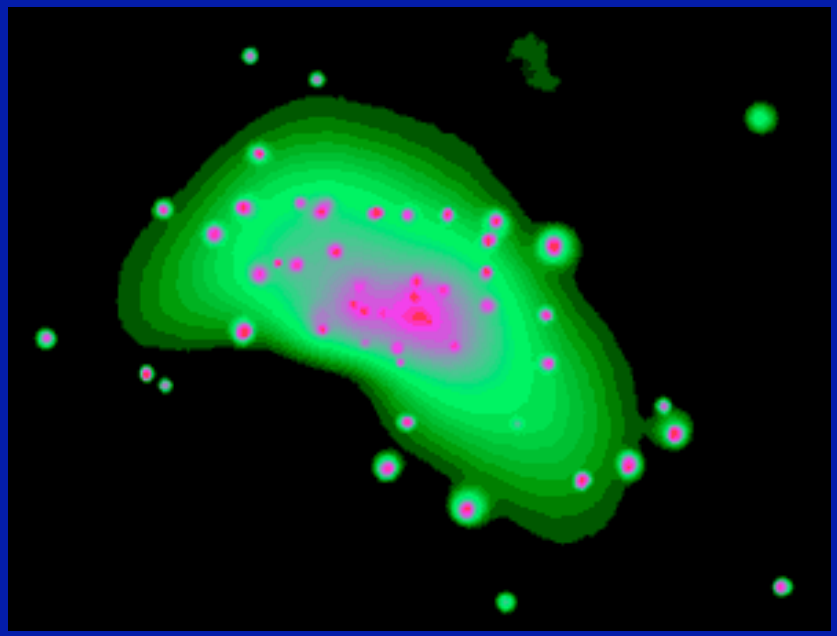


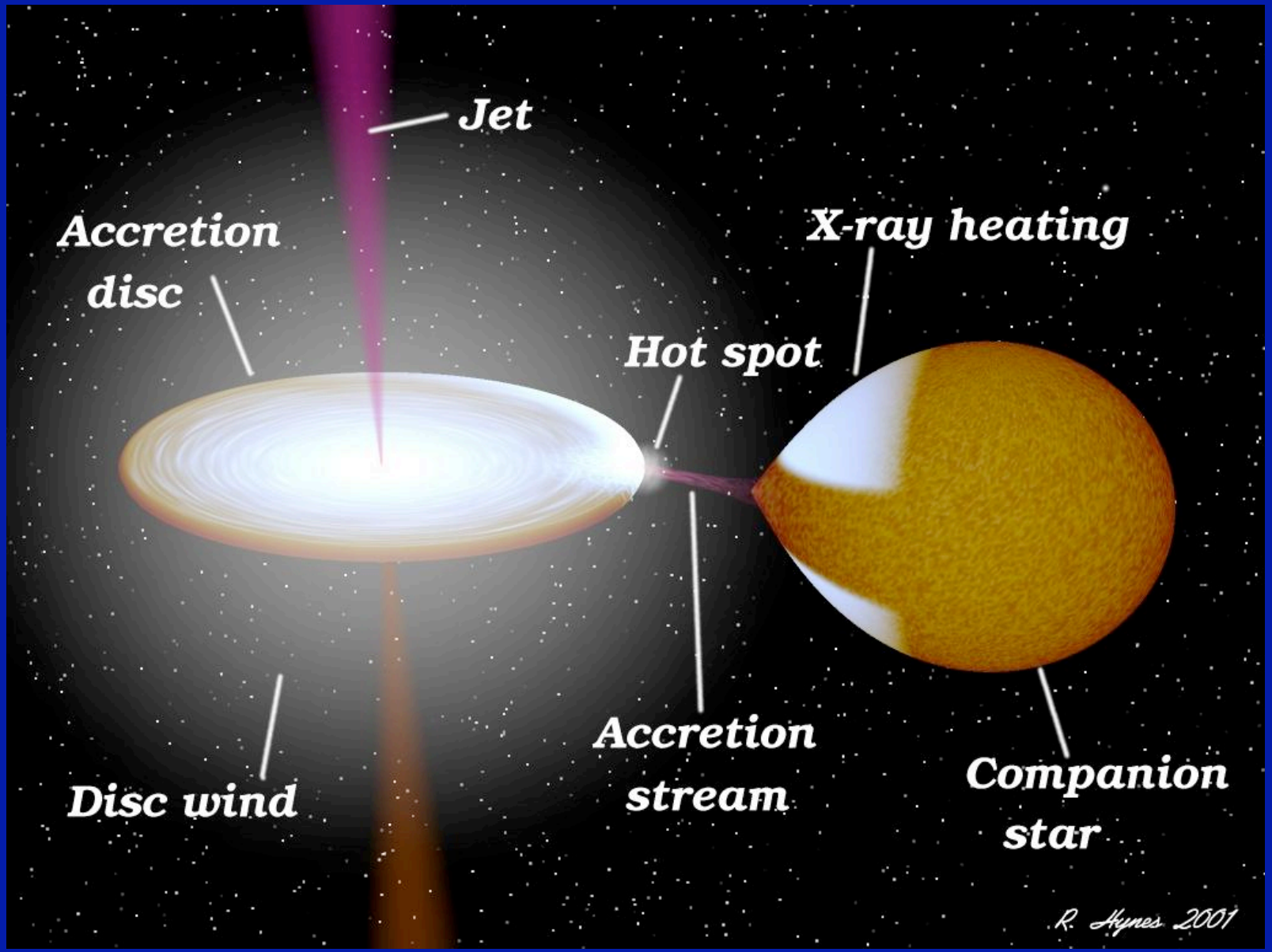
(INTEGRAL satellite, neutron star Cyg X-3 at upper left)

