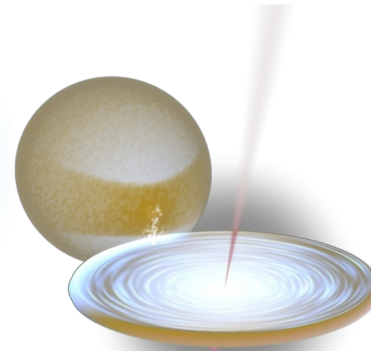
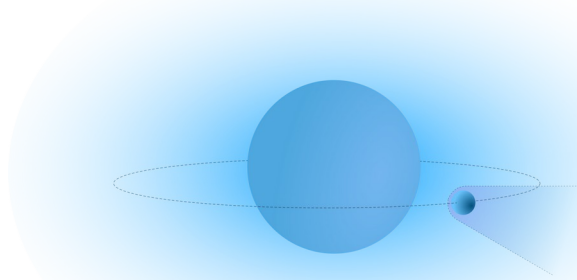
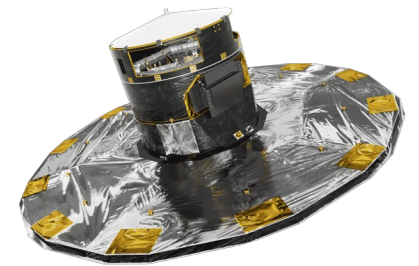
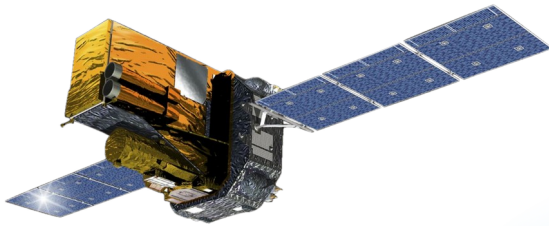
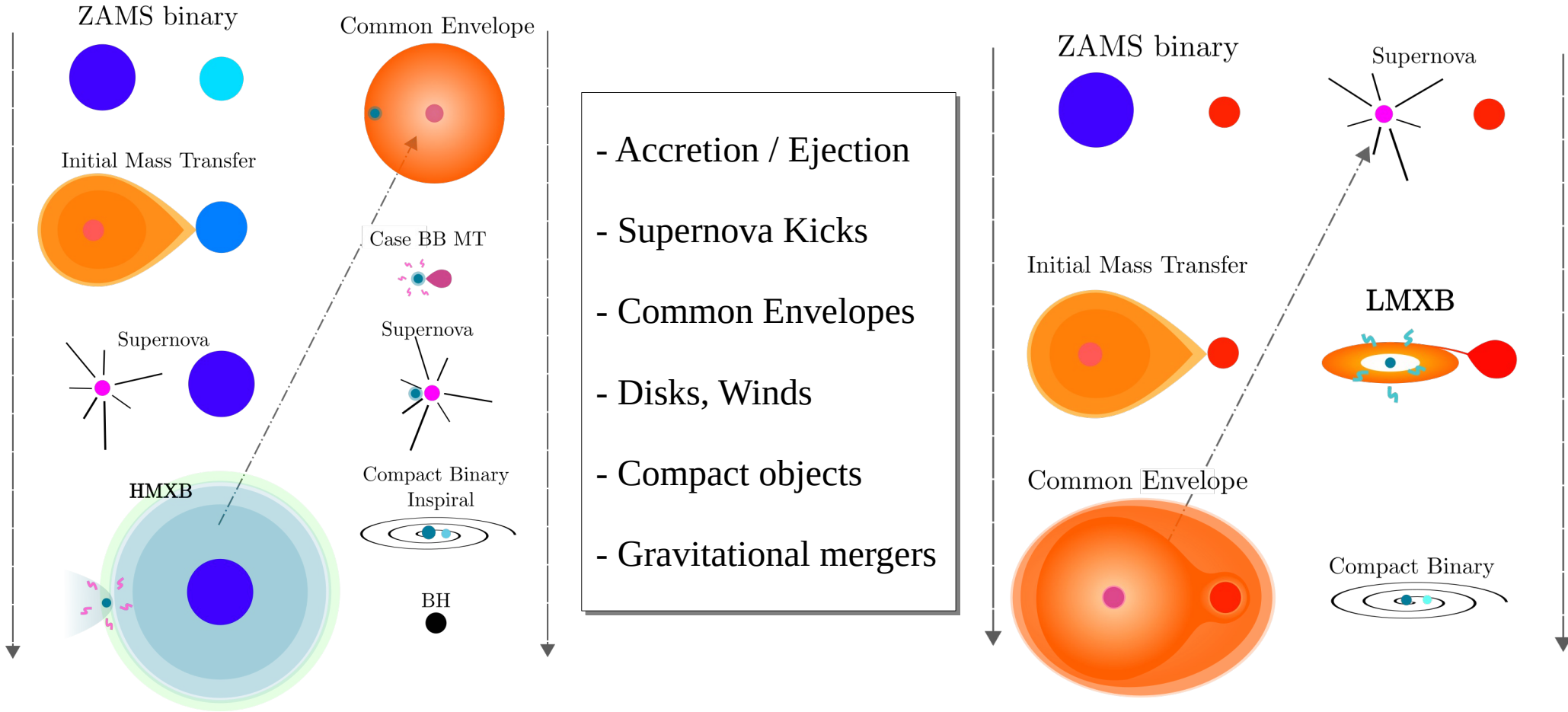


