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# A catalogue of low-mass X-ray binaries in the Galaxy: From the INTEGRAL to the *Gaia* era<sup>★</sup>

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## ABSTRACT

**Context.** Low-mass X-ray binaries (LMXBs) are high-energy sources that require multi-wavelength follow-up campaigns to be fully characterised. New transients associated with LMXBs are regularly discovered, and previously known systems are often revisited by astronomers to constrain their intrinsic parameters. All of this information compiled into a catalogue may build a useful tool for subsequent studies on LMXBs and their population.

**Aims.** We aim to provide an update on past LMXB catalogues dating back 16 yr and propose to the community a database on Galactic LMXBs with the most complete, manually curated set of parameters and their original references. On top of a fixed version accessible through Vizier, we propose hosting the catalogue independently on our GitHub collaboration, side-by-side with our previous catalogue on high-mass X-ray binaries. The database will be regularly updated based on new publications and community inputs.

**Methods.** We built a working base by cross-matching previous LMXB catalogues and supplementing them with lists of hard X-ray sources detected over the past 20 yr. We compiled information from Simbad on LMXBs as a starting point for a thorough, manual search in the literature to retrieve important parameters that characterize LMXBs. We retrieved newly detected LMXBs and candidates directly from literature searches. Counterparts to these LMXBs are compiled from hard X-ray to infrared and radio domains. Every piece of information presented on the LMXBs is curated and backed by accurate references.

**Results.** We present a catalogue of 339 Galactic LMXBs listing their coordinates, companion star spectral type, systemic radial velocity, component masses and compact object nature, the presence of type I X-ray bursts, as well as orbital data. Coordinates and identifiers of counterparts at various wavelengths are given, including 140 LMXBs detected in *Gaia* DR3.

**Key words.** catalogs – binaries: general – stars: low-mass

## 1. Introduction

More than 60 yr have passed since the identification of the first extrasolar X-ray source (Giacconi et al. 1962). This particular source, Scorpius X-1, belongs to the category of low-mass X-ray binaries (LMXB), which are composed of a compact object – either a black hole (BH) or a neutron star (NS) – that accretes material from a low-mass companion star ( $M \lesssim 1 M_{\odot}$ ). LMXBs are soft X-ray emitters powered by mass transfer happening through Roche-lobe overflow (see a general review on accreting binaries in Chaty 2022). An accretion disc can form around the compact object and can be responsible for the majority of the radiation emitted during periods of high activity from X-rays down to infrared wavelengths. The formation of relativistic jets commonly occurs during specific phases of activity in micro-quasars (i.e. BH LMXBs). However, these X-ray systems are but a single phase in the whole evolution of binary stars, from their

formation up to their endpoint as compact binaries and gravitational wave sources (see a recent review by Tauris & van den Heuvel 2023).

As a follow-up to our previous work on building an updated catalogue of Galactic high-mass X-ray binaries (HMXBs, Fortin et al. 2023b, now containing more than 160 sources in HMXBwebcat<sup>1</sup>), we present our latest catalogue of 339 LMXBs in the Milky Way here. Information available on LMXBs in the literature suffers from the same caveat as HMXBs: as these sources are inherently difficult to observe and require multi-wavelength and time series campaigns to be properly constrained, most of the discoveries on LMXBs end up spread over several years and can come from many different teams of researchers across the world. This is why the catalogue presented in this paper is centred on two important concepts. Firstly, for each parameter listed, we provide the original reference where it was derived; this results in a compilation of more than 600 unique, curated references. Secondly, in parallel to being hosted in Vizier in a fixed version, we host it independently on a dedicated website, LMXBwebcat, on which the database is able to receive updates through

<sup>★</sup> The catalogue (Tables A.1 and A.2) is available at the CDS via anonymous ftp to [cdsarc.cds.unistra.fr](https://cdsarc.cds.unistra.fr) (130.79.128.5) or via <https://cdsarc.cds.unistra.fr/viz-bin/cat/J/A+A/684/A124> as well as at <https://binary-revolution.github.io/LMXBwebcat>. The database in the associated GitHub repository will be continuously updated based on community input.

<sup>1</sup> <https://binary-revolution.github.io/HMXBwebcat>

our GitHub collaboration<sup>2</sup> as new observations are made, and new or updated parameters of already known sources become available. Hence, this catalogue is open-source, and we invite the community to participate in adding their discoveries and updates on LMXBs, or correct any omission they may identify in our catalogue.

Since the late 90s, X-ray observatories such as INTEGRAL<sup>3</sup>, XMM-Newton<sup>4</sup>, Chandra, Swift, and MAXI<sup>5</sup> have participated in the discovery of new LMXBs and gaining in-depth knowledge on their intrinsic parameters such as orbital data, companion mass, or the exact nature of the accreting compact object. All of this information would benefit from being compiled together to facilitate further studies on LMXBs. However, the need for such a catalogue is not only motivated by the observational progresses of the past 16 yr, it is also the upcoming facilities dedicated to the high energy and transient sky, such as eROSITA, LSST<sup>6</sup>, and SVOM<sup>7</sup>, that warrant keeping a constantly up-to-date catalogue in anticipation of the amount of new data that will be available on X-ray binaries. In turn, this will also allow us to better predict the population of gravitational-wave sources that LISA<sup>8</sup> will be able to detect (see the white paper Amaro-Seoane et al. 2023).

