



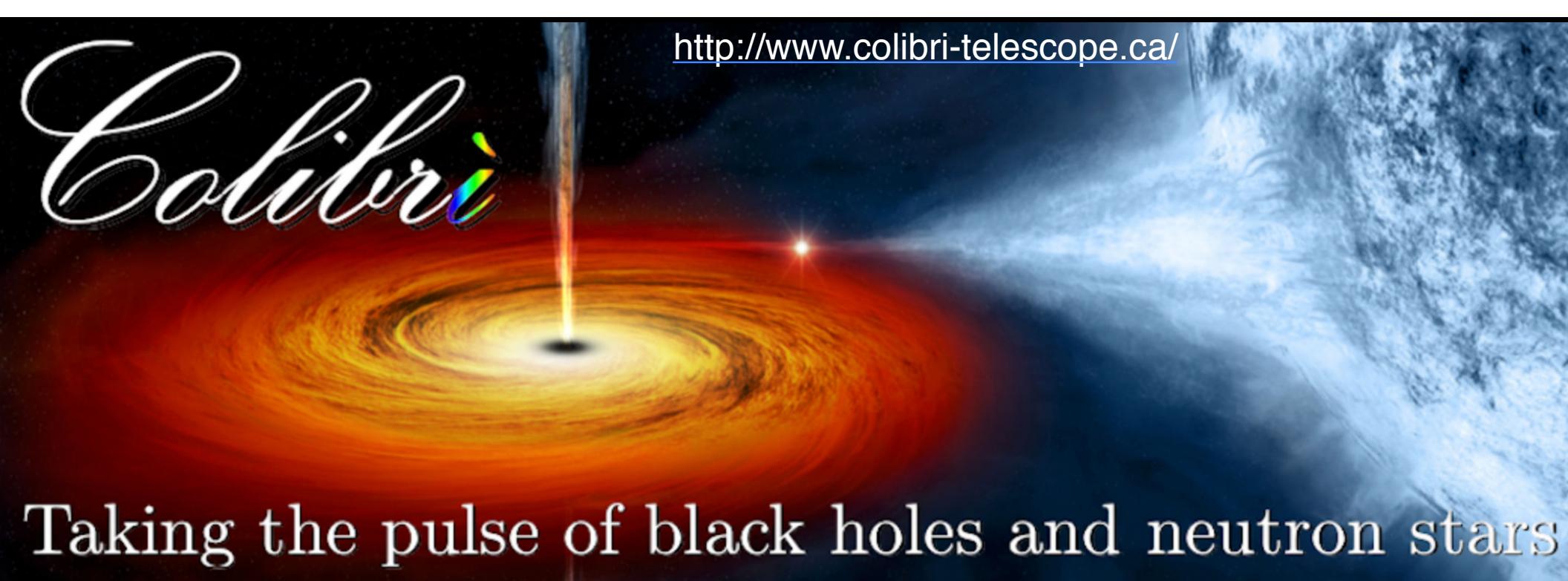
# Colibrì

Taking the pulse of  
neutron stars and black holes



Canada's **First** Flagship X-ray Telescope (Concept Study)  
high-time-resolution, high-energy-resolution, high-throughput

Colibrì  
Collaboration



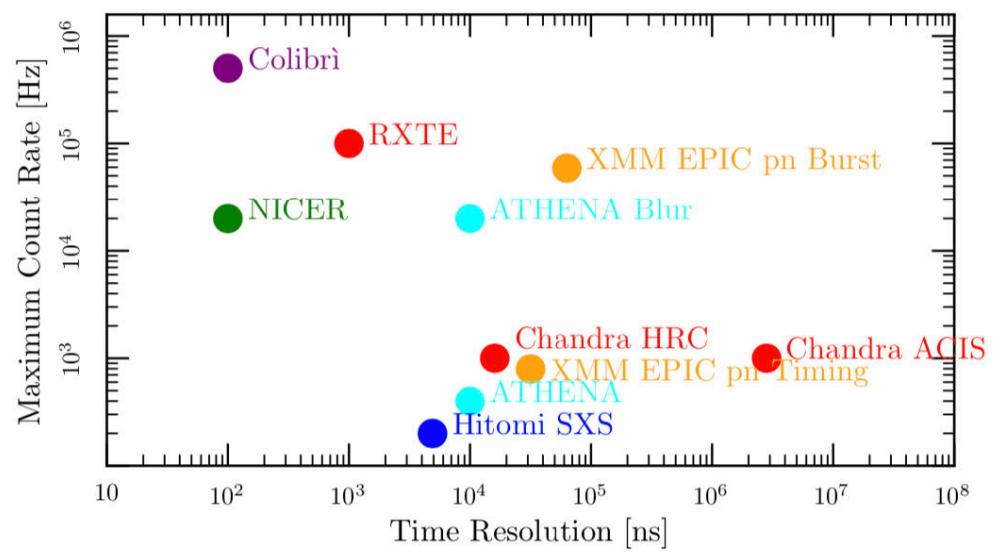
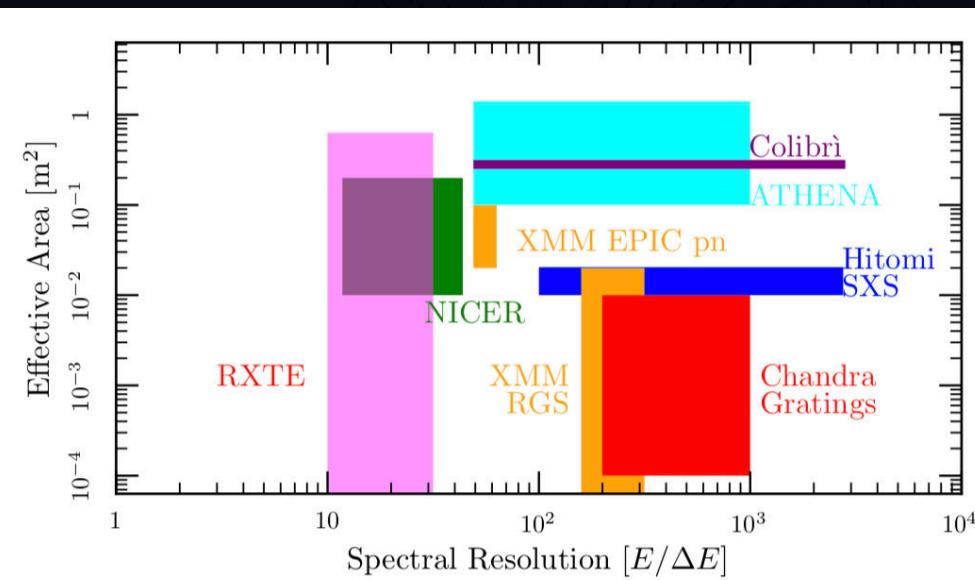
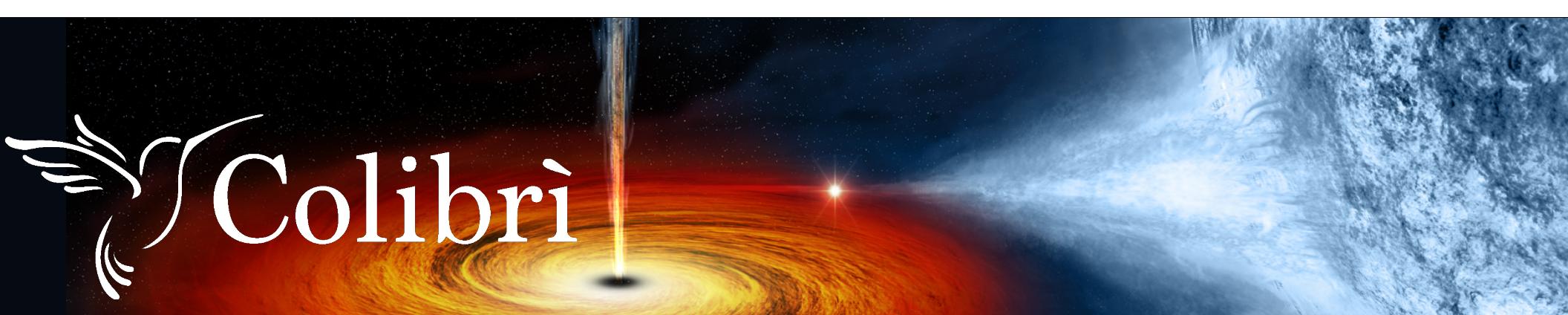
Taking the pulse of black holes and neutron stars

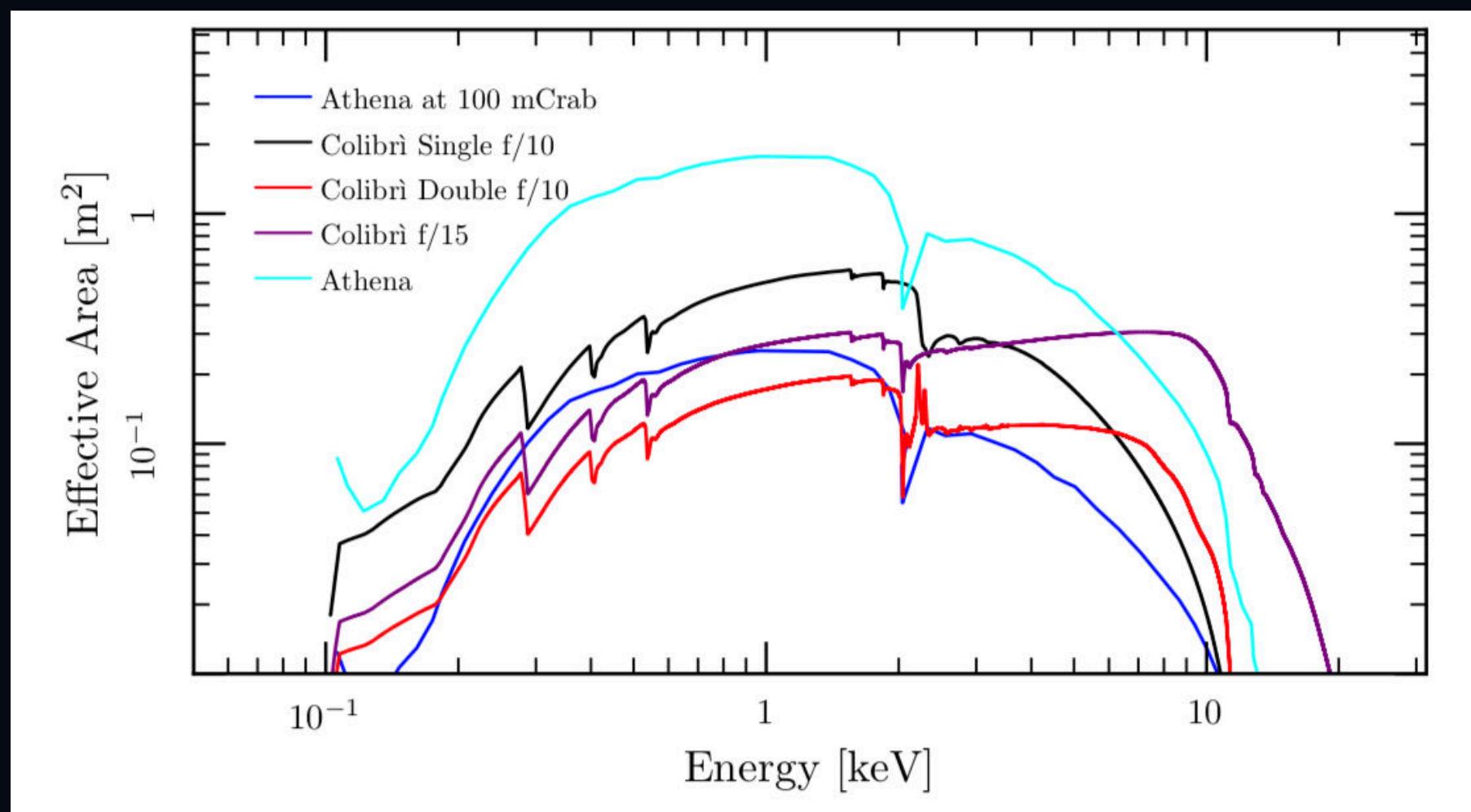
## Science

- How do accretion disks transport material?
- How are relativistic jets launched?
- What is the structure of the spacetime surrounding black holes?
- What are the masses, radii and composition of neutron stars?

## Goal Specs

- 0.5-10 keV (Fe-K, 6.4 keV)
- Energy resolution: 2-5 eV  
**TES X-ray detectors**
- Time resolution: 250 ns
- NICER-like optics\*3+a big Hitomi (SXS)
- Effective area: 3000 cm<sup>2</sup>





# Science team leaders

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PI

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Project Scientist

Kelsey Hoffman, Bishop's



Project Manager

Daryl Haggard, McGill



Mission Planning Lead

Sarah Gallagher, Western



Black holes WG Lead

Samar Safi-Harb, Manitoba



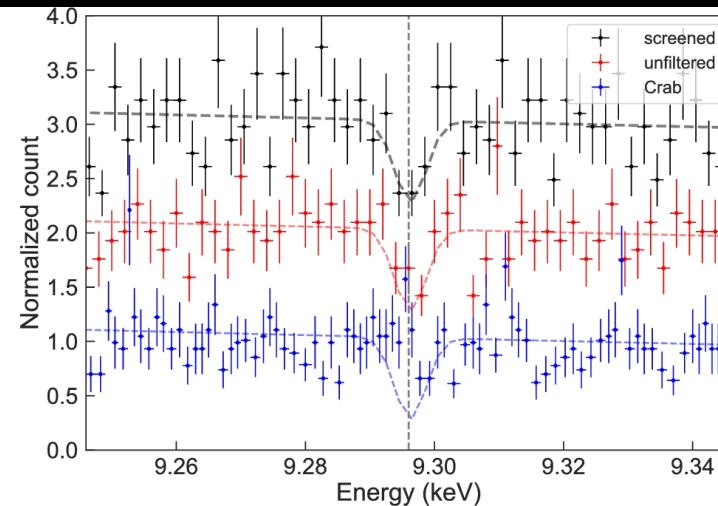
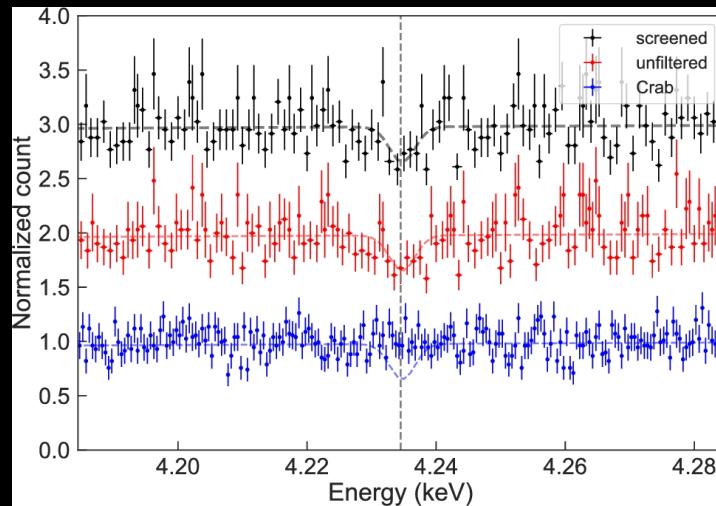
Neutron stars WG Lead

	<b>Energy Range</b>	<b>Energy resolution</b>	<b>Timing resolution</b>	<b>Effective area</b>
<b>Colibrì</b>	0.2 - 12 keV	3 eV @ 6.4 keV	<1 $\mu$ s	> 2000 cm <sup>2</sup> @ 6.4 keV
<b>NICER</b>	0.2 - 12 keV	137 eV @ 6 keV	<0.3 $\mu$ s	~ 600 cm <sup>2</sup> @ 6 keV
<b>XMM-Newton</b>	0.1 - 15 keV	130 eV @ 6.5 keV	300 $\mu$ s	~ 700 cm <sup>2</sup> @ 6.4 keV
<b>NuSTAR</b>	3 - 79 keV	400 eV @ 6 keV	100 $\mu$ s	~ 800 cm <sup>2</sup> @ 6.4 keV
<b>Hitomi SXS</b>	0.3 - 12 keV	7 eV @ 6 keV	5 $\mu$ s	~ 210 cm <sup>2</sup> @ 6 keV
<b>RXTE PCA</b>	2 - 250 keV	1100 eV @ 6 keV	1 $\mu$ s	~ 6000 cm <sup>2</sup> @ 6 keV
<b>ATHENA X-IFU</b>	0.2 - 12 keV	2.5 eV @ 6 keV	10 $\mu$ s	~ 3000 cm <sup>2</sup> @ 6 keV

Credit: Ilaria Caiazzo

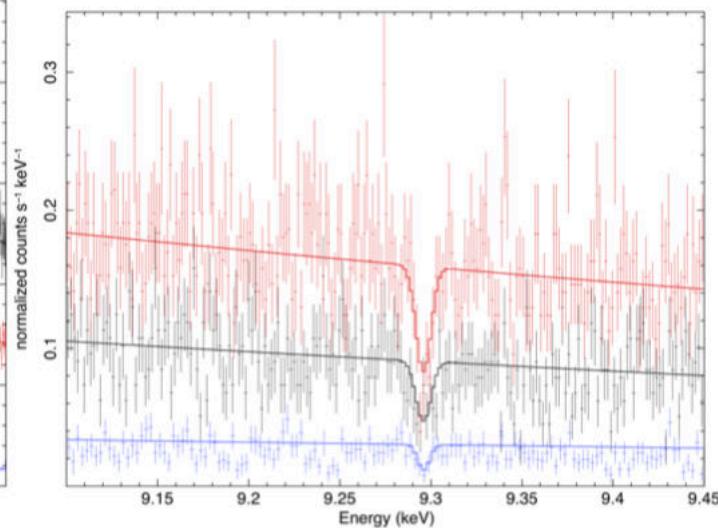
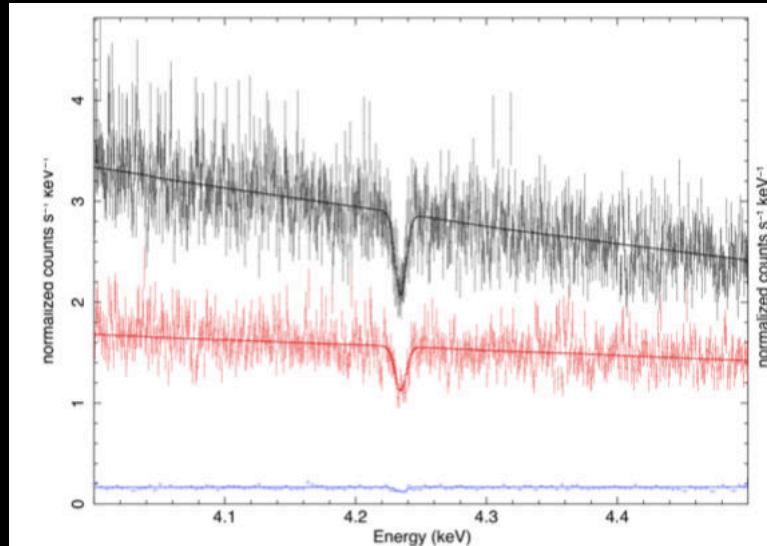
# G21.5-0.9 Rotation-Powered Pulsar J1833-1034

Hitomi's SXS absorption features at 4.2345 keV and 9.296 keV



Hitomi

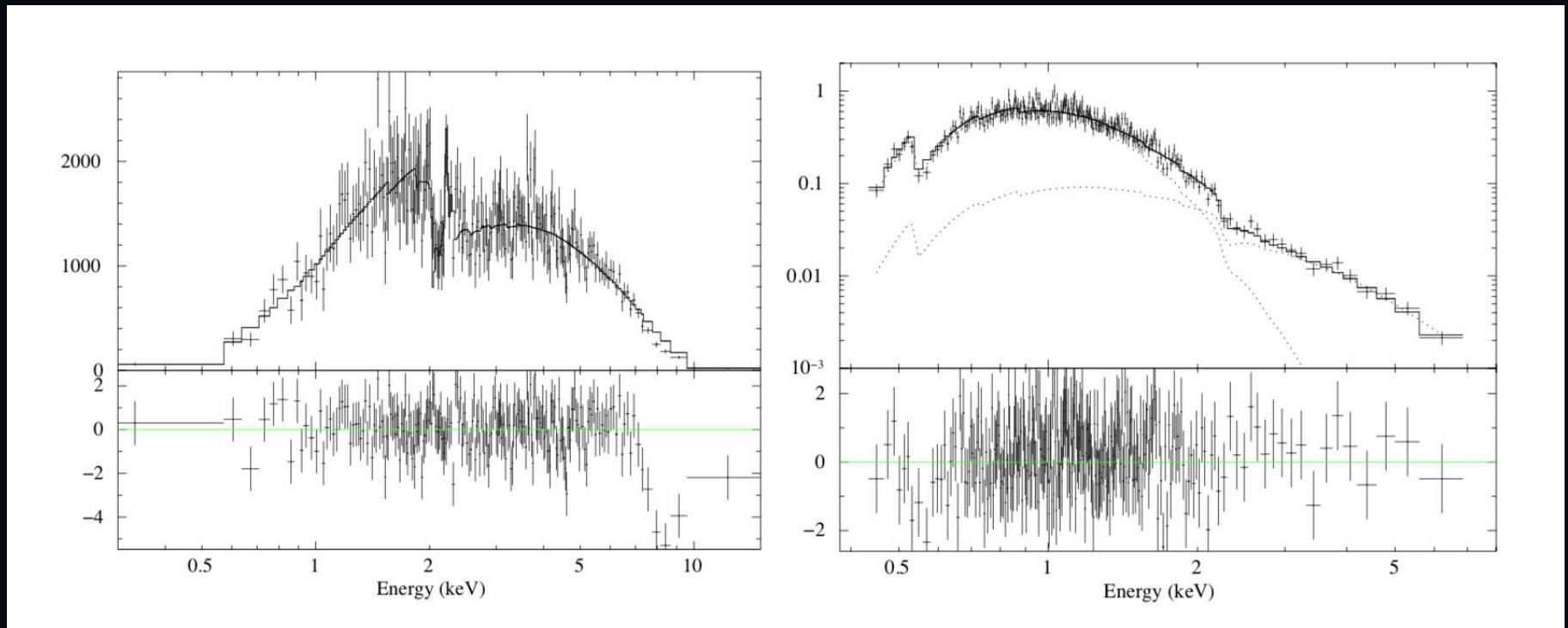
Hitomi collaboration  
2018



Colibrì  
(2 configurations)

Hitomi

# Low-mass X-ray binaries



Colibrì simulated observation during the cooling tail of an X-ray burst exhibiting an absorption edge at 7.5 keV.

Colibrì simulated observation with of quiescent Aquila X-1 showing an absorption feature at 0.55 keV.

**Colibri LRP2020 white paper**