Galaxy NGC 4697

Optical light

X-rays




Jet
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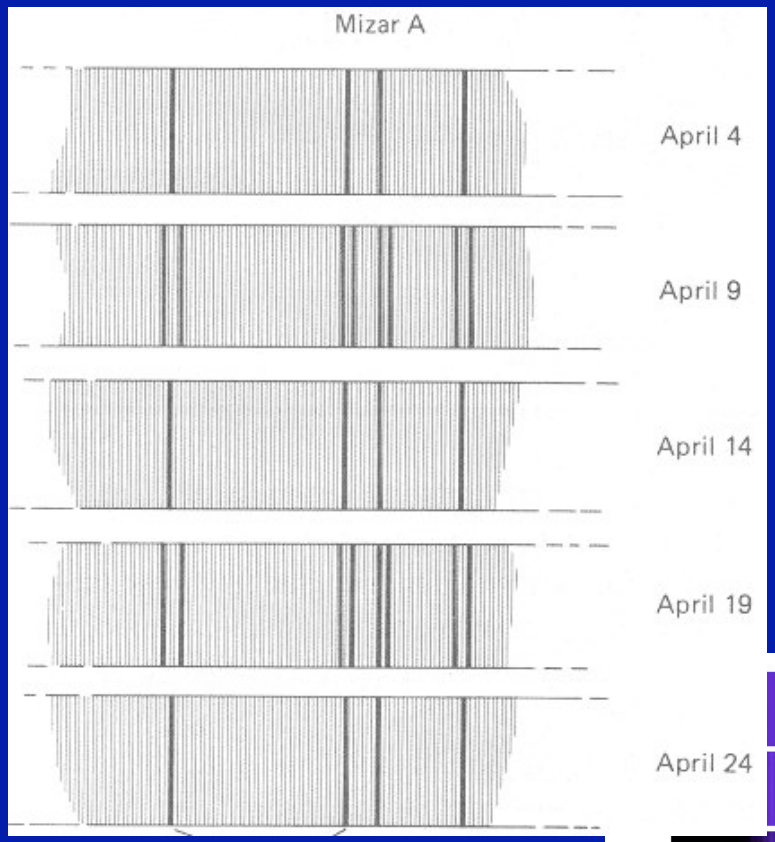