The first instances of LMXB catalogues date back to the 1980s (Bradt & McClintock 1983; van Paradijs 1983) and counted roughly 33 X-ray systems. Subsequent catalogues were made following the advancements of space-based X-ray observatories, namely the ones presented in van Paradijs (1995), Liu et al. (2001), and, finally, the latest and most used catalogue to date of 187 Galactic LMXBs by Liu et al. (2007).

In this paper, we first describe the method we followed to build the catalogue (Sect. 2, which follows a similar structure to what we presented in our HMXB catalogue Fortin et al. 2023b), namely for the recovery of parameters and numerous counterparts to each LMXB. In Sect. 3, we discuss the catalogue itself and how it compares to previous iterations and other similar catalogues. We also discuss the potential uses of our catalogue and conclude on this work in Sect. 4.

## 2. Building the catalogue

In this section, we provide a step-by-step description of the tasks we performed to build the catalogue. We adopted a very similar approach to that presented in the twin catalogue dedicated to HMXBs (Fortin et al. 2023b), such as using pre-existing catalogues of high-energy sources as a starting base. We relied on the services of the Centre de Données Astronomiques de Strasbourg (CDS) such as Simbad and Vizier, and of course minute manual research through references using NASA's Astrophysics Data System (ADS) abstract search engine.

### 2.1. Reference catalogues and building a working base

More than 16 yr after publication, the LMXB catalogue by Liu et al. (2007) is still the most used reference; at that time, the authors listed 187 LMXBs and candidates in the Milky Way. We supplemented this list with the catalogue of INTEGRAL

detections (Bird et al. 2016), which contains 939 hard X-ray sources of various nature. We only kept the sources labelled LMXB or unidentified, thus adding 345 sources. We identified sources common to both Liu et al. (2007) and Bird et al. (2016) using positional and identifier cross-matching performed with TOPCAT (Taylor 2005). We then queried Simbad for all the sources containing the type (or subtype) LXB; this returns a list of 674 sources, most of which are extragalactic. These are usually grouped in small clusters around their host galaxy; hence, we used the same spatial filtering method as that presented in Fortin et al. (2023b), where we check each source for the presence of close neighbours. However, contrary to HMXBs, LMXBs are known to be present in globular clusters, and these structures may hold up to  $\sim 10$  LMXBs very close together (as is the case in NGC 6440, for instance). Hence, we used the list of globular clusters available in Vasiliev & Baumgardt (2021) to check the likelihood of a group of LMXBs being part of a Galactic globular cluster, before filtering them out if they have neighbours closer than  $10'$ . This way, we retrieved 251 Galactic LMXB candidates from Simbad.

Eventually, after cross-matching the Simbad LXBs with the sample of high energy sources from Liu et al. (2007) and Bird et al. (2016), we obtain a working base of 573 sources. We note that a significant amount (216) were listed in the INTEGRAL catalogue as unidentified, and most of them will be discarded through a thorough manual process of checking new information published on these sources in the literature.

### 2.2. Retrieving binary parameters and new LMXBs

While pieces of information are available on the LMXBs and candidates compiled so far (mainly from the data catalogued in Liu et al. 2007; Ritter & Kolb 2011, and Simbad), our goal for this catalogue is to perform a thorough investigation on each of these sources to, firstly, identify which are interesting LMXB candidates, and, secondly, retrieve useful parameters as well as the original studies that derived them (this includes double checking references already compiled by former catalogues). We find that the later point is especially important, as some parameters listed might have been derived using different methods for each source; this information should be readily available for authors of further studies that revisit these sources. Thus, during the individual search for information on each of these sources, we only used already available data as a starting point for the manual search, and we systematically re-verified already available references. We compile new and updated data whenever they are available, confirm the already measured parameters by retrieving the original studies, and we search for older publications to ensure we have compiled every piece of information possible for each binary. Hence, none of the parameters or references we list in the catalogue come from an automated, unsupervised query on Simbad. We did use the resources in works that already compiled some useful data on LMXBs, such as spectral types, orbital periods and masses in Yungelson & Lasota (2008); a list of type I X-ray bursts seen by RXTE in Galloway et al. (2008) and its extension to BeppoSAX and INTEGRAL MINBAR (Galloway et al. 2020); orbital periods in Asai et al. (2022); the catalogue of stellar-mass black holes in X-ray binaries BlackCAT (Corral-Santana et al. 2016); or the latest catalogue of Ultra-Compact X-ray Binaries UltraCompCAT (Armas Padilla et al. 2023, which is also a dynamic database<sup>9</sup>).

<sup>9</sup> Available at <https://research.iac.es/proyecto/compactos/UltraCompCAT/>

<sup>2</sup> <https://github.com/Binary-rEvolution/LMXBwebcat>.