# An inventory of Compact objects in X-ray binaries

## - From the *INTEGRAL* to the *Gaia* era



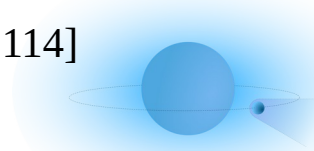
# Evolution of X-ray binaries – Progenitors of GWs ?



# The new catalogue of HMXBs in the Galaxy

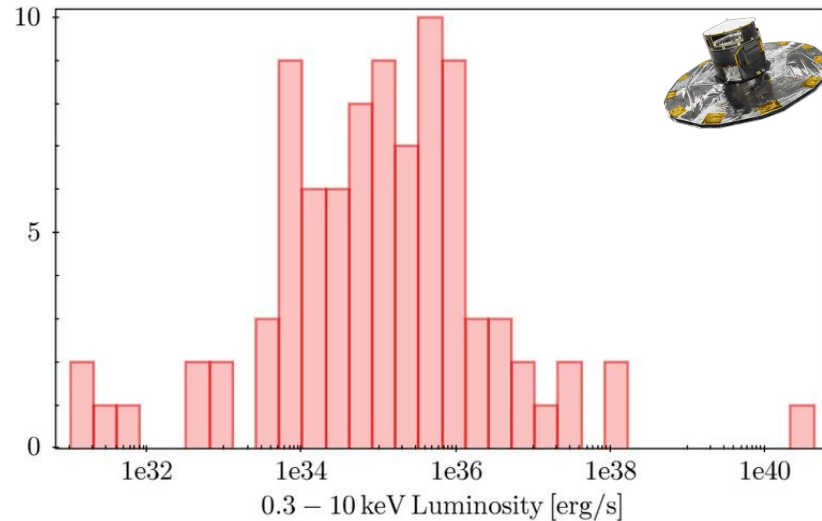
Last catalogue of HMXBs : [Liu et al. 2006](#) [N = 114]

- many new observations since then
- INTEGRAL was just beginning !

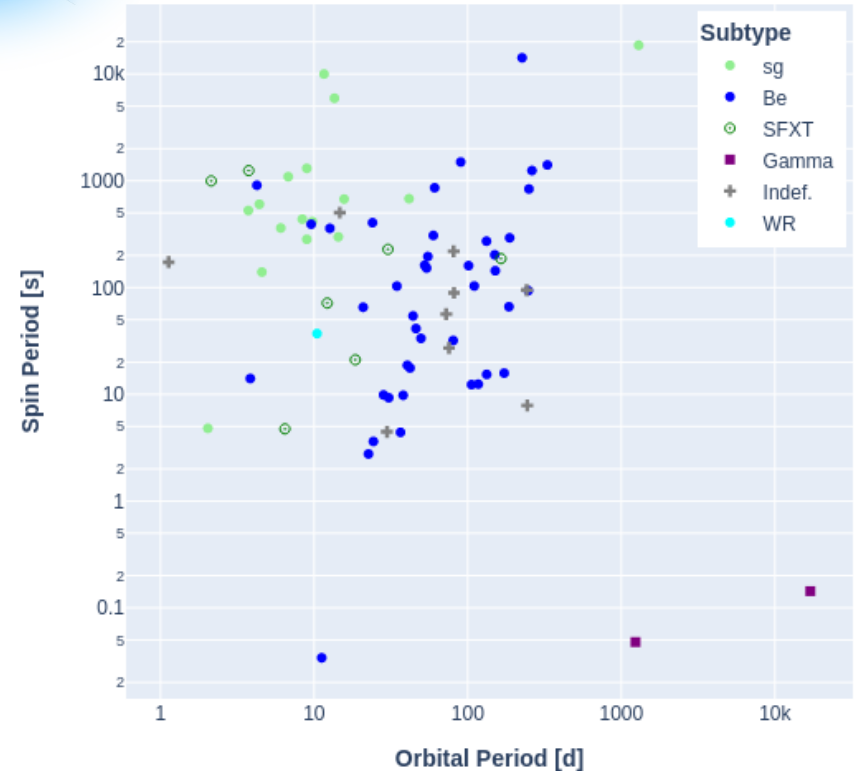


New catalogue of HMXBs : [Fortin et al. 2023b](#) [N = 160+]

- automated search for multi-wavelength counterparts
- manual search for spectral types, orbital parameters...



Corbet diagram of Galactic HMXBs



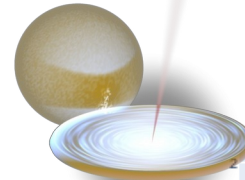
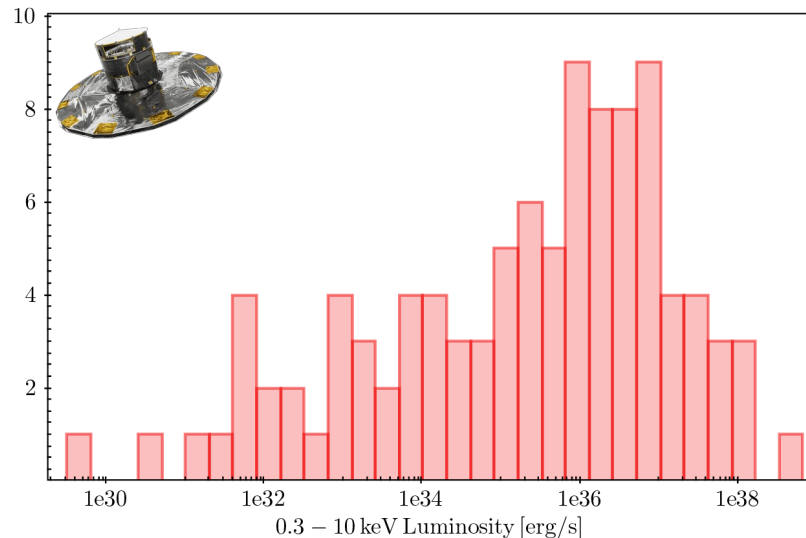
# The new catalogue of LMXBs in the Galaxy

Last catalogue of HMXBs : [Liu et al. 2007](#) [N = 187]

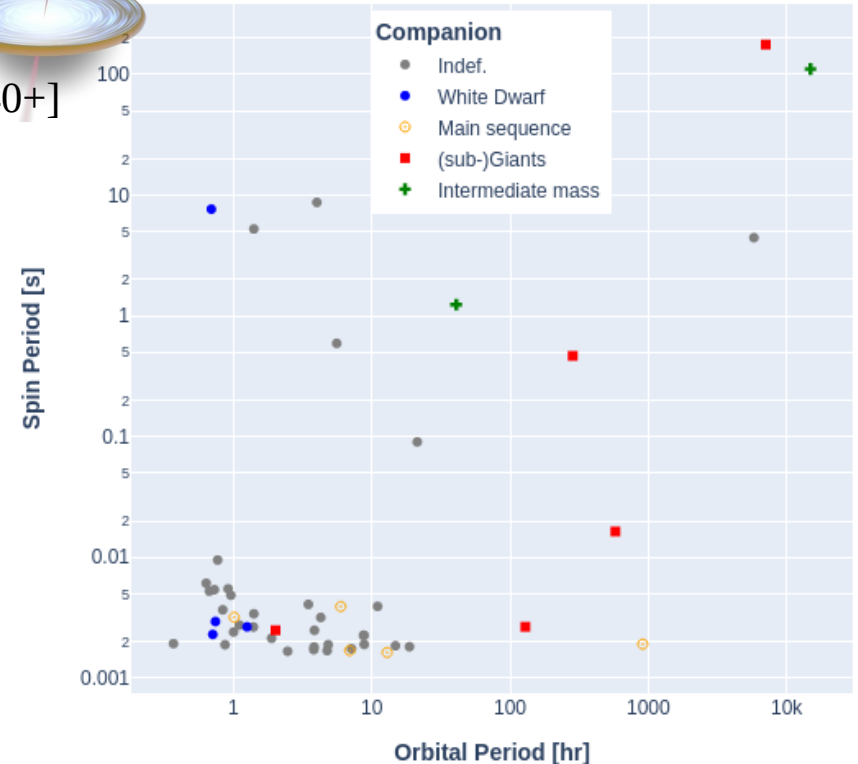
- many new observations since then
- INTEGRAL was just beginning !

New catalogue of HMXBs : [Fortin et al. 2023c subm.](#) [N = 340+]

- automated search for multi-wavelength counterparts
- manual search for spectral types, orbital parameters...



Corbet diagram of Galactic LMXBs



# HMXB and LMXB Webcat : participative database

## A Catalogue of High-Mass X-ray Binaries in the Galaxy

From the *INTEGRAL* to the *Gaia* era

HOME CATALOGUE NOTES DOWNLOADS CONTRIBUTING ABOUT

Search HMXB:

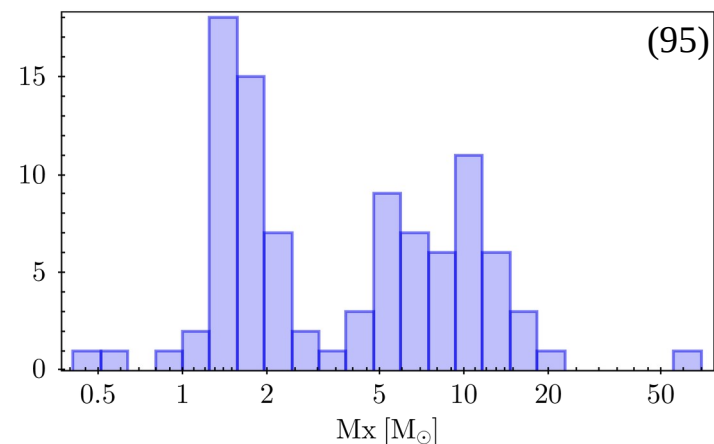
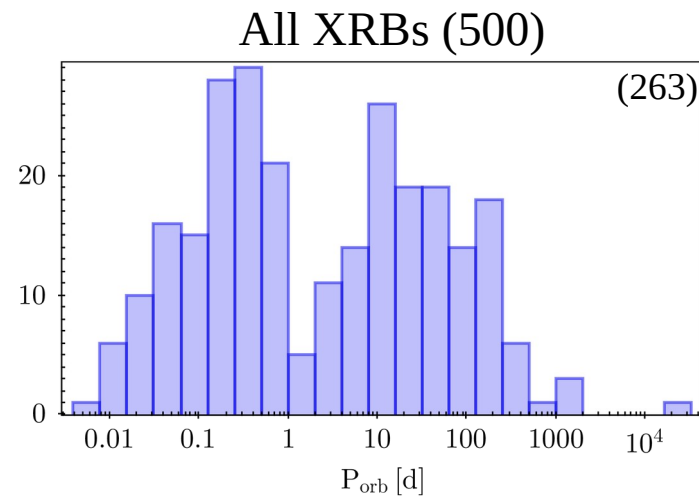
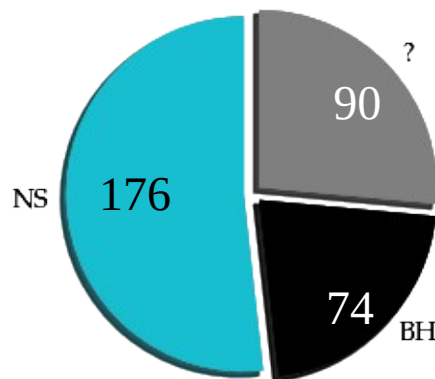
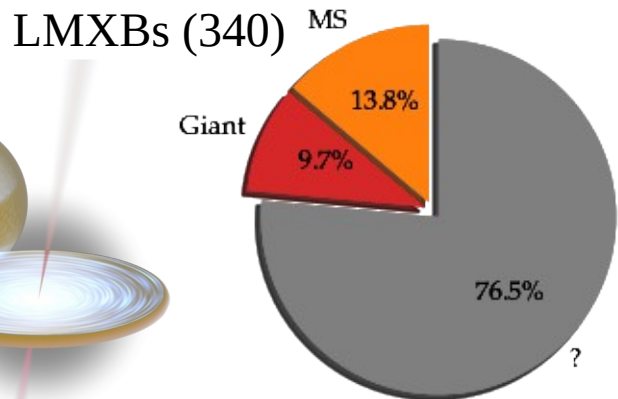
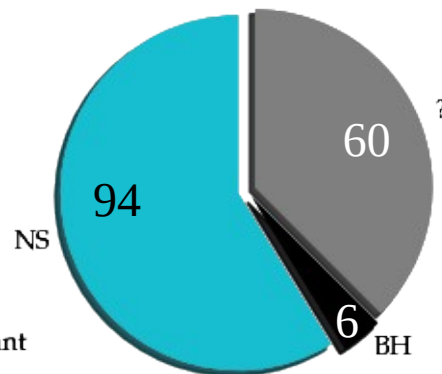
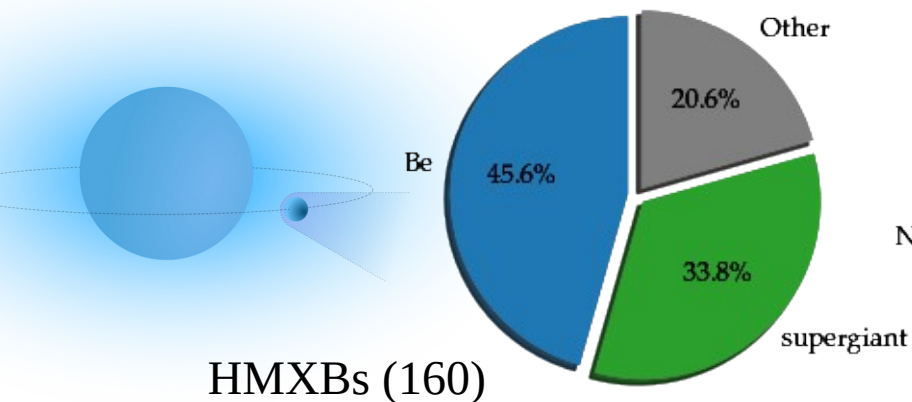
Show: 10

Query tip: any identifier known by Simbad will work !

<input type="checkbox"/>	Main ID [Field of View]	Spectral type	Class	Right Ascension [J2000]	Declination [J2000]	Error radius [mas]	Distance [pc]	Mx [Msun]	Mo [Msun]	Period [d]
<input type="checkbox"/>	IGR J00370+6122 [FoV]	BN0.7 Ib <a href="#">2014A&amp;A...566A.131G</a>	sg	9.29013	61.3601	0.008	3401 (-171,+186)		22.0 <a href="#">2014A&amp;A...563A...1G</a>	15.664 <a href="#">2021P...</a>
<input type="checkbox"/>	gam Cas [FoV]	B0.5IVpe <a href="#">2011ARep...55...31S</a>	Be	14.17745	60.7167	1.8			13.0 <a href="#">2000A&amp;A...364L..85H</a>	203.37 <a href="#">2012A...</a>
<input type="checkbox"/>	EM* AS 14 [FoV]	B2 <a href="#">1960IzKry..24..160B</a>		18.99604	59.1539	0.011	2592 (-140,+156)			

→ [GitHub/HMXBwebcat](https://github.com/HMXBwebcat)

# Some statistics on Galactic XRBs

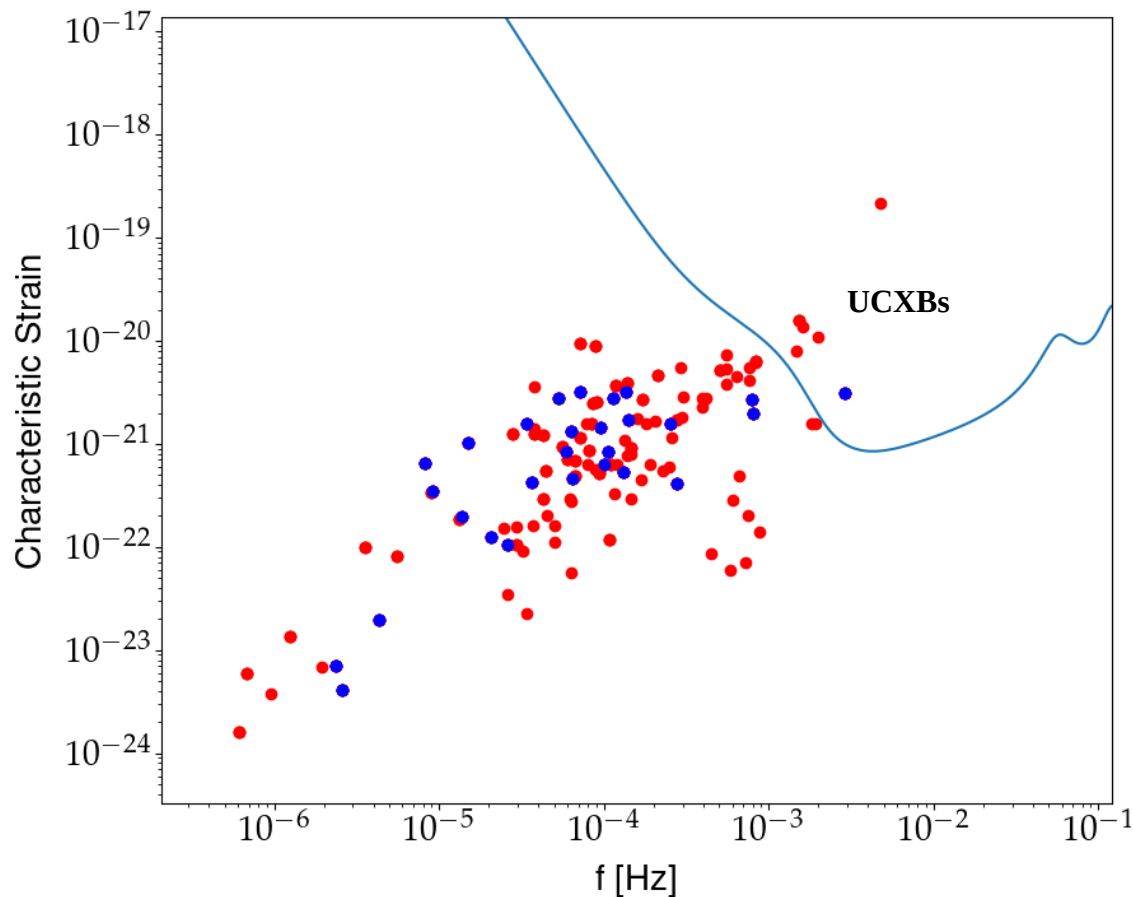


# LMXBs as GW emitters : LISA

$$\text{Strain} = f(M_x, M_o, P_{\text{orb}}, D, T_{\text{obs}})$$

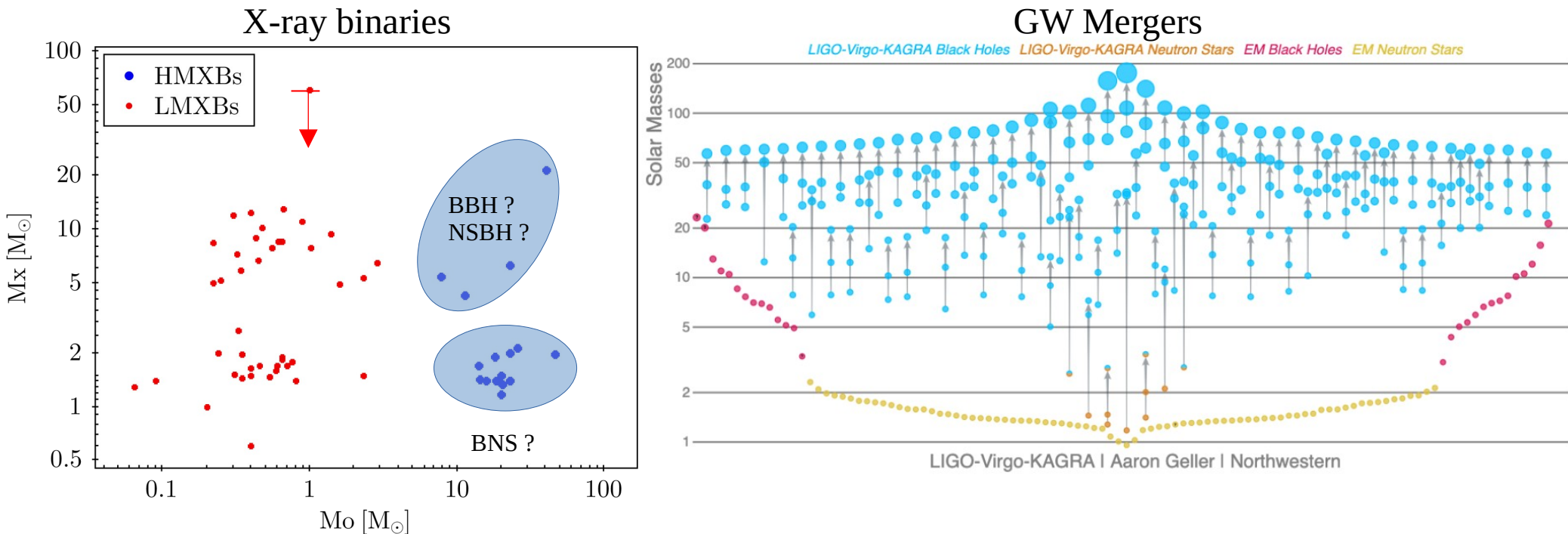
**Red** : filled-in  
parameters (i.e. 1.4 Msun  
NS, Galactic Bulge...)

**Blue** : all parameters  
available





# XRB systems vs. LVK GW progenitors



- Cyg X-1 : likely NSBH (7% survival after kick), maybe BBH in Hubble time (Neijssel+2021)
- Galactic XRBs vs. far away GW mergers : impact of metallicity ?



# Take away messages & questions

- The number of known XRBs in the Galaxy is **500+**.
- BH in LMXBs : likely biased towards lower BH masses (**Jonker+2021**).
  - “hidden” population of BH LMXBs with masses akin to GW BBHs ?
- GW BBH selection effects + low number of known BH HMXBs : maybe compatible (**Fishbach+2022**)
- Different galaxies = different histories: low metallicity allows for Chemically Homogeneous Evolution.
  - up to 3/4 of the GW BBHs coming from isolated binary evolution (**Riley+2021**) ?

Selection effects ?

Use the characteristics of XRBs in the Milky Way to calibrate pop synth models ?

Synergy with binary evolution simulations ?

How does the MW compares to other galaxies ?

Can we probe older populations of massive stars in binaries ?

Attendance reward:



Mésange à longue queue /  
Long-tailed tit  
Étang de Marcoussis, FR