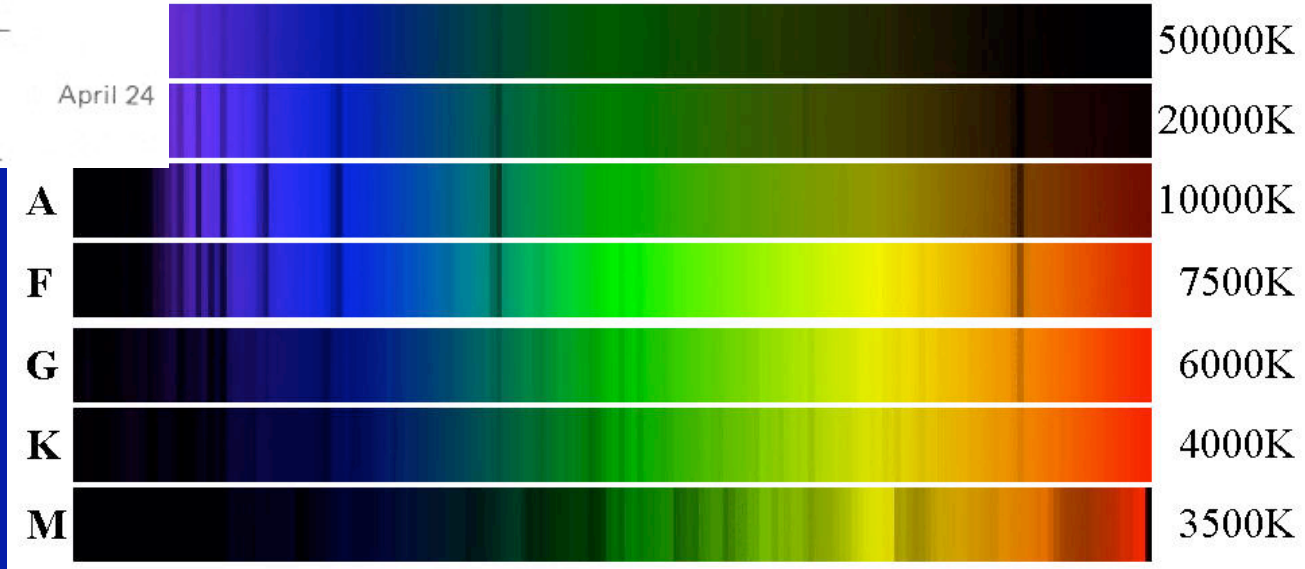
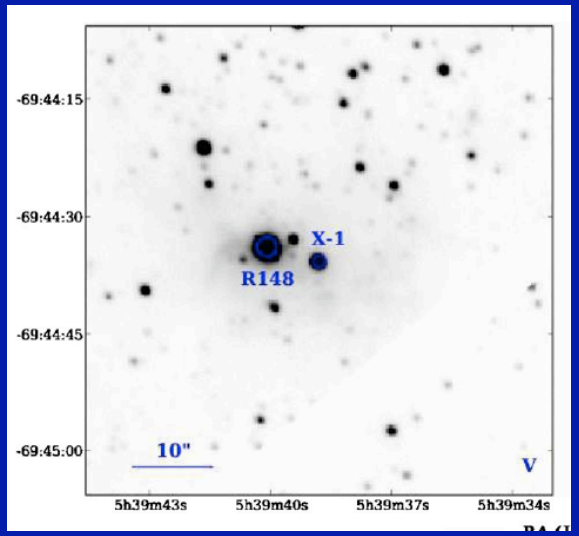
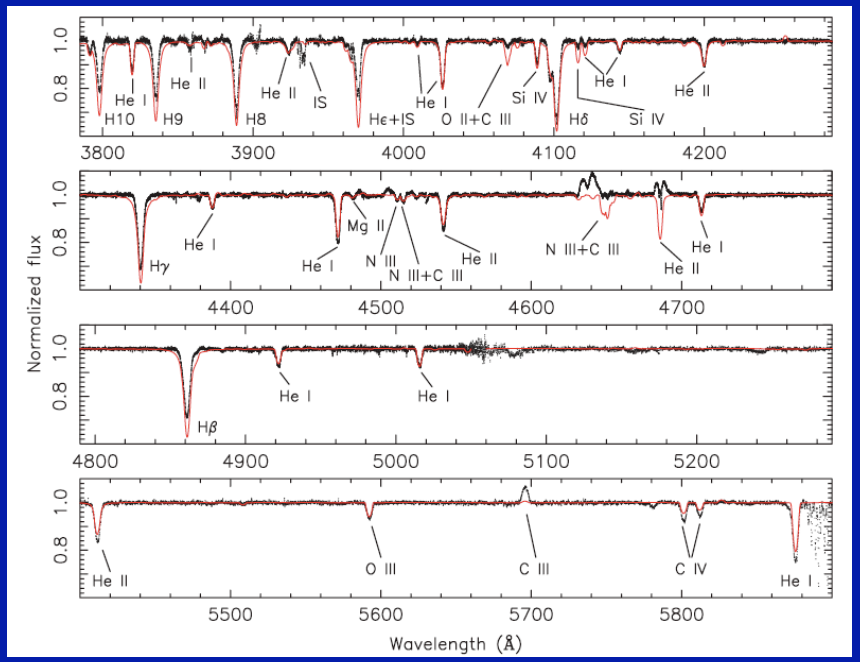