<sup>3</sup> INternational Gamma-Ray Astrophysics Laboratory.

<sup>4</sup> X-ray Multi-Mirror Mission.

<sup>5</sup> Monitor of All-sky X-ray Image.

<sup>6</sup> Large Synoptic Survey Telescope.

<sup>7</sup> Space Variable Objects Monitor.

<sup>8</sup> Laser Interferometer Space Antenna.

Because LMXBs can be highly variable sources, we settled on a list of parameters to look for that we believe are representative of the systems at all times. These are the spectral type of the companion star, the nature of the accreting compact object, masses of the binary components, the orbital parameters, the radial velocity of the centre of mass, the presence of a spin period and its time derivative, and the detection of type-I X-ray bursts. We tried not to log any ‘assumed’ values for any parameters – such as when NSs are assumed to be  $1.4 M_{\odot}$  in orbital solutions or when the LMXBs are being located at 8 kpc by default if they are near the Galactic centre – unless they are motivated or indirectly constrained by other measurements.

Lastly, we performed ‘blind’ searches within the literature for newly detected LMXBs and candidates in papers ranging from 2016 to 2023 that may not appear in either of the catalogues of high-energy sources we used or may not yet be logged as LMXBs in Simbad. This was mainly done through queries of keywords such as binary, transient, and X-rays in the NASA ADS abstract service. Most new candidates discovered this way come from Astronomer’s Telegrams.

We note that at this point, we have made the data in the catalogue as reliable as possible; this kind of curated data-mining is, however, bound to contain small errors or oversights. This is why the catalogue is hosted on an independent website and, as our previous catalogue already did (Fortin et al. 2023b), it will receive gradual updates and new releases as new information is either found by ourselves or put forward by the community.

### 2.3. Finding an unambiguous chain of counterparts

As we previously argued in Fortin et al. (2023b), we believe that part of what consists of a secure identification as an LMXB or candidate LMXB is having an unambiguous list of counterparts, ideally from hard X-ray to infrared. Having this positional information is also a necessary tool for astronomers to prepare new observations in follow-up campaigns. The automated search for counterparts to each LMXB is not trivial, but it is still facilitated by positional data already present in Simbad and by the stored identifiers, which also contain information about the coordinates of the source and their accuracy. Our goal here is to perform a cone search on all the catalogues listed in Table 1 in order to retrieve a proper chain of counterparts from the high energies down to the infrared wavelengths. For this, we need an initial set of coordinates to query in these catalogues.

These starting coordinates are either the ones listed in Simbad, or the ones that we parsed from the list of identifiers available in Simbad, whichever is most accurate. For instance, the candidate LMXB IGR J17480–2446 has coordinates available in Simbad, but without any information on their accuracy. It does have another identifier, CXOG1b J174804.8–244648, which we can parse into a set of coordinates with an accuracy below the arcsecond scale as it comes from *Chandra* observations. This is a quick method that is capable of automatically retrieving accurate positional data from Simbad that may not necessarily be available in catalogues, but that was, for instance, derived in Astronomer’s Telegrams. In this particular case, this allowed us to instantly find the *Chandra* counterpart of IGR J17480–2446 (2CXO J174804.8–244649) with a cone search in the *Chandra* CSC 2 database (Evans et al. 2019).

This positional cross-match is still prone to false positives, as we have to carefully look within the catalogues on a sufficiently large area so that we do not miss any potential counterparts. This is why we also performed a recursive search within the produced list of counterparts, from the poorest to the most accurate

**Table 1.** Queried catalogues for the counterpart search.

Catalogue	Reference	Radius
HEAO 1	Wood et al. (1984)	20′
<i>Uhuru 4</i>	Forman et al. (1978)	20′
<i>Ariel V 3</i>	Warwick et al. (1981)	20′
INTEGRAL	Bird et al. (2016)	20′
<i>Fermi</i>	Abdollahi et al. (2022)	20′
<i>BeppoSAX</i>	Capitanio et al. (2011)	6′
<i>Einstein 2E</i>	Harris et al. (1990)	4′
ROSAT	White et al. (2000)	35″
<i>Swift 2SXPS</i>	Evans et al. (2020)	8″
4XMM DR11	Webb et al. (2020)	4″
<i>Chandra CSC 2</i>	Evans et al. (2019)	3″
2MASS	Cutri et al. (2003)	120 mas
<i>Gaia</i> DR3	<i>Gaia</i> Collaboration (2022)	20 mas

catalogues (*XMM-Newton*, *Chandra*, 2MASS, *Gaia*). We note that for LMXBs closely grouped within globular clusters, this method is sometimes unable to automatically separate different chains of counterparts, especially for hard X-rays for which the astrometric precision is not accurate enough to separate closely grouped LMXBs in clusters. Thus, for LMXBs found in clusters, we manually checked the consistency of their counterparts to ensure each have a unique, precise localisation.

