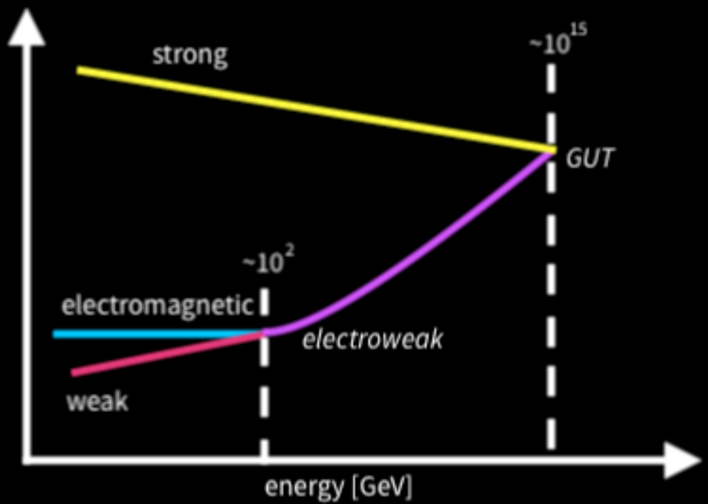
Frascati workshop, 3 June 2019

TESTING GR WITH ACCRETION ONTO COMPACT OBJECTS

Colibrì Collaboration

Ilaria Caiazzo
University of British Columbia

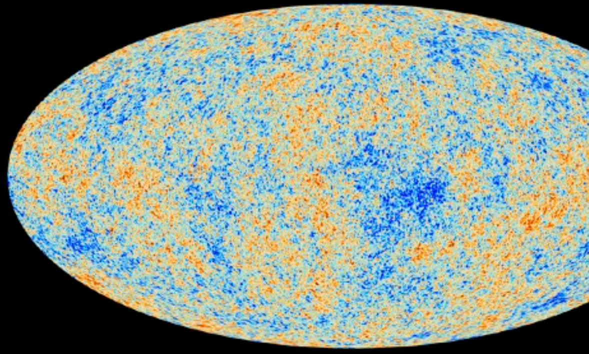
Is GR a complete theory?



- General Relativity doesn't fail anywhere below the Plank scale
- Is there a scale at which GR transition to an alternate theory of gravity?
- Can we explain the accelerating expansion rate of the Universe with modifications to GR?

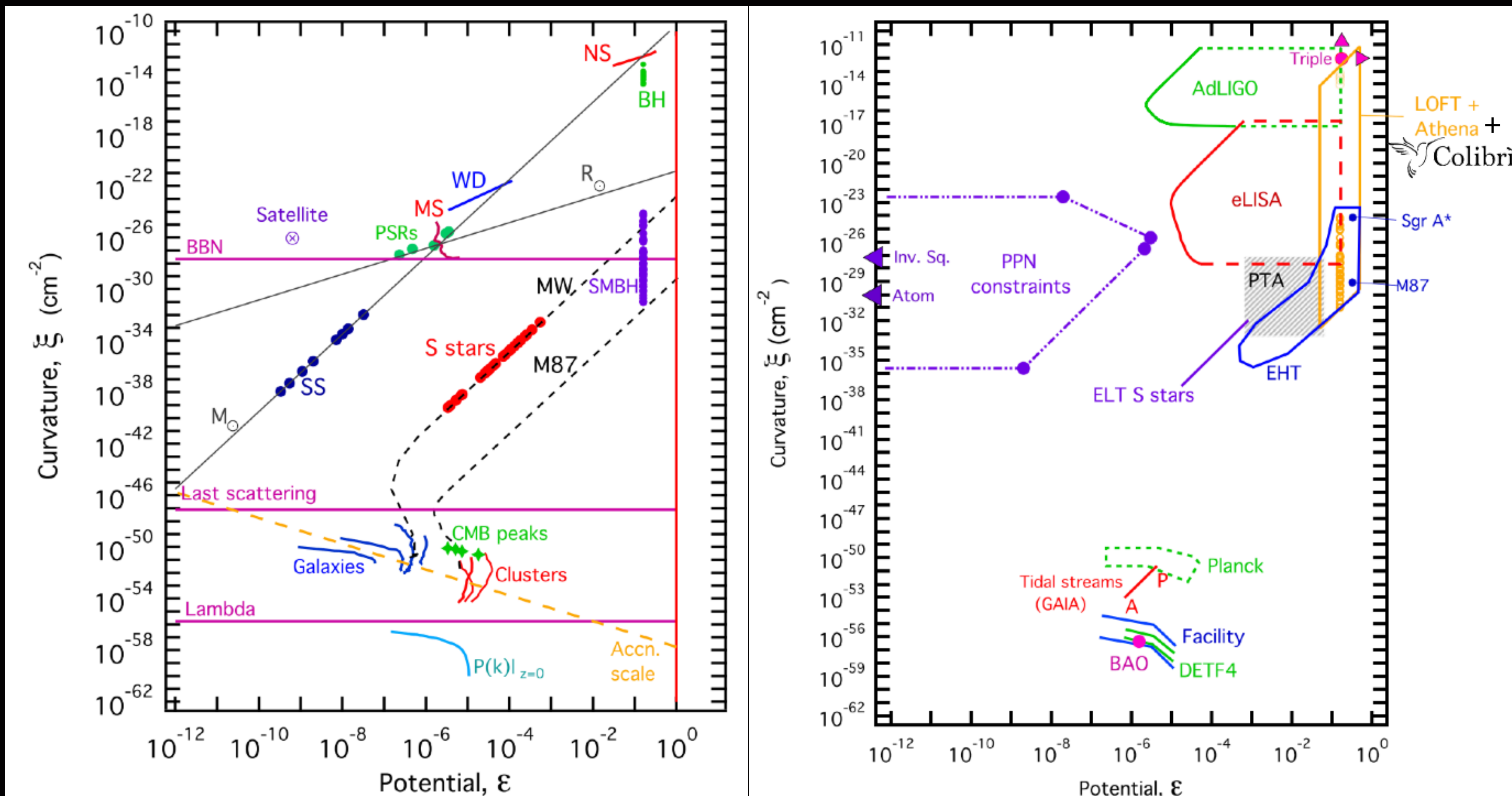
- Is it an energy scale? Curvature of the spacetime? Potential well? Acceleration?

$\stackrel{?}{=}$



Why compact objects?

Baker, Psaltis and Skordis 2015



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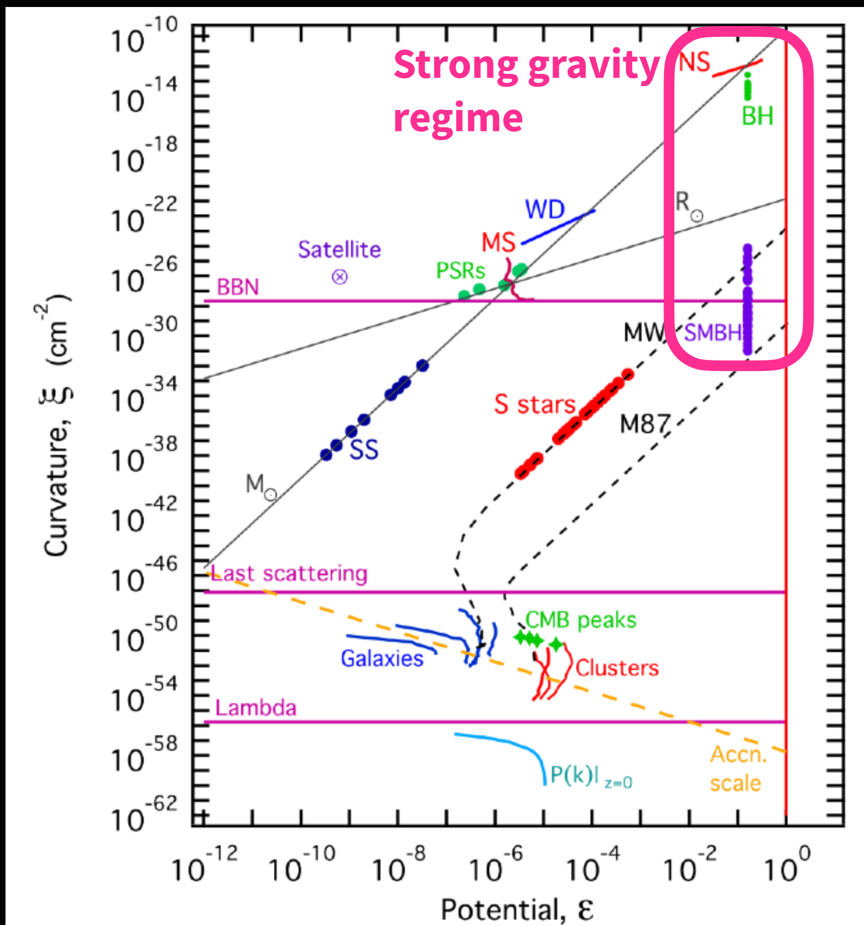
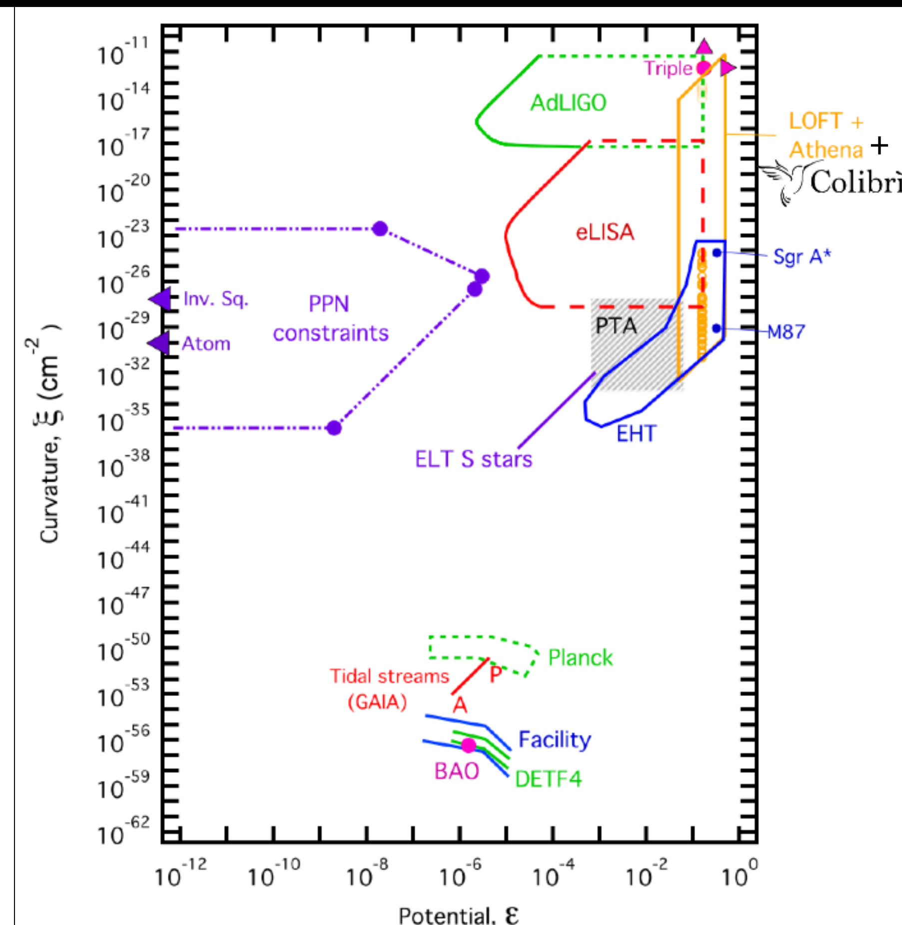
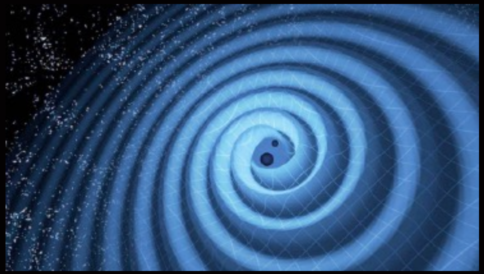
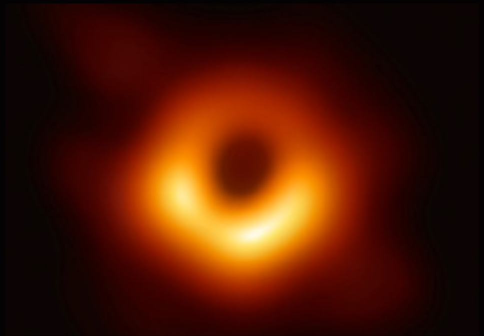


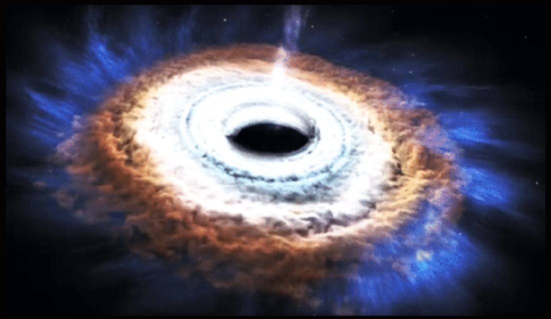


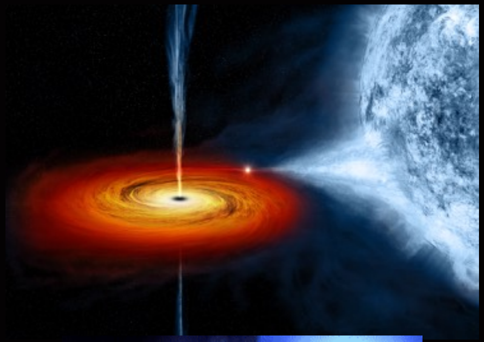
Why accreting?



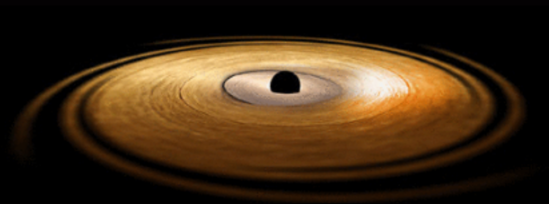
- GW and EHT. More later during the conference

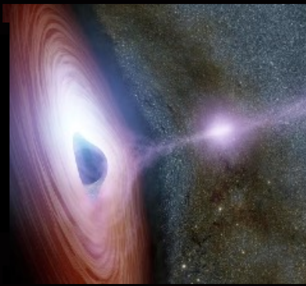




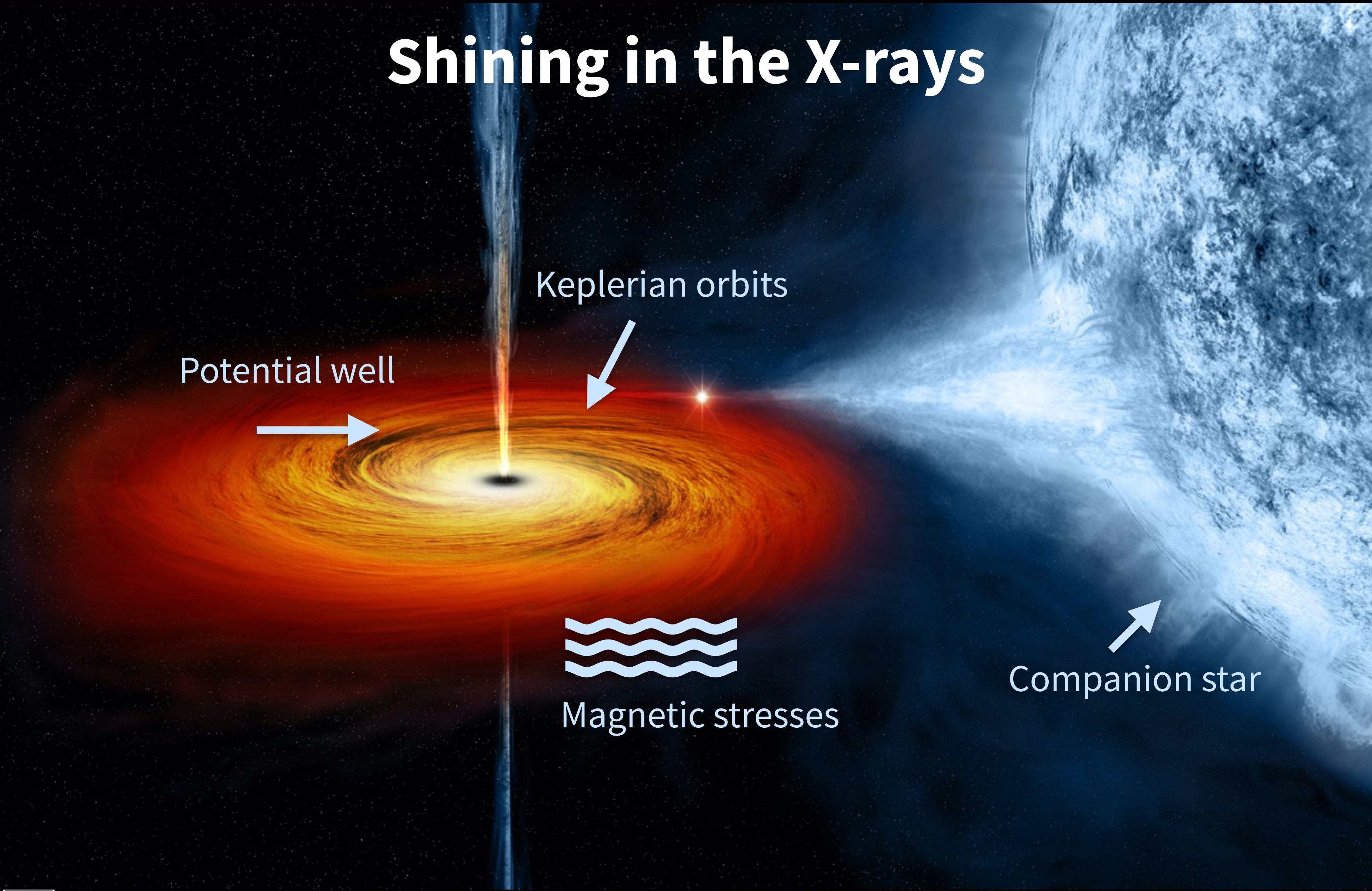


- Accreting objects can probe the details of the spacetime in the strong field
- Wide range of systems

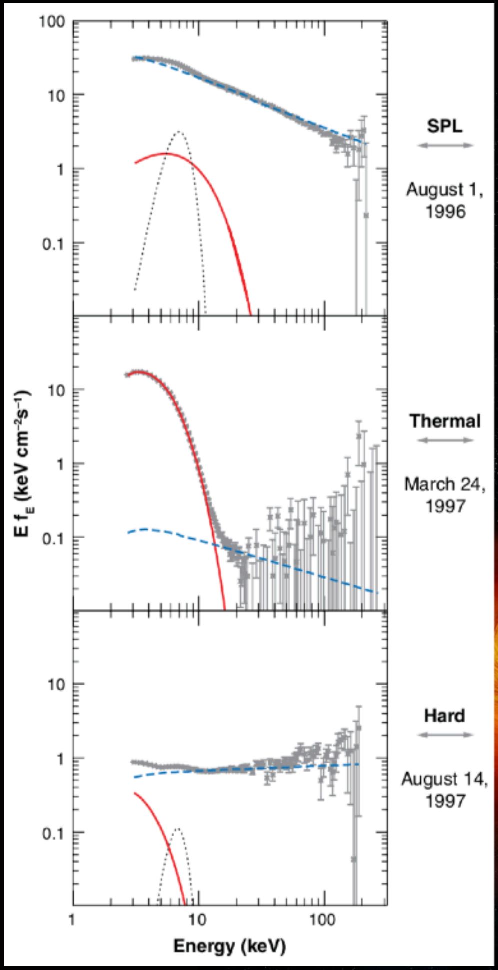




Shining in the X-rays



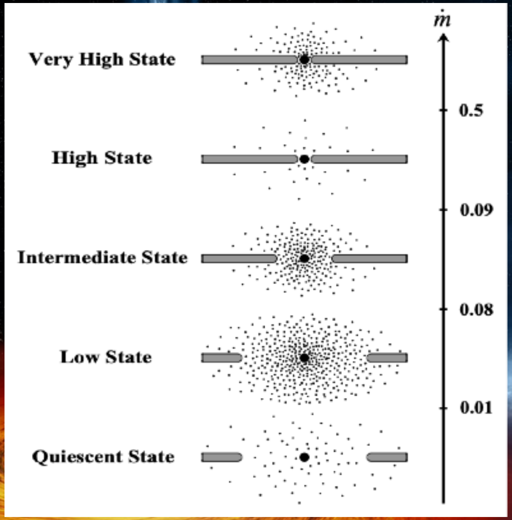
Shining in the X-rays - spectra

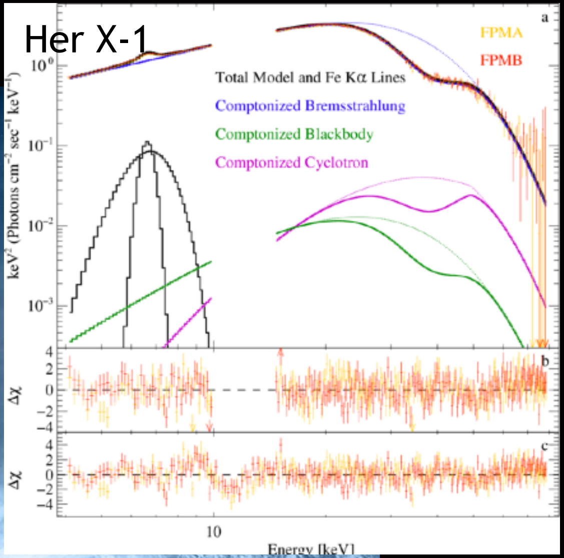


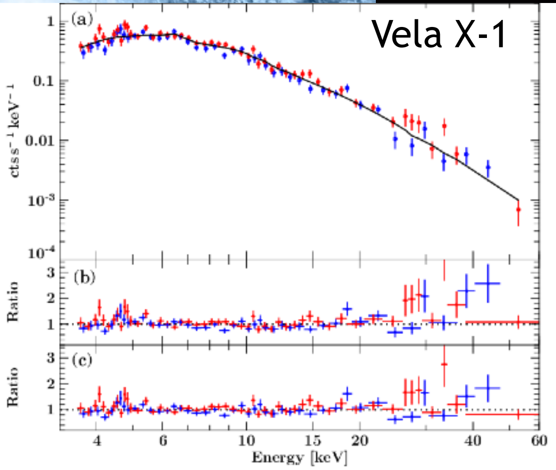
GRO J1655-40

McClintock and Remillard 2005

Remillard and McClintock 2006



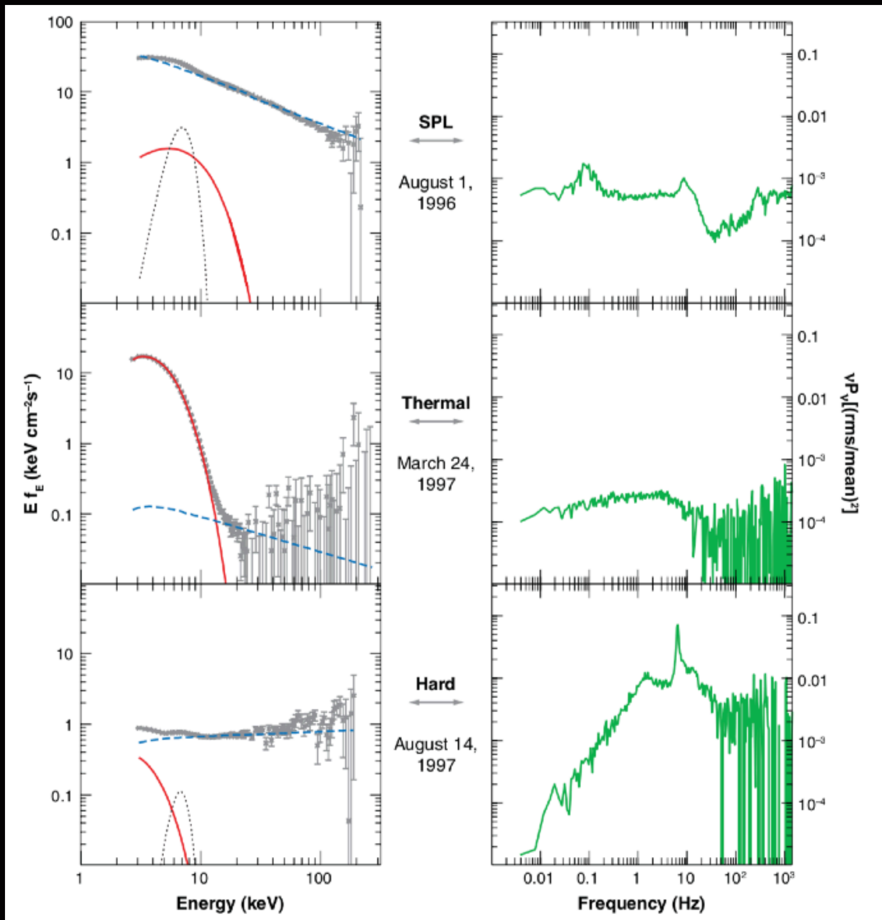


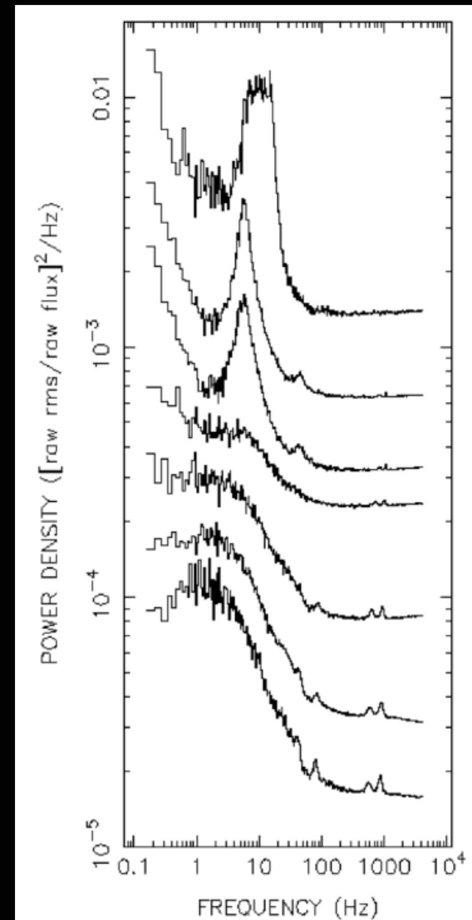


Wolff et al 2016

Fuerst et al 2013

Shining in the X-rays - timing

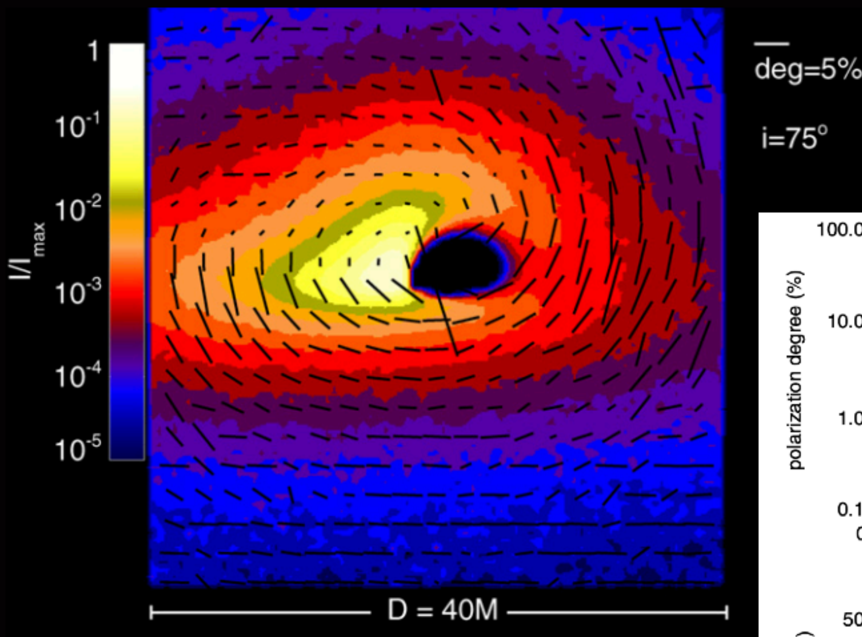




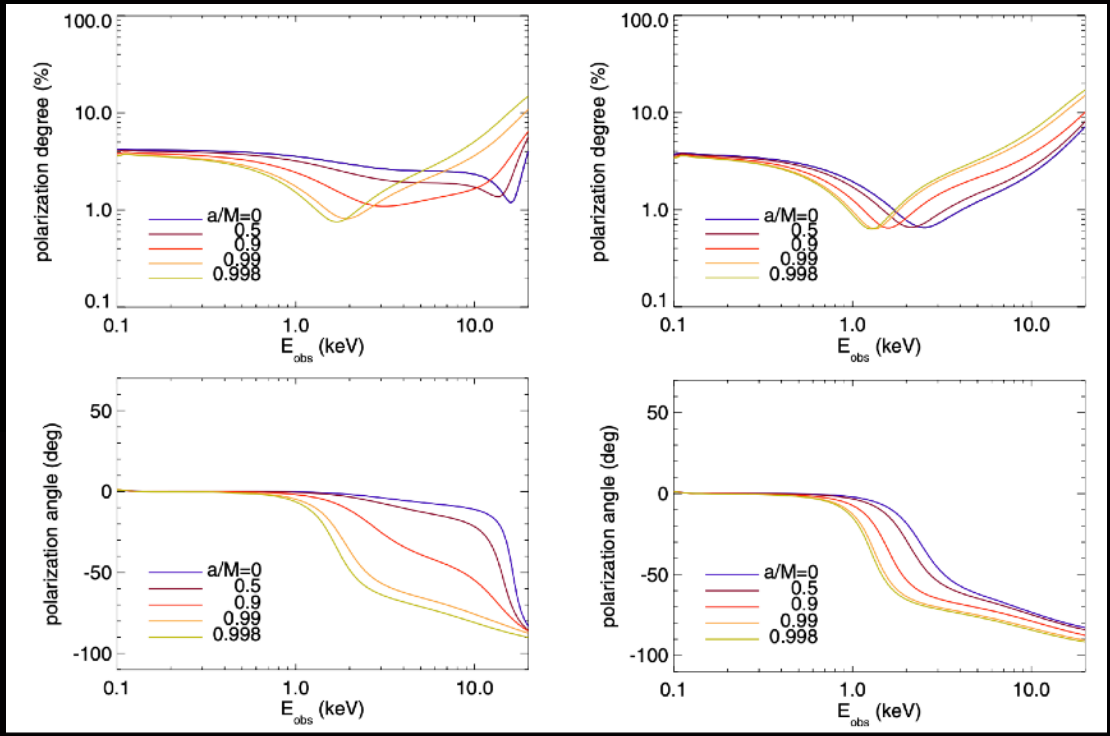
GRO J1655-40 Remillard and McClintock 2006

Sco X-1 RXTE

Shining in the X-rays - polarization

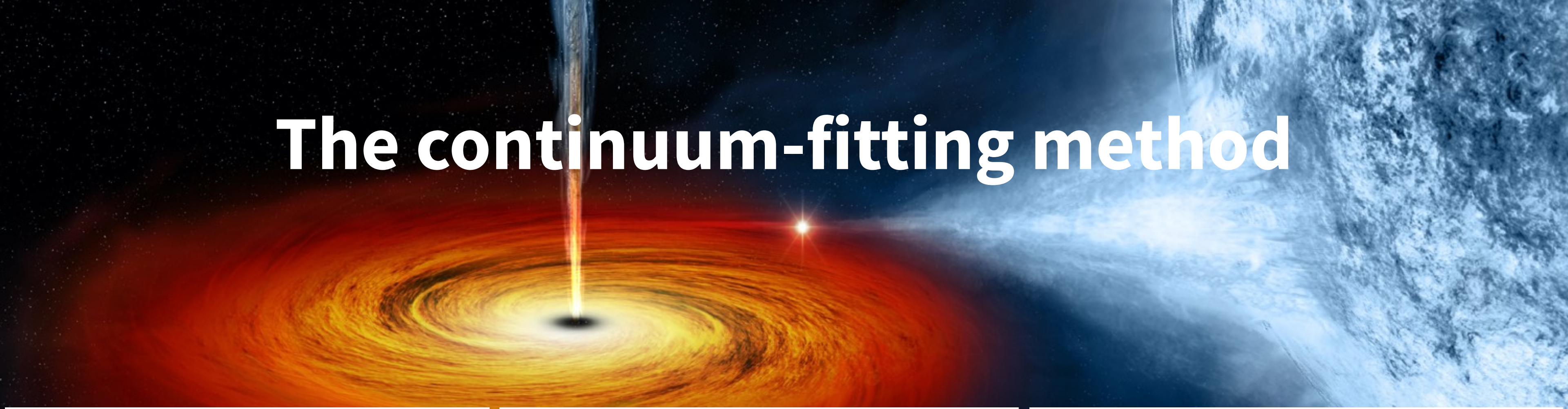


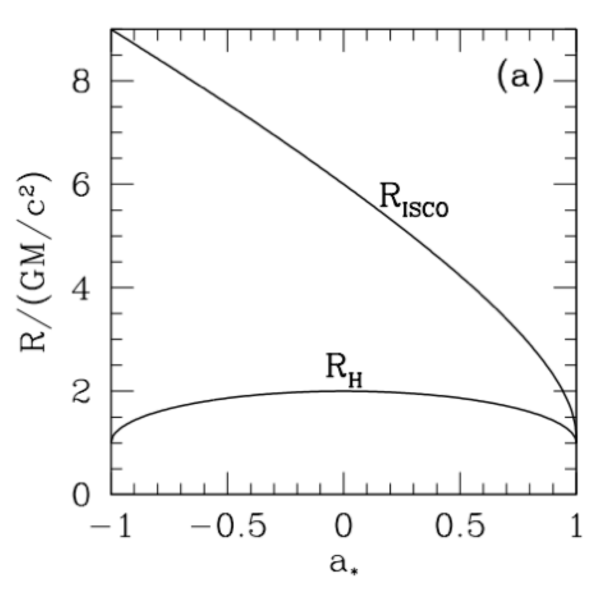
Coming soon!

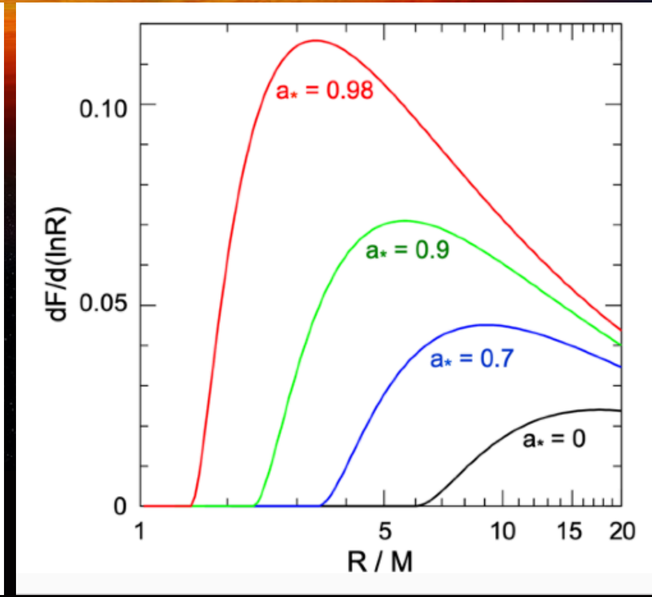


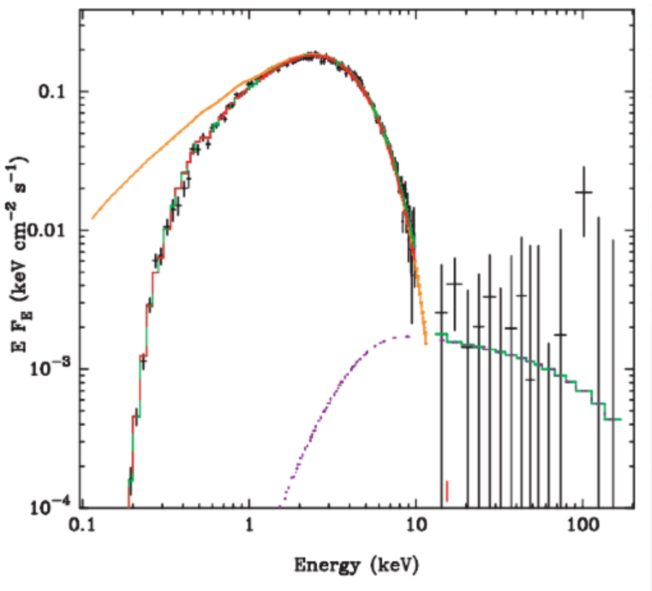
Figures from
Schnittman and Krolick 2009

The continuum-fitting method









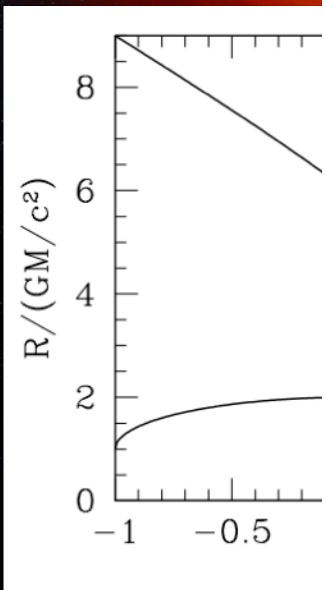
Novikov & Thorne 1973

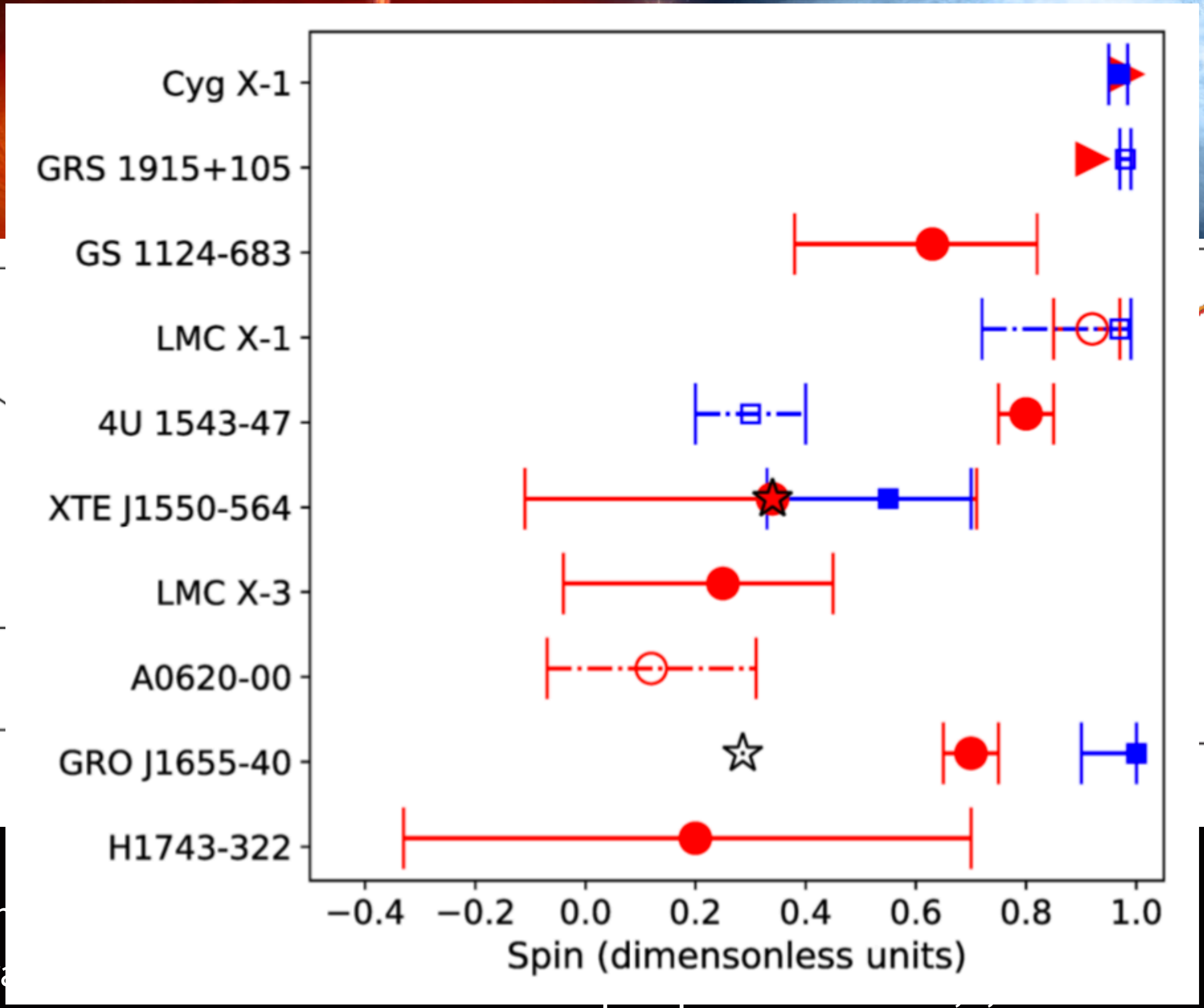
McClintock, Narayan, Steiner 2013

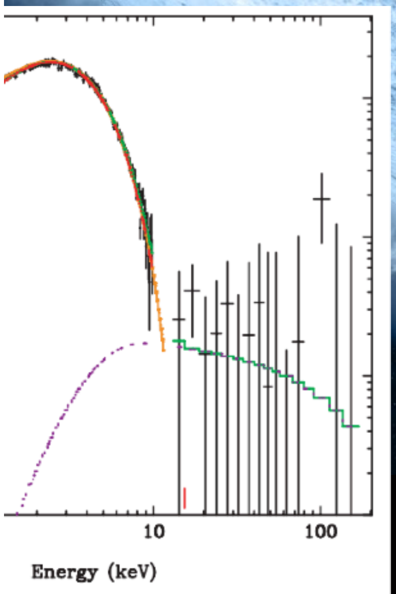
Fitting T & F

Input parameters: M, i, D

The continuum-fitting method







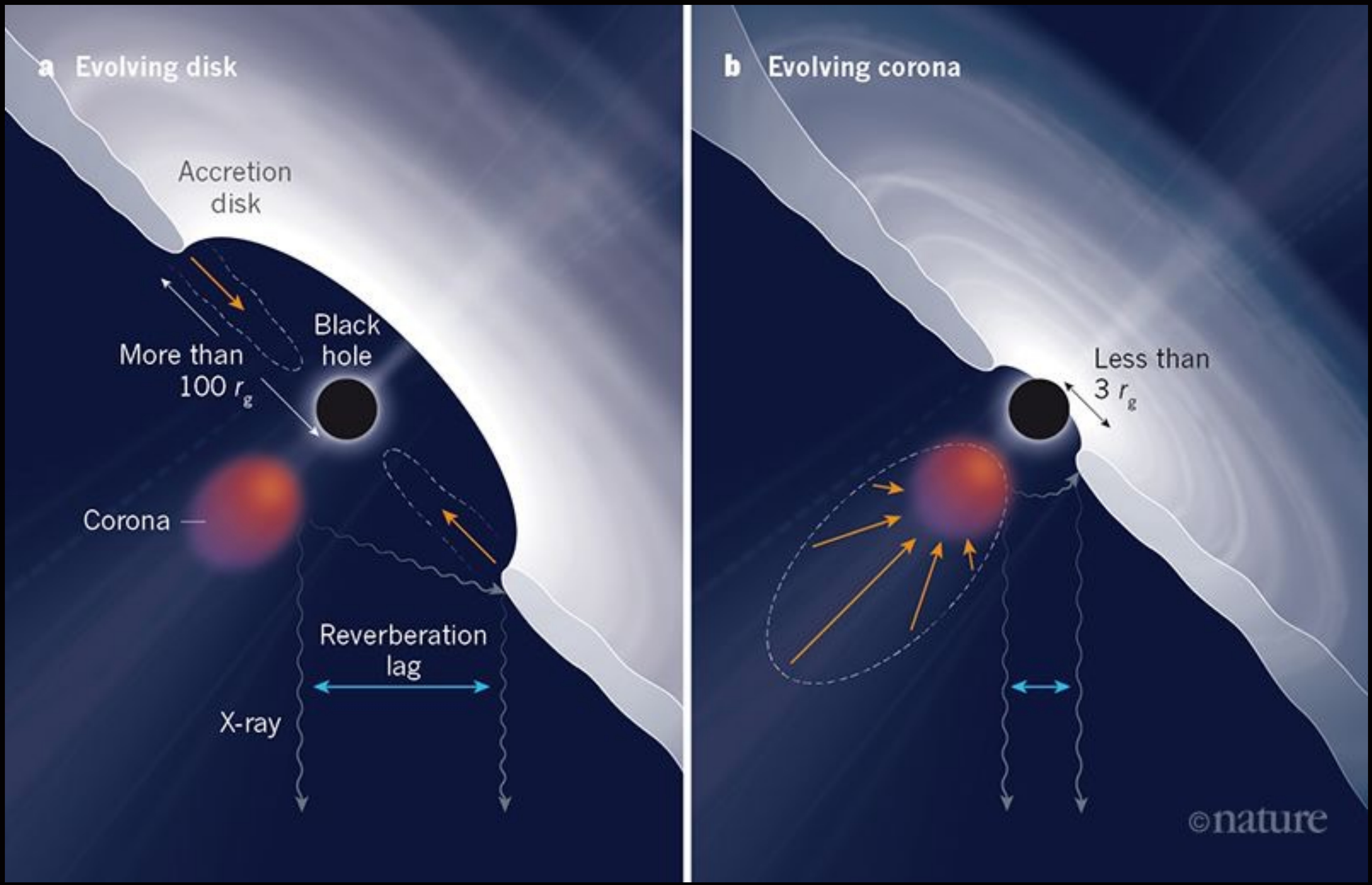
Novikov & Thorn
McClintock, Nara

De Rosa et al
2019

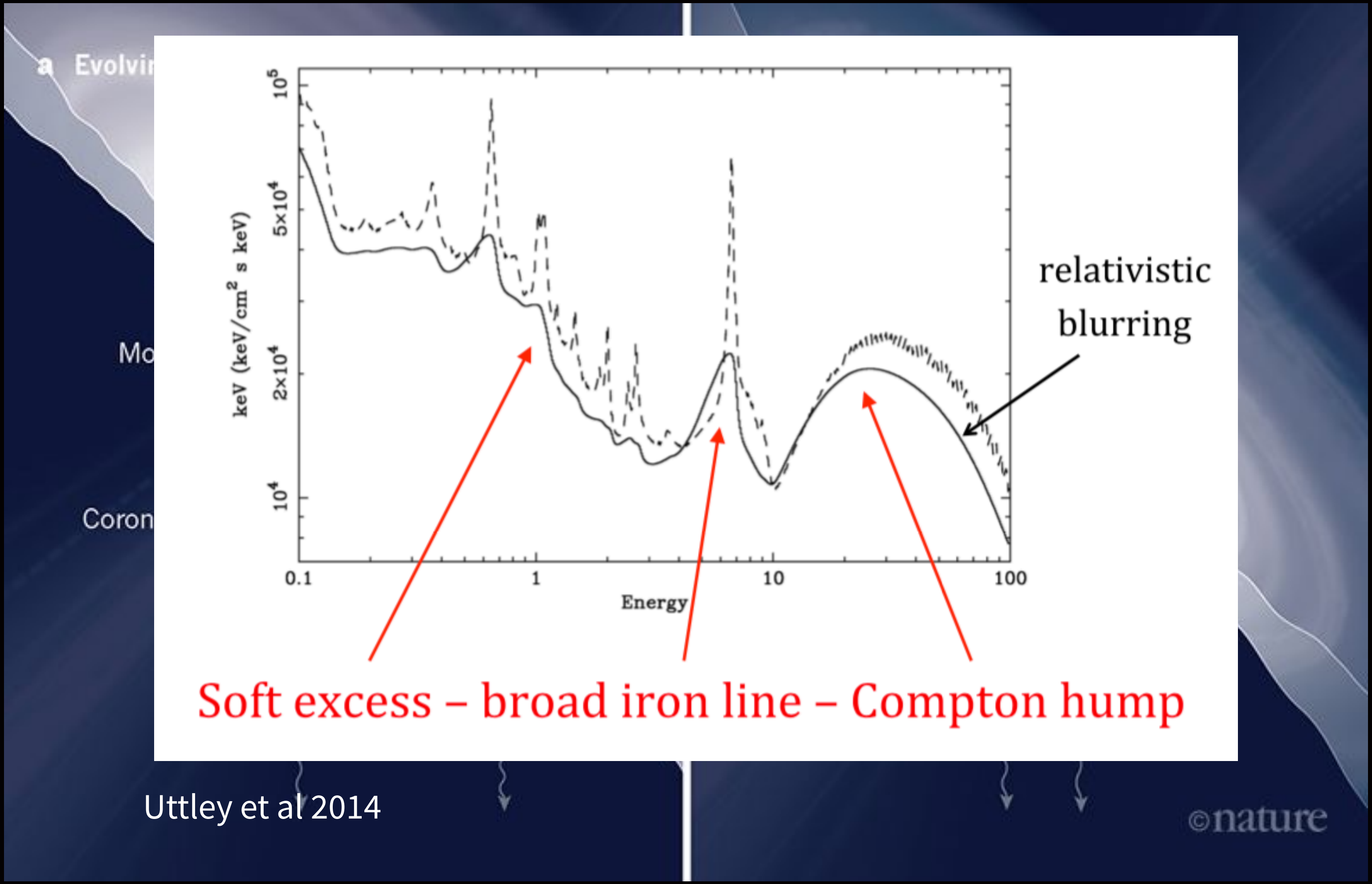
Ilaria Caiazzo

Colibrì Collaboration

Reverberation mapping

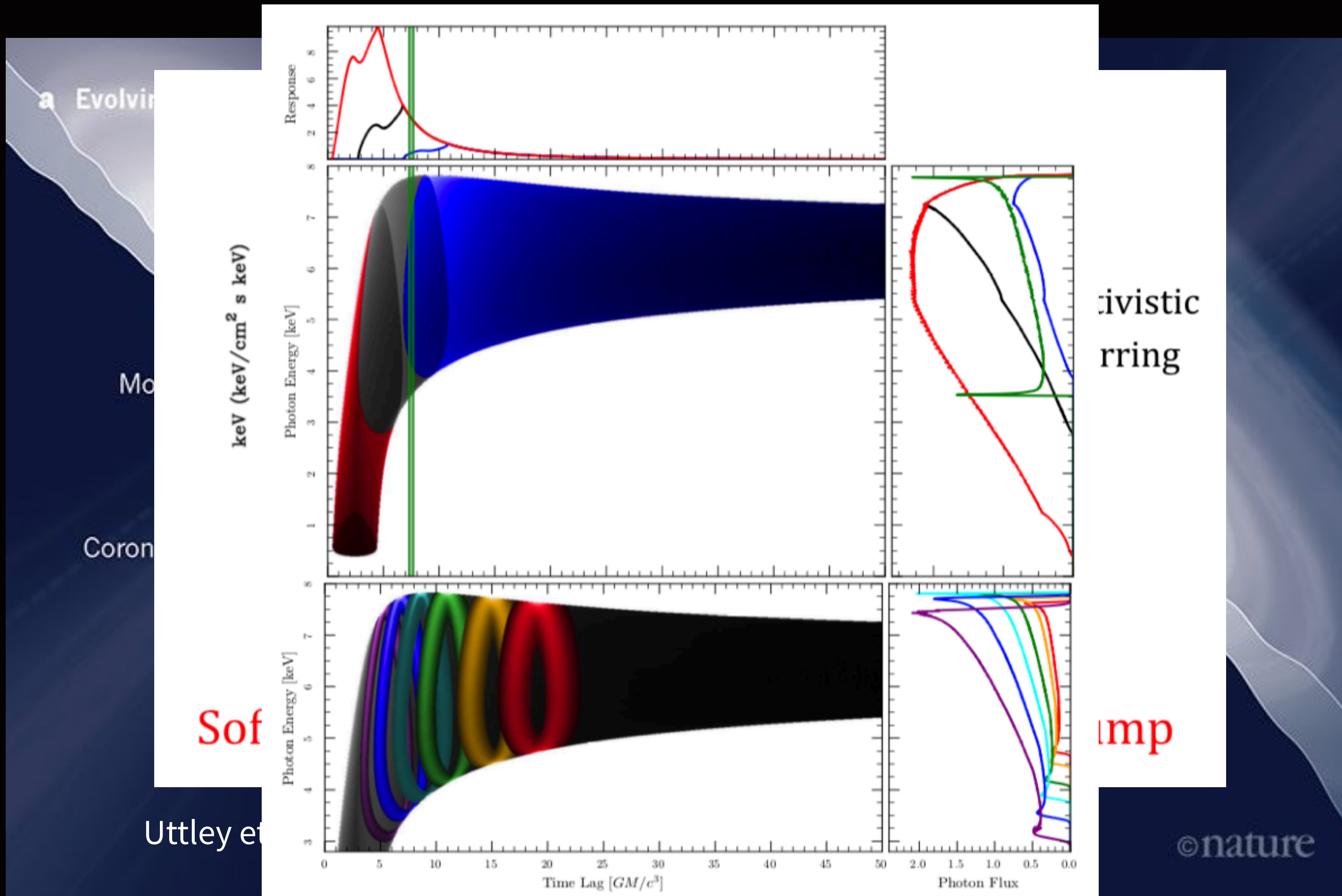


Reverberation mapping



Uttley et al 2014

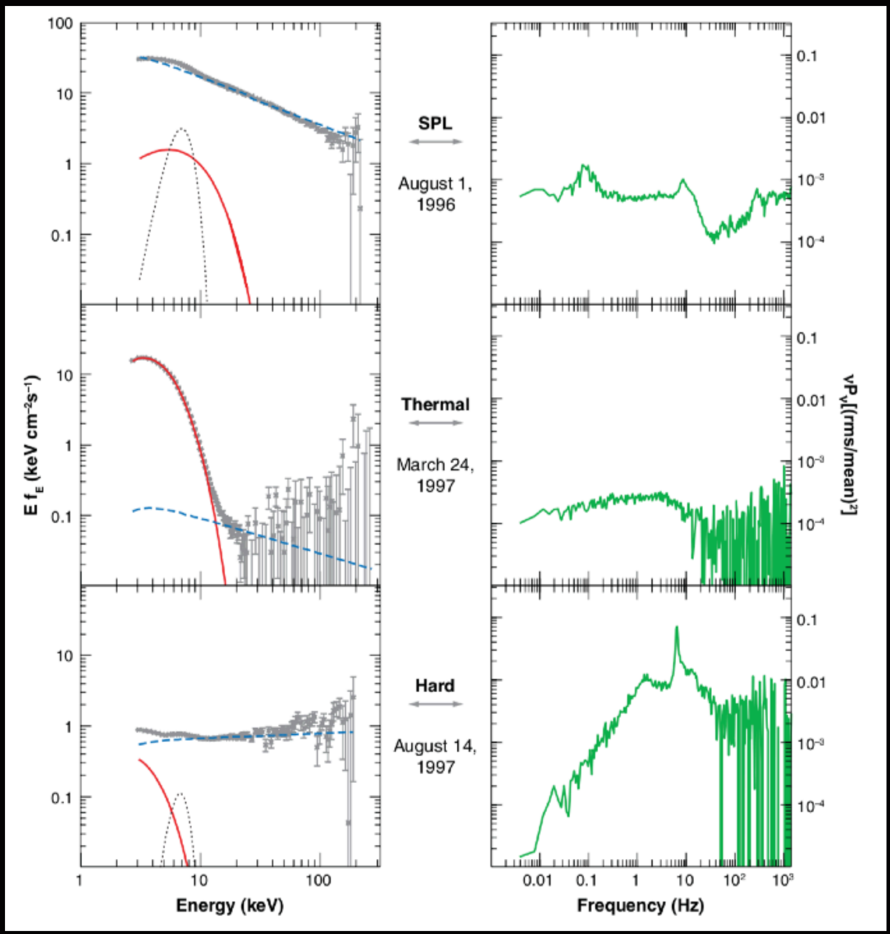
Reverberation mapping



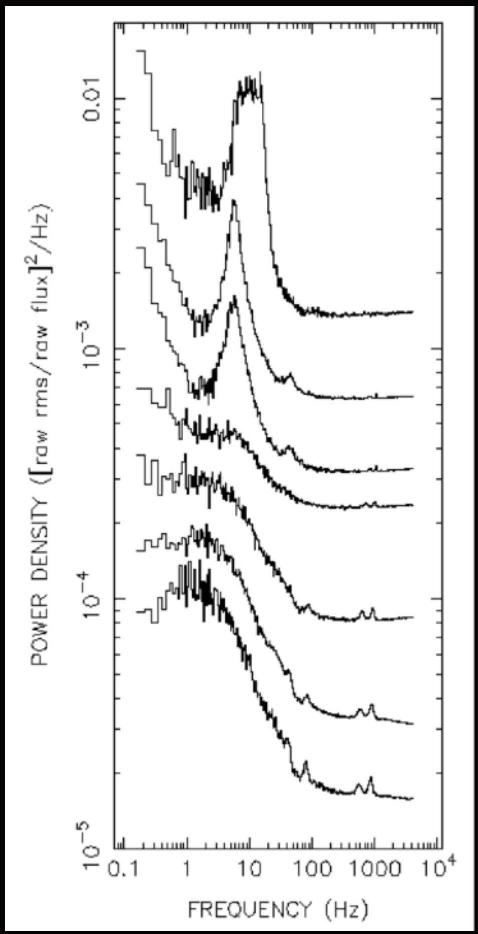
Mastroserio et al 2018

Caiazzo et al 2019

Quasi-periodic oscillations

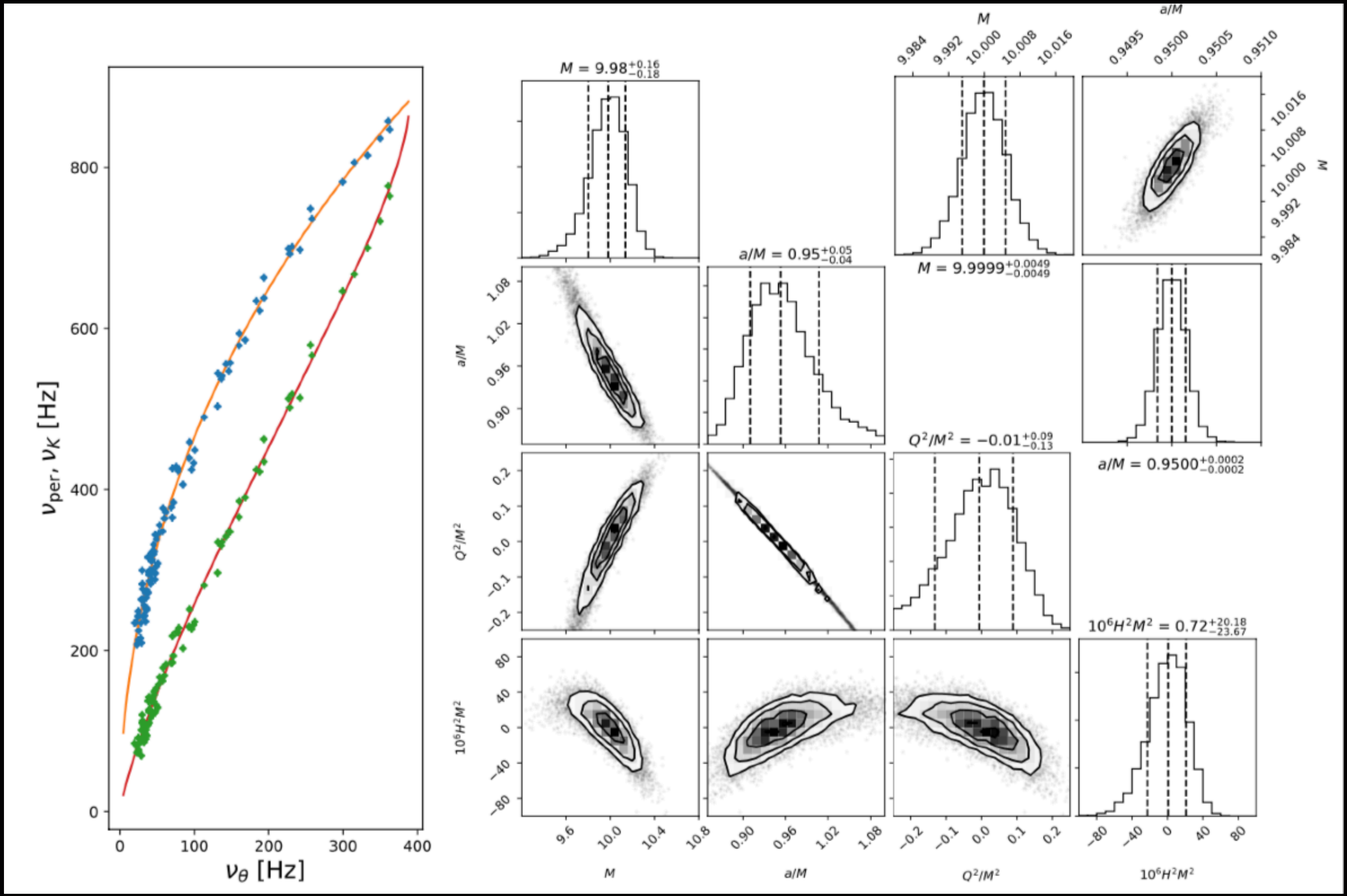


GRO J1655-40 Remillard and McClintock 2006



Sco X-1 RXTE

Quasi-periodic oscillations



Caiazzo et al 2019

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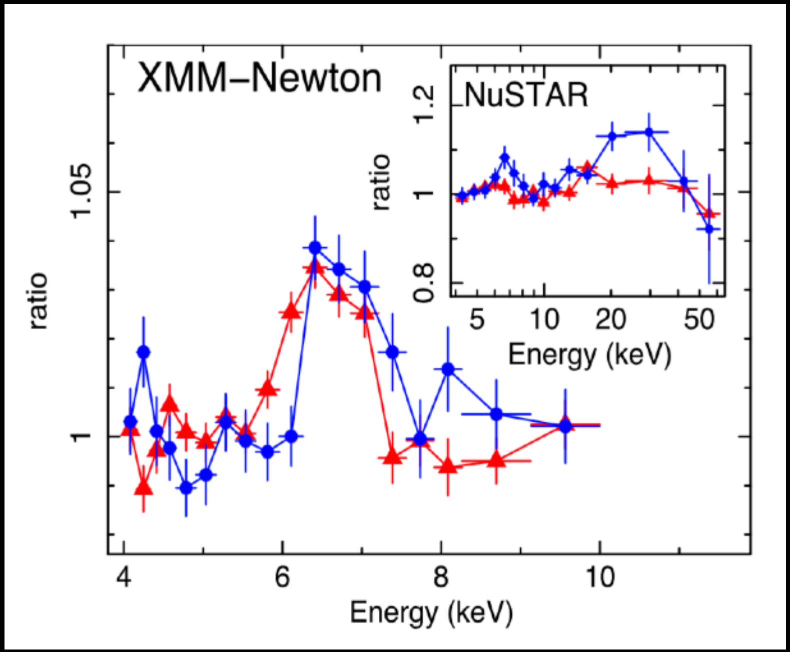
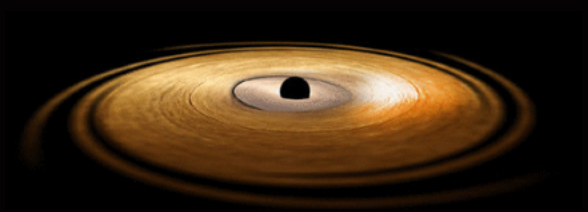
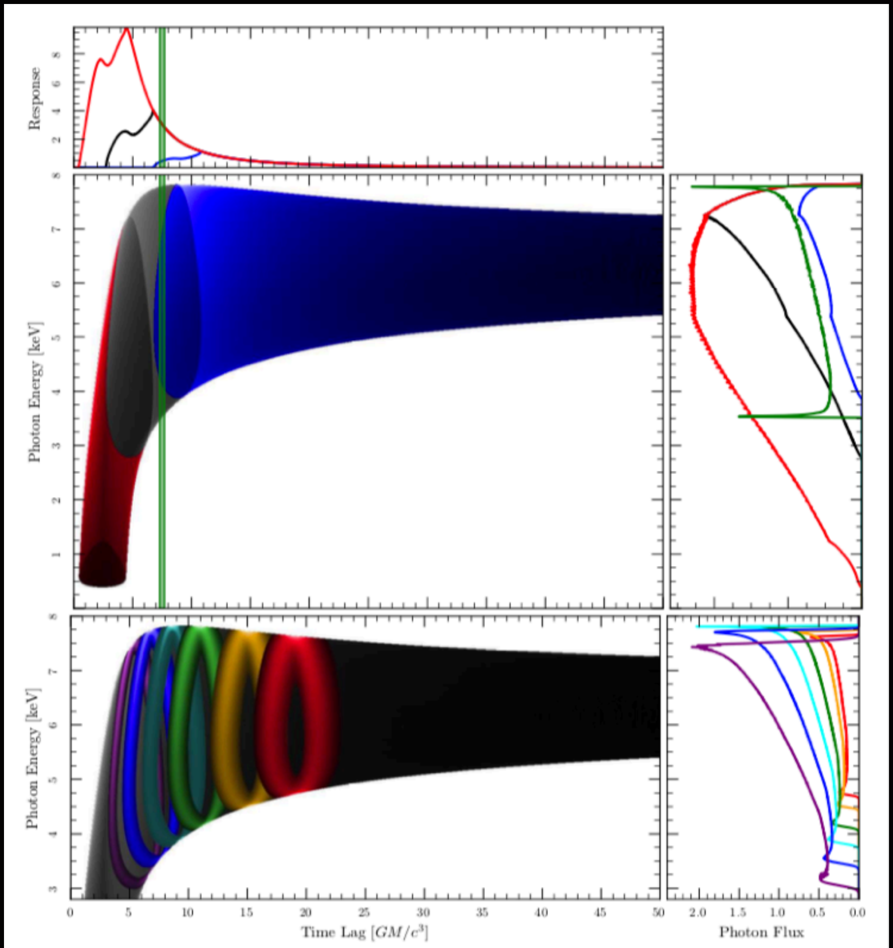


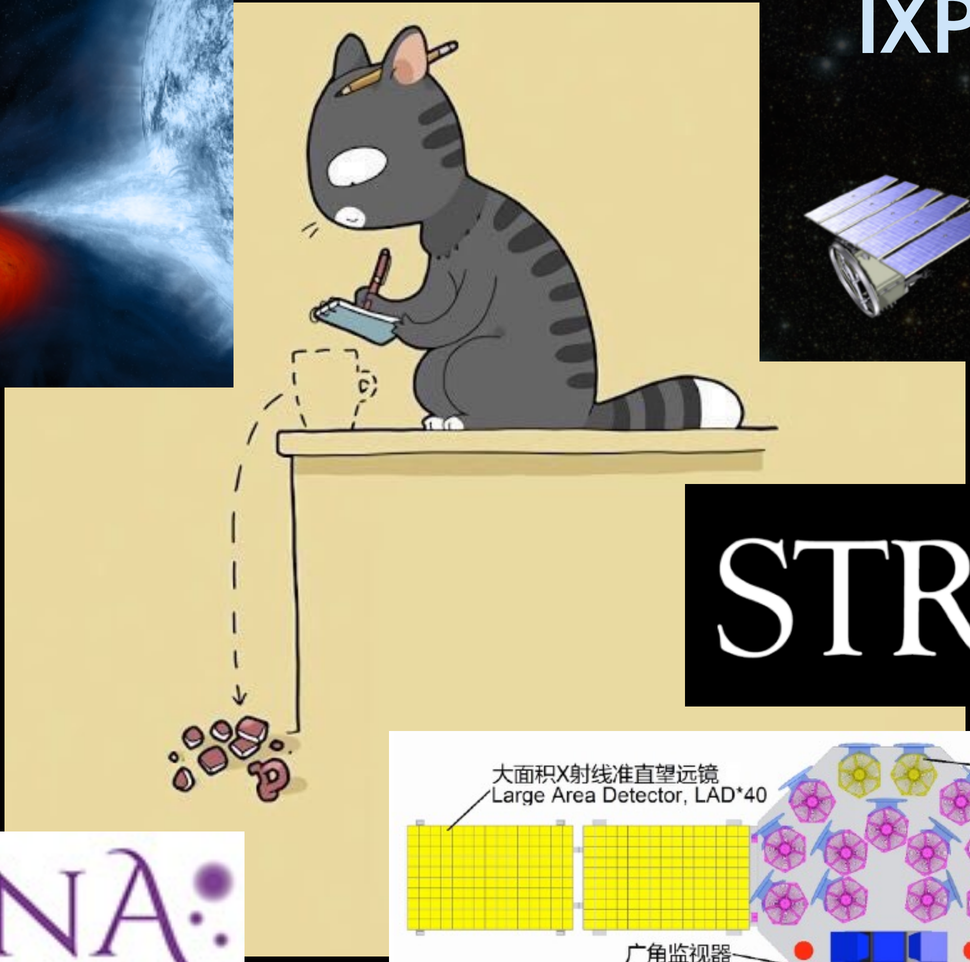
Ingram et al 2016

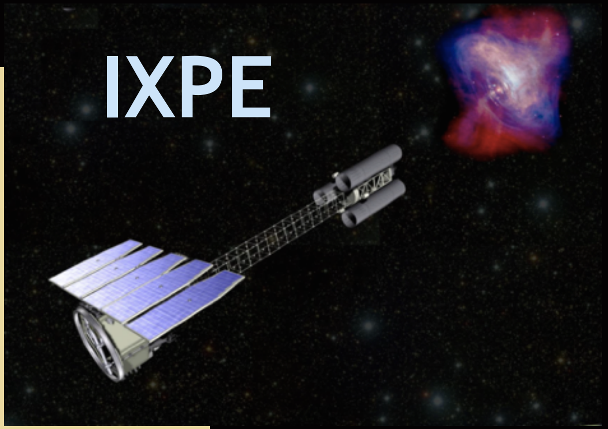




Caiazzo et al 2019

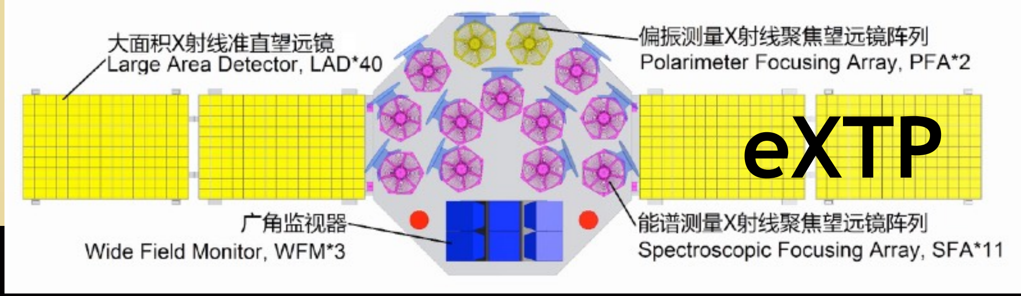
Testing gravity…





STROBE-X

ATHENA



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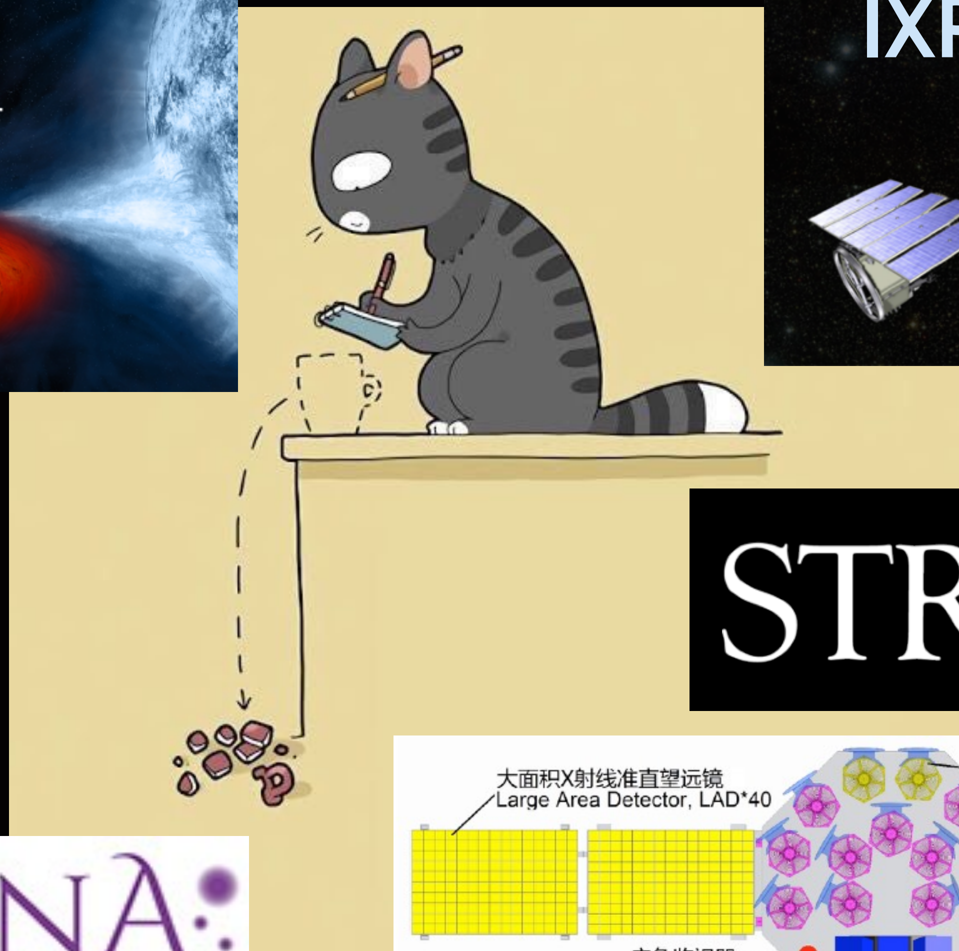

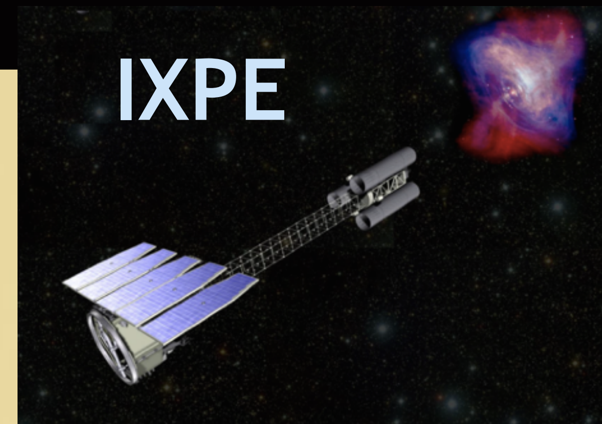

STROBE-X

Thank You!

ATHENA