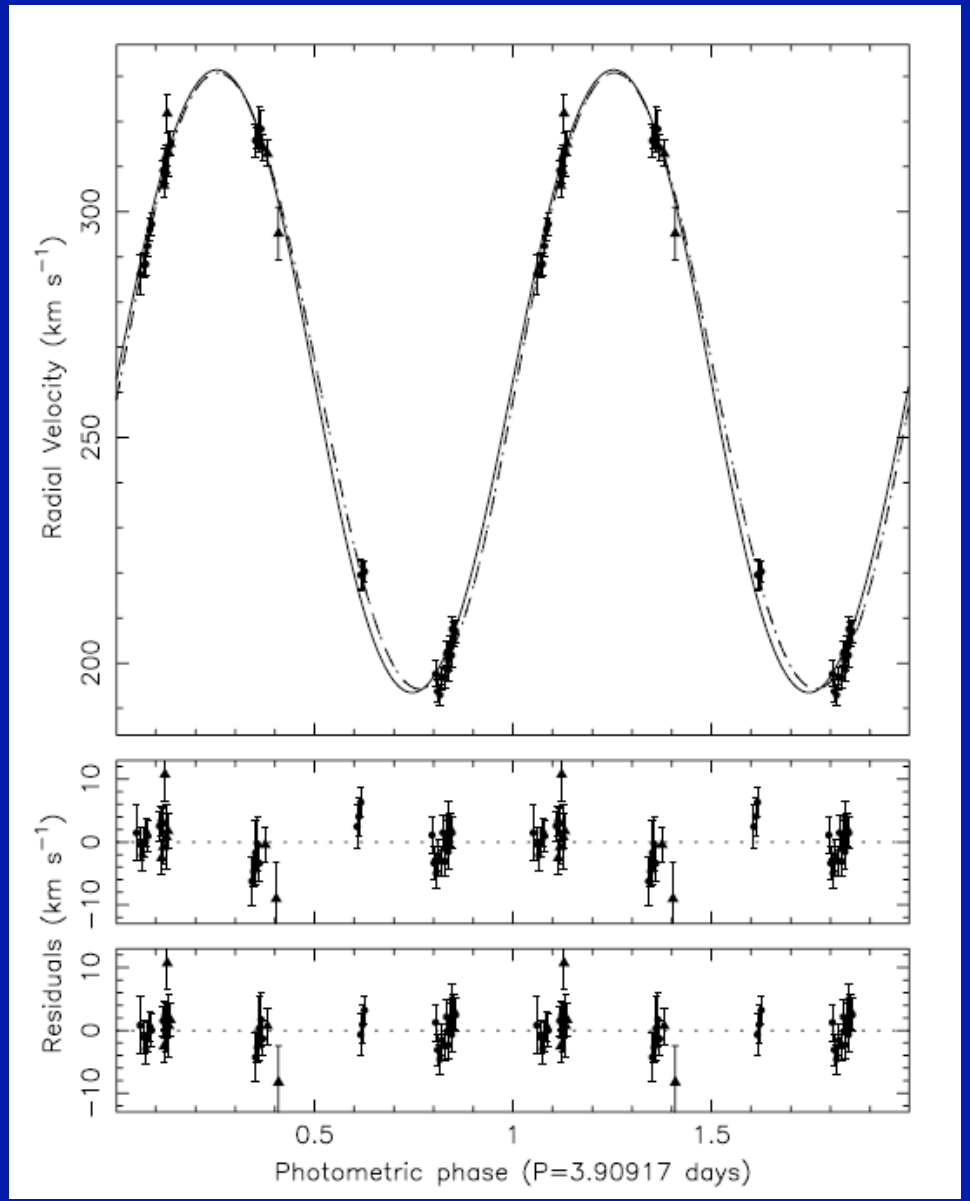
See Thorne Fig 8.3



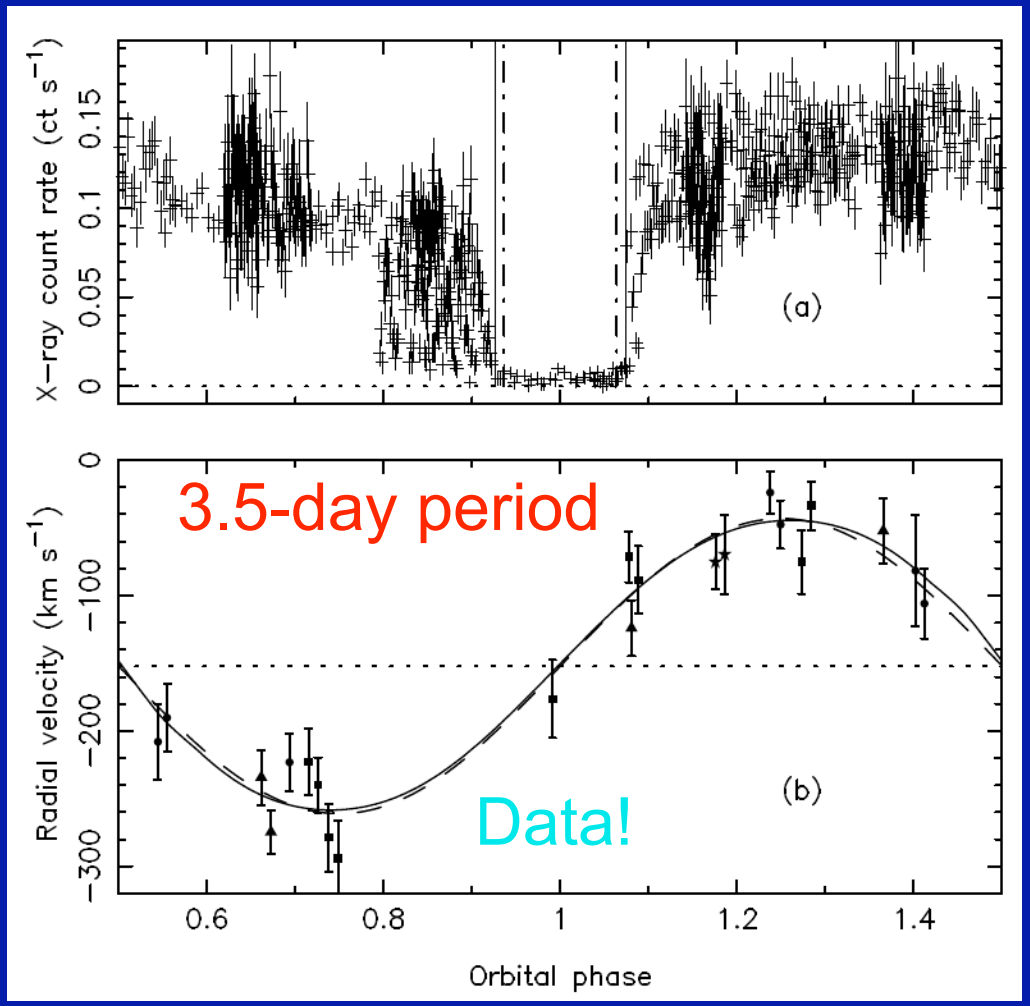
Orosz et al. 2009, LMC X-1, $M_{BH} = 10.9 \pm 1.4\ M_{\odot}$

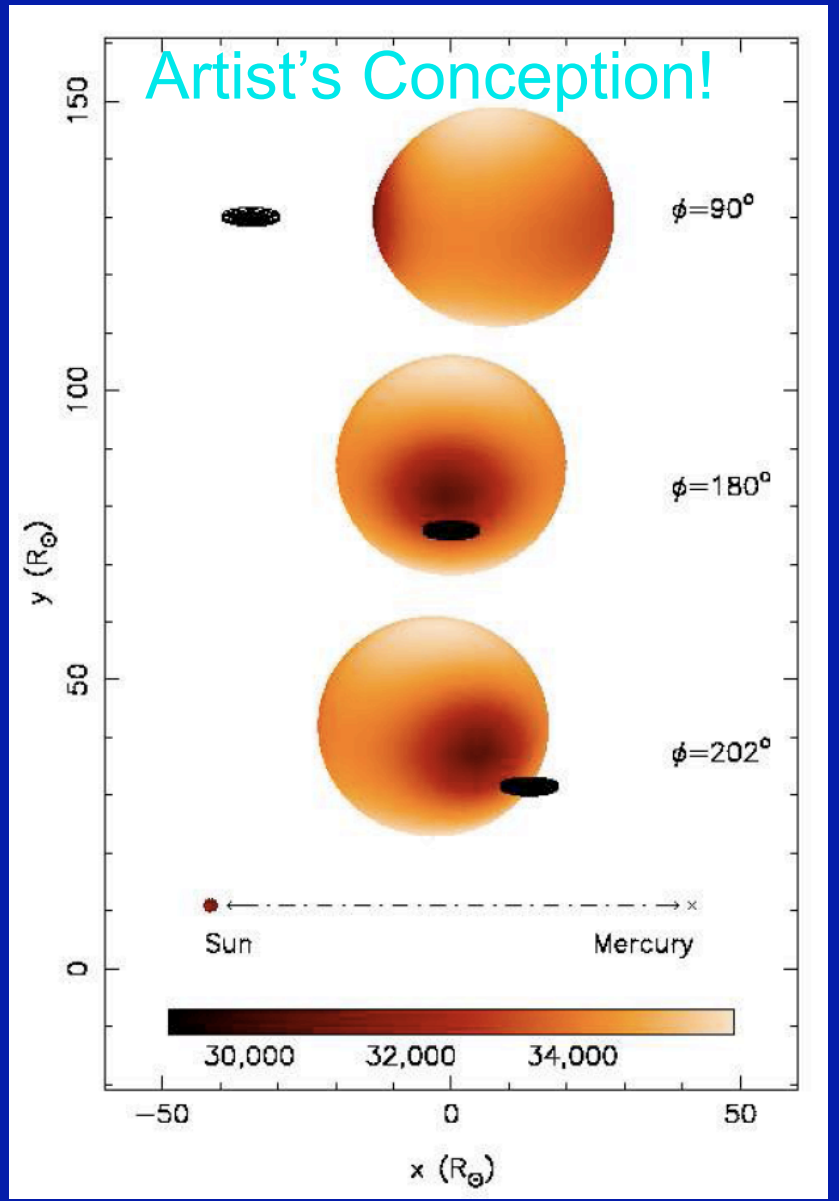




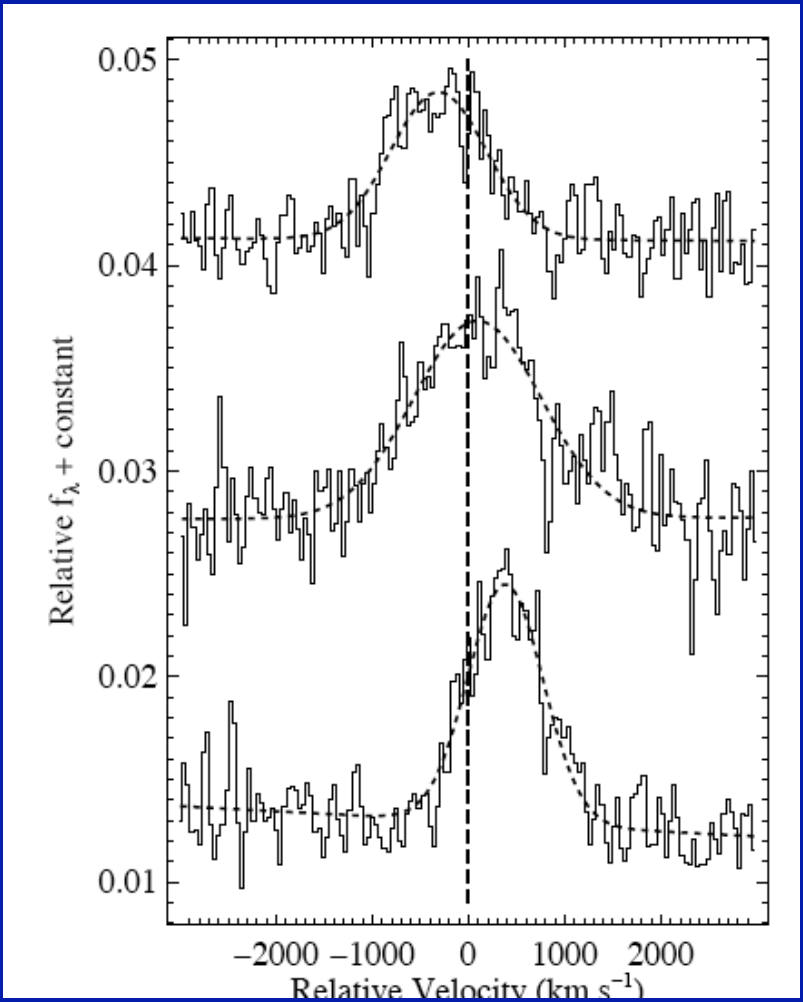


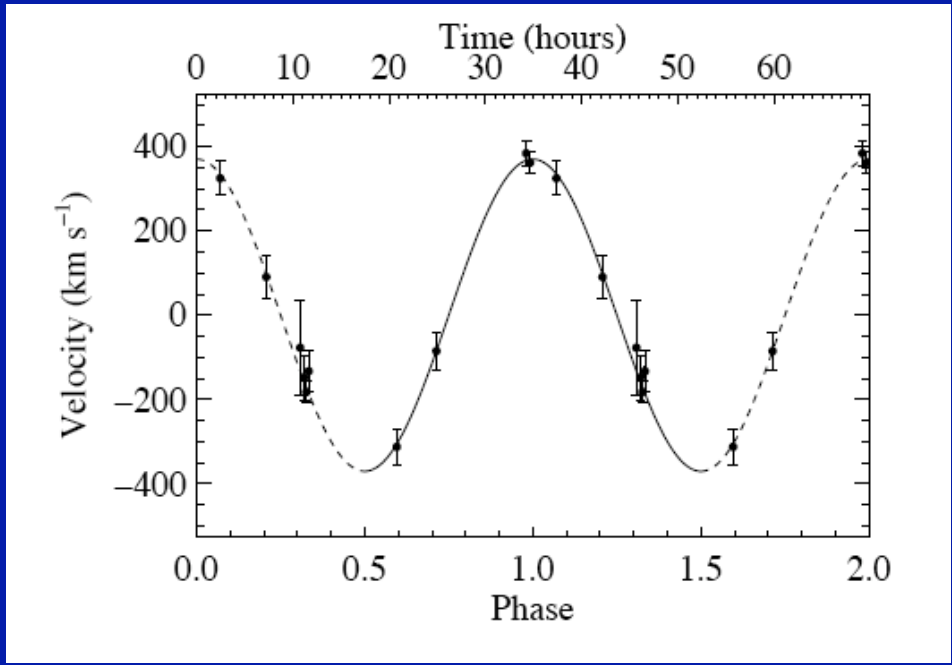
Orosz et al. 2007, a 15.7$M_\odot$ BH in nearby galaxy M33, eclipsed by its 70 $M_\odot$ companion



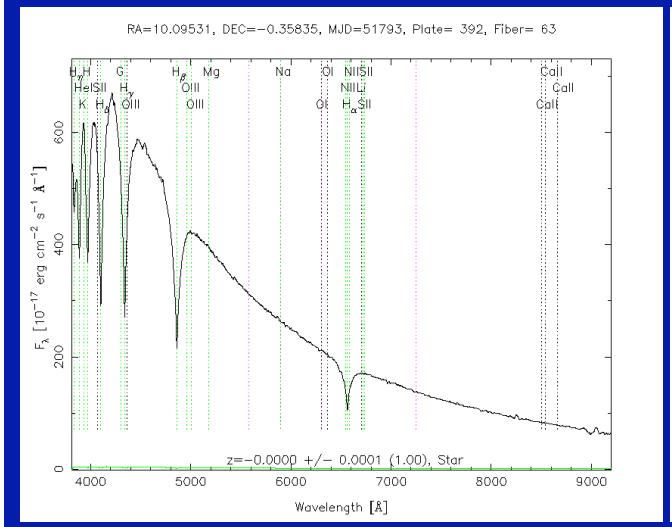


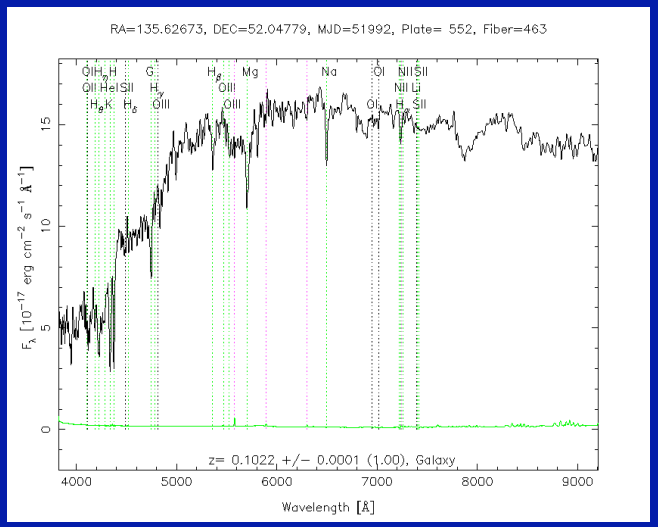
Silverman & Filippenko 2008, confirmation of 33 ± 3 $M_\odot$ black hole in a nearby galaxy (IC 10),

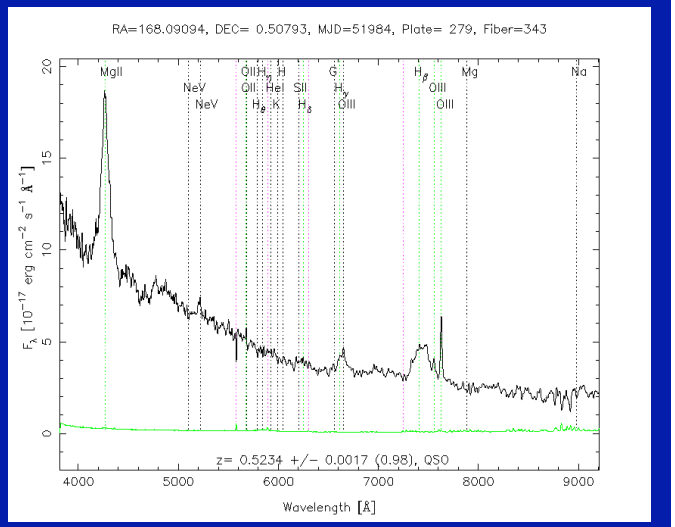




Helium emission line



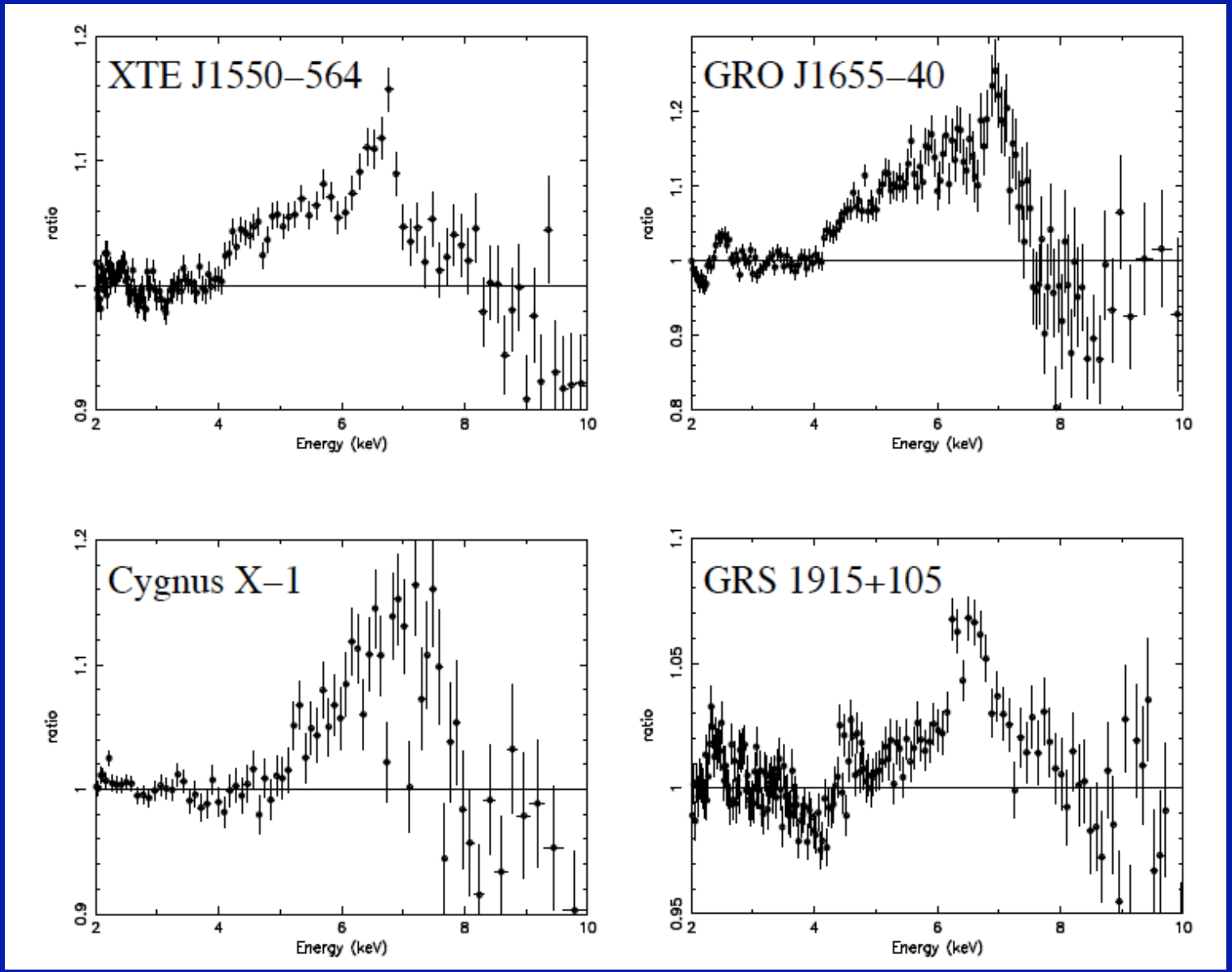




White dwarf

Galaxy

Quasar



X-ray iron lines of four stellar mass black holes

From Miller 2007, ARAA

Narayan & McClintock 2008: *Minimum* X-ray luminosities of X-ray binaries are much higher for neutron stars than for black holes. Suggests the former have a surface, the latter do not.