### 2.4. Contents of the catalogue

The general characteristics of Galactic LMXBs are presented in Table A.1. The full catalogue provides their Simbad identifier (Main ID field from Simbad) and a short list of the most used IDs we found in the literature. To build this list, we queried each known ID from Simbad in ADS and retrieved how many papers used them in their title, abstract, or full text. We ranked them from most popular to least popular, and thus provide identifiers that should reflect the community’s preferred naming convention. In this paper, we list the LMXBs under their most popular identifier, except for a few sources for which no popular ID can be recovered in ADS; in this case, we use their Simbad identifier. The online catalogue provides the full list of identifiers known by Simbad to facilitate queries in LMXBwebcat. The ‘Compact’ column provides information on the nature of the accreting compact object, and ‘Spectype’ refers to the spectral type of the donor star. When available, we list the distance inferred from *Gaia* EDR3 parallaxes by Bailer-Jones et al. (2021). We also cross-matched our LMXBs with the list of globular clusters from Baumgardt & Vasiliev (2021), which contains information about their distances inferred from various means, including *Gaia* parallaxes. Hence, in the case of a spatial association with a globular cluster we provide the name of the cluster and the inferred distance in the ‘Other distance’ column. In the text, we only keep the largest error bound for *Gaia* distances, and values are voluntarily rounded for the sake of readability; the unaltered numbers are available in the electronic versions of the catalogue. When there is no cluster association, the ‘Other distance’ column may also contain distance estimates from a number of other methods, which are available in the given references. Lastly, we indicate when one or several type I X-ray bursts were observed by providing a reference.

In Table A.2, we present the orbital parameters: orbital period, eccentricity, and semi-amplitude of the donor’s radial

velocity. We also give details on the mass of each binary component –  $M_x$  for the compact object and  $M_o$  for the companion star – as well as information on the presence of a pulse period and its time derivative in the case where the compact object is an NS. Again, values are rounded for readability and are available in full in the electronic version of the catalogue.

The electronic version also provides extra information on the counterparts for each binary, namely their numerous identifiers, coordinates, and corresponding astrometric precision. The right ascension and declination are given in J2000, and astrometric uncertainties are the 90% positional errors retrieved from the queried catalogues. The full contents of the LMXB catalogue can be queried on VizieR or viewed and queried from the dedicated website LMXBwebcat<sup>10</sup>. The latter database will be updated regularly, and new versions of the catalogue will be published on the website; every change will be logged to track the evolution of each version, which will remain available alongside the latest upload.

We advise readers to remain critical of all the parameters we list in this catalogue and to check the references before using them in their own work. To ease the process, we implemented a flag system to quickly inform the reader about the reliability of each listed parameter. The flags appear as numbers in dedicated columns in the catalogue database; for the sake of readability, we use daggers in the text:

- 0 / (nothing): directly measured parameter. This flag is not displayed in Tables A.1 and A.2 or in LMXBwebcat. This includes companion spectral types inferred through spectroscopy, full orbital solutions derived from radial velocity follow-ups, orbital periods from pulse timing or eclipses, dynamical masses, NSs confirmed by the presence of type I bursts or a spin period, or compact object types identified through the measure of the dynamical mass. This also includes distances of globular clusters hosting LMXBs derived via the *Gaia* parallaxes of the cluster members.
- 1 (†): caution. The parameter is either indirectly measured or needs better constraints. This includes tentative orbital periods, rough estimations of spectral types from photometry, compact object masses and distances from spectral fitting, radial-velocity semi-amplitudes from empirical relations, or compact object types identified through comparison of X-ray spectra. It also includes all parameters for which we only have upper or lower limits on a direct measurement (i.e. most eccentricity measurements).
- 2 (††): warning. The parameter is assumed in the scope of a model and likely needs proper observational constraints. This also includes indirectly derived parameters with lower or upper limits.

For instance, out of the 75 BH LMXBs we list, only 19 are flagged as reliable BH (“0”) since direct evidence of the presence of a BH is hard to obtain, apart from deriving a dynamical mass greater than  $\sim 3 M_\odot$ . Most BHs are thus flagged ‘1’ ( $N = 52$ ), and only a few are flagged ‘2’ ( $N = 4$ ) since this identification mostly comes from their X-ray spectrum resembling the one of typical BH LMXBs. The presence of an NS is, however, much easier to prove through the observation of type I X-ray bursts or the detection of a spin period; hence, 146 out of 176 NSs in LMXBs are flagged as being reliable. These flags can be used to quickly identify which LMXBs are worth revisiting to give better constraints on their set of parameters.

## 2.5. *Gaia* candidate counterparts

The only parameter flag that slightly differs from the others is the one attributed to the *Gaia* distances in Table A.1. Because LMXBs are generally very faint in the optical and nIR, and because there are so many late-type stars in the field, finding the true optical or nIR counterpart to an LMXB can be challenging even in the case where sub-arcsecond X-ray localisation is available, as interlopers can be present along with the true counterpart within the X-ray error circles. Hence, we propose candidate *Gaia* counterparts to LMXBs based on astrometric cross-matching as well as historical associations in the few cases where both deep and high-resolution optical or nIR imaging has been performed.

The *Gaia* distance flag does not refer to the reliability of the distance estimation; instead, it represents how the *Gaia* counterpart was associated with the LMXB. *Gaia* counterparts that we found compatible with either an *XMM-Newton* or *Chandra* detection (e.g. a sub-arcsecond scale association) and that do not have any other neighbour in the *Gaia* catalogue closer than 1” are deemed secure, and as such we do not flag them. *Gaia* counterparts that were found only based on a *Swift* detection (e.g. an arcsecond scale association) are flagged as uncertain (“1”/†). The *Gaia* counterparts flagged as “2”/†† are not necessarily unreliable, but they are not based on an association with an accurate soft X-ray detection. Instead, they come from a historical association with an optical counterpart. For instance, Sco X-1 has a *Gaia* counterpart but no soft X-ray position available in the *Swift*, *Chandra*, or XMM catalogues because of its tremendous X-ray brightness.

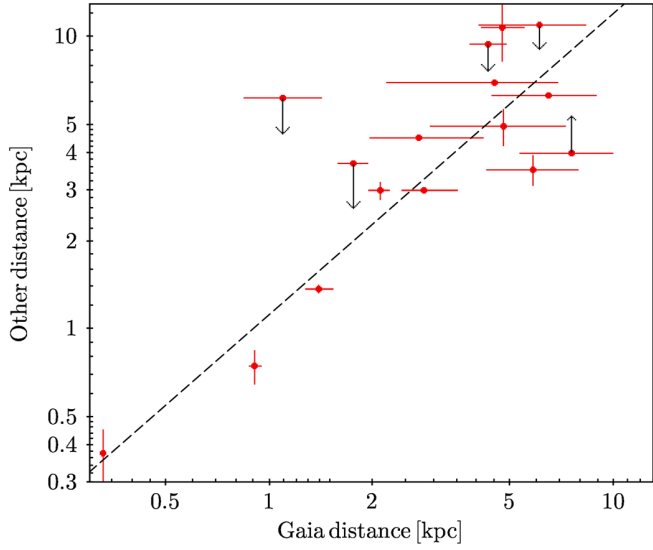
These *Gaia* candidate counterparts can be subject to change in further iterations of the database as new X-ray positional constraints or deeper optical and nIR imaging becomes available on LMXBs. There are ways to further determine the level of confidence in the *Gaia* counterparts we found, such as comparing their optical magnitudes to previously published survey data. Because LMXBs can be highly variable, we chose to perform a check between the distances inferred by *Gaia* parallax and the distances inferred by other means (‘other distance’, such as spectral energy distribution fitting or photospheric radius expansion in bursting sources). After removing the LMXBs that lie within clusters (since all of their distance information come from *Gaia* data), in Fig. 1 we plot the *Gaia* distances versus the other distances from the literature. A linear fitting excluding the data points with lower or upper limits returns a proportional coefficient of 1.03 and a systematic of 50 pc, which is satisfactory since we are comparing two completely independent sets of measurements. We note that this sub-sample is representative of the whole catalogue concerning the *Gaia* flags: we count four flag-0, a single flag-1, and six flag-2 *Gaia* counterparts in the fitted sample. This may indicate that our flagging system is a bit too strict, with the caveat of a low number of sources to work with.

## 3. Results, discussions, and byproducts

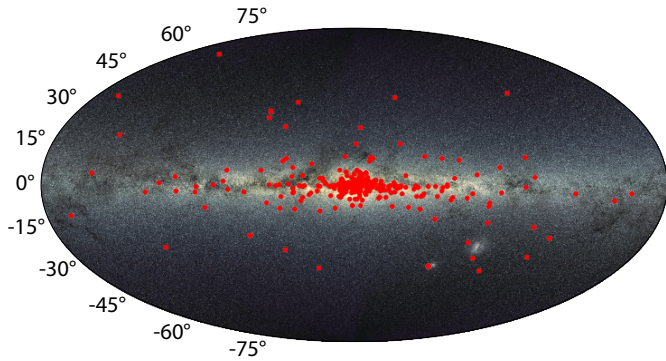
### 3.1. Catalogue statistics and uses

We present a list of 339 Galactic LMXBs and candidates in this new catalogue, as represented in Fig. 2. We note that contrary to the previous catalogue of Liu et al. (2007), we do include quiescent LMXB candidates (qLMXBs hereafter); 25 are present in the current version of our catalogue. Hence, after subtracting these qLMXBs to compare our total sample to Liu et al. (2007), we provide a 67% increase in the total number of LMXBs and

<sup>10</sup> <https://binary-revolution.github.io/LMXBwebcat/catalog.html>



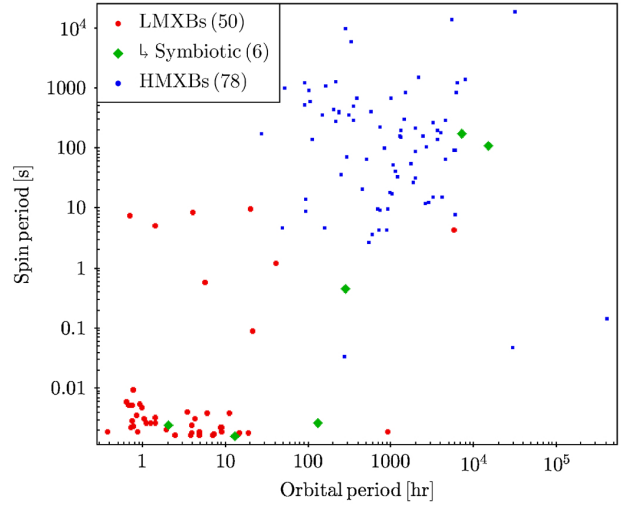
**Fig. 1.** Comparison between distances to LMXBs from the literature versus the distances of the proposed *Gaia* counterparts inferred from their parallax. Only LMXBs that have both information and are not located within a cluster are plotted ( $N = 16$ ); black arrows indicate lower or upper limits. The dashed black line is the best linear fit, excluding sources with only lower or upper limits ( $N = 11$ ).



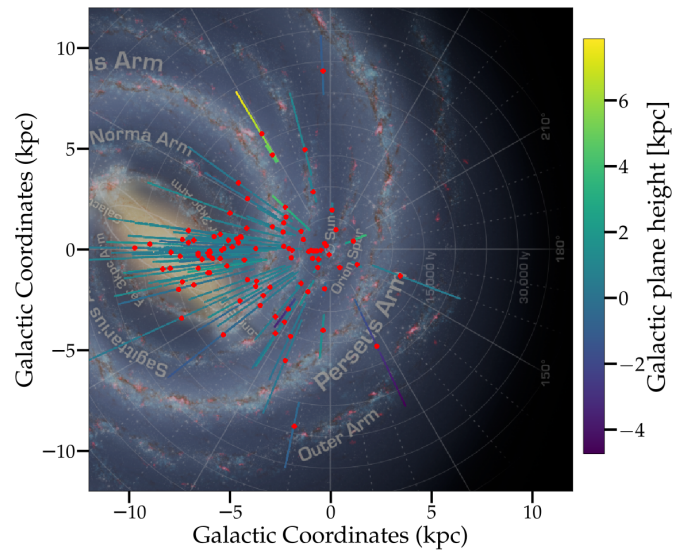
**Fig. 2.** Edge-on view of 339 LMXBs in the Galaxy. Galactic latitudes are indicated in degrees. Background image credits: ESA/*Gaia*/DPAC.

candidates in the Milky Way. We have at least a tentative identification of compact object type for more than 250 LMXBs, with a predominance of NSs (70%) compared to BHs (30%). We compiled 150 orbital periods and 69 spin periods, which are, respectively, a 200% and 150% increase compared to the 2007 catalogue, showing the tremendous impact of new detections and follow-up studies on LMXBs. Out of the 176 NS LMXBs, 112 are known to be X-ray bursters.

In Fig. 3, we present the full Corbet diagram of NS XRBs in the Galaxy, compiling the data of the present catalogue for NS LMXBs with both the orbital period and spin period derived ( $N = 50$ ) alongside the same data for HMXBs available in Fortin et al. (2023b). In this sample, the majority of the NSs in LMXB have spin periods lower than 10 ms ( $N = 39$ ), a region exclusively dominated by LMXBs contrary to NSs in HMXBs that seldom have spin periods lower than 100 ms. LMXBs and HMXBs are generally well-separated in the Corbet diagram, although some symbiotic LMXBs (where the donor is an evolved, giant star) do overlap with HMXBs as consequence



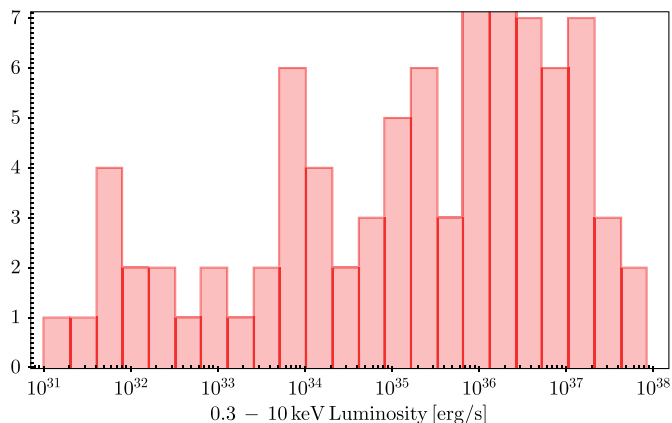
**Fig. 3.** Corbet diagram of 50 NS LMXBs in the current catalogue alongside the 78 NS HMXBs now available in Fortin et al. (2023b), which have both orbital and spin-period information (all flags included). Symbiotic LMXBs are indicated in green rhombuses.



**Fig. 4.** Face-on view of 98 Galactic LMXBs with *Gaia* parallaxes. Bars indicate the 68% confidence interval in distance. Background image credits: NASA/JPL-Caltech/R. Hurt (SSC/Caltech).

of a larger orbital separation and lower efficiency at transferring angular momentum.

In our previous catalogue dedicated to HMXBs, almost three quarters of the HMXBs were detected by *Gaia* and were of sufficient astrometric quality to invert the distance from the parallax; in this LMXB catalogue, we note that only about 40% of the sources (140) have a *Gaia* DR3 counterpart, and only 98 of them have distance information available in Bailer-Jones et al. (2021). This is explained by the fact that optical counterparts of LMXBs are fainter on average, and also because these are older astrophysical objects that had time to migrate out of the Galactic plane towards the bulge of the Milky Way, which is too far away for any source to have a reliable *Gaia* parallax, even when a counterpart is detected. This still allows us to localise  $\sim 30\%$  of our LMXBs within the Galaxy thanks to *Gaia* as shown in Fig. 4. If we combine to the *Gaia* distances the ones found in



**Fig. 5.** Distribution of soft X-ray luminosities of Galactic LMXBs seen by *Swift* and with a distance determination ( $N = 89$ ).

the literature and the distances to globular clusters, we reach the number of 208 LMXBs with a distance estimation. We note that regardless of the method used for distance estimation (parallax, globular cluster association, or X-ray modelling), we advise the users to remain cautious of the determined distance values when considering individual systems as they may be subject to various biases, such as poor parallax quality, wrong association within a globular cluster, foreground star, and so on. When considering the whole sample, these biases should at least partly cancel out, but there are bound to be outliers.

To show the potential of the data we aggregated in this catalogue, we constructed the distribution of X-ray luminosities of the Galactic LMXBs using the 2SXPS *Swift* database (Evans et al. 2020). We combined the unabsorbed 0.3–10 keV Apec flux (labelled FAU0 in 2SXPS) with either the *Gaia* distances or, when not available, the ‘Other distance’ determination in the LMXB catalogue. In the case where the LMXBs are associated with globular clusters, we used the distance to the cluster. This luminosity distribution, shown in Fig. 5, is the first step to obtaining an estimation of the total X-ray budget of LMXBs in the Milky Way, and it is only presented here as an example of how this catalogue can be used. To go further, users may want to consider other methods of flux measurements from the 2SXPS catalogue, combine fluxes from other observatories such as *XMM-Newton* (Webb et al. 2020) or *Chandra* (Evans et al. 2019), and of course discuss the impact of the behaviour of LMXBs from quiescence to outburst on the average flux values available in the aforementioned catalogues.

### 3.2. Byproducts

A noteworthy byproduct of our work is the retrieval of information about INTEGRAL sources marked as unidentified in Bird et al. (2016). We kept five of them as candidate LMXBs, which appear in our catalogue; in Table B.1, we also provide a separate list for the 44 INTEGRAL sources for which we found an identification in the literature that is not present in Simbad. Most are background active galactic nuclei (AGNs) or cataclysmic variables (CVs). The purpose of this table is to provide easily digestible data for the CDS to update references in Simbad.

### 3.3. Discussion

After the publication of our previous HMXB catalogue and during the writing of this paper, a similar LMXB catalogue was

released by Avakyan et al. (2023), where the authors list 349 Galactic LMXBs. We have similar approaches, as the authors also propose to update their database based on community inputs. We did find, however, notable differences: first and foremost, we do not cite previous catalogues as references for the parameters in our catalogue; instead, we look for the original studies cited in Liu et al. (2007) or Ritter & Kolb (2003) and update them when necessary. This results in a compilation of 570 unique references for the parameters we compile in the present catalogue. Secondly, we carefully review any reference provided by Simbad, as we have found many instances where they do not point to the original study deriving the cited parameter. For example, several companion spectral types are given in Yungelson & Lasota (2008), which is a paper discussing evolutionary models for BH LMXBs that happens to list these spectral types (and some other parameters such as orbital periods or mass ratios) coming from already published data. Thirdly, we are slightly more strict concerning the inclusion of LMXB candidates, as we do not list X-ray sources for which there is no particular indication of them being at least candidate LMXBs. For this reason, we did not include the following in our catalogue: AX J1824.5–2451, [BSP2003] 24, Swift J174038.1–273712, CXOGC J174538.0–290022, XMM J174544–2913.0, SWIFT J174553.7–290347, CXOGC J174622.2–290634, Swift J175233.9–290952, and NGC 6752 CX19. Thanks to our minute investigation of each LMXB candidate, we were also able to exclude duplicates where one or several counterparts of the same source were listed as independent LMXBs. This was the case for KS 1741–293, IGR J17353–3539, TYC 6824–713–1, [ZGV2011] 9, and 3U 1728–16. Lastly, we provide corrected identifications for some sources that may have been wrongly reported to be LMXBs, such as the HMXB Cir X-1 (Jonker et al. 2007), the cataclysmic variable OGLE BLG-ELL-12042 (Gomez et al. 2021), and some which are less likely to be LMXBs ([PLV2002] CX10 is a candidate CV in Pooley et al. 2002).

It is of prime importance for a catalogue to carefully list references. Firstly, this provides at least some insurance to the users that the data were manually curated as, for now, there are no machine learning algorithms that outperform manual data mining in the literature as we present here. Secondly, we also find that it is important to acknowledge all the observational work done on LMXBs and X-ray binaries in general since, as the current catalogue shows, there are still many missing parameters on X-ray binaries that will only be derived thanks to regular proposals for follow-up observations by teams of astronomers. Lastly, the main motivator for such catalogues is to untangle the huge amount of information spread throughout the literature; citing previous catalogues as a source for data goes against this endeavour of making data more accessible to the community.

## 4. Conclusion

The continuous endeavour of catching X-ray transients and performing multi-wavelength follow-ups has led to the discovery of many new LMXBs and helped characterise their properties tremendously in these past 16 yr. To bring together all this information, we present a new catalogue of 339 Galactic LMXBs that constitutes a tool for further studies on either individual systems or their whole population. Being hosted on an independent website, LMXBwebcat, this catalogue is also ready to receive updates and corrections based on new publications or input from the community. Compared to the 187 LMXBs listed in Liu et al. (2007), the current number of known Galactic LMXBs

has almost doubled, and given the upcoming observational landscape dedicated to high energies and transient sky astronomy (i.e. eROSITA, LSST, or SVOM), these numbers are likely to keep growing further.

It is therefore essential to continue monitoring new discoveries on X-ray binaries so that we are able to better grasp their properties as a population, their role in the Galactic ecology and how, at the endpoint of their evolution, they may become gravitational-wave sources detectable by LISA (Tauris 2018). We would also like to note that optical and nIR follow-ups are still much needed to complete the set of observables (such as spectral types or orbital solutions from radial velocities) available on LMXBs. We hope this catalogue can also be a tool to identify which parameter needs constraints and to facilitate the identification of ideal targets for astronomers to revisit.

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## References

- Abdollahi, S., Acero, F., Baldini, L., et al. 2022, *ApJS*, 260, 53
- Amaro-Seoane, P., Andrews, J., Arca Sedda, M., et al. 2023, *Living Rev. Relativity*, 26, 2
- Armas Padilla, M., Corral-Santana, J. M., Borghese, A., et al. 2023, *A&A* 677, A186
- Asai, K., Mihara, T., & Matsuoka, M. 2022, *PASJ*, 74, 974
- Avakyan, A., Neumann, M., Zainab, A., et al. 2023, *A&A*, 675, A199
- Bailer-Jones, C. A. L., Rybizki, J., Fouesneau, M., Demleitner, M., & Andrae, R. 2021, *AJ*, 161, 147
- Baumgardt, H., & Vasiliev, E. 2021, *MNRAS*, 505, 5957
- Bird, A. J., Bazzano, A., Malizia, A., et al. 2016, *ApJS*, 223, 15
- Bozzo, E., Pavan, L., Ferrigno, C., et al. 2012, *A&A*, 544, A118
- Bradt, H. V. D., & McClintock, J. E. 1983, *ARA&A*, 21, 13
- Capitanio, F., Bird, A. J., Fionchi, M., Scaringi, S., & Ubertini, P. 2011, *ApJS*, 195, 9
- Chaty, S. 2022, *Accreting Binaries: Nature, Formation, and Evolution* (IOP Publishing)
- Clavel, M., Tomsick, J. A., Bodaghee, A., et al. 2016, *MNRAS*, 461, 304
- Corbet, R. H. D., Chomiuk, L., Coe, M. J., et al. 2019, *ApJ*, 884, 93
- Corral-Santana, J. M., Casares, J., Muñoz-Darias, T., et al. 2016, *A&A*, 587, A61
- Cowperthwaite, P. S., Massaro, F., D’Abrusco, R., et al. 2013, *AJ*, 146, 110
- Cutri, R. M., Skrutskie, M. F., van Dyk, S., et al. 2003, *VizieR Online Data Catalog*: II/246
- Evans, I. N., Primini, F. A., Glotfelty, C. S., et al. 2019, *VizieR Online Data Catalog*: IX/57
- Evans, P. A., Page, K. L., Osborne, J. P., et al. 2020, *ApJS*, 247, 54
- Fionchi, M., Bassani, L., Bazzano, A., et al. 2010, *ApJ*, 720, 987
- Forman, W., Jones, C., Cominsky, L., et al. 1978, *ApJS*, 38, 357
- Fortin, F., Chaty, S., Coleiro, A., Tomsick, J. A., & Nitschelm, C. H. R. 2018, *A&A*, 618, A150
- Fortin, F., Chaty, S., & Tomsick, J. 2023a, *ATel*, 16099, 1
- Fortin, F., García, F., Simaz Bunzel, A., & Chaty, S. 2023b, *A&A*, 671, A149
- Foschini, L. 2002, *Understanding the nature of the unidentified EGRET source 3EG J1631-4033*, Chandra Proposal ID 04508160
- Gaia Collaboration 2022, *VizieR Online Data Catalog*: I/355
- Galloway, D. K., Muno, M. P., Hartman, J. M., Psaltis, D., