Optically Unseen Black Hole Candidate

Optical Companion

$P_{\text{orb}}$ (days)

Cyg X–1
Gies & Bolton, 1986
$f(M) = 0.25 \pm 0.01$

LMC X–1
Hutchings et al., 1987
$f(M) = 0.14 \pm 0.05$

LMC X–3
Cowley et al., 1983
$f(M) = 2.3 \pm 0.3$

A0620–00
McClintock & Remillard, 1986
$f(M) = 2.91 \pm 0.08$

V404 Cyg
Gies & Bolton, 1986
$f(M) = 6.26 \pm 0.31$
Asymptotic limit

Newtonian approximation

Last stable circular orbit
Integral of $\chi^2$ Distribution

- $0.3$ ms
- $1$ ms
- $3$ ms
- $10$ ms
- $30$ ms

Poisson
Variability Timescale (ms)

Derived from 9 minutes of HEAO A–1 data @ kbits/sec.

(~5% of total luminosity in 1–20 keV)

$r / M \approx 6 \rightarrow 2R_{\text{disk}} = 300 \text{ km} \rightarrow \text{cutoff @ 1 ms}$
X-ray signals from Cyg X-1
- Timing for each $\gamma$
- Energy for each $\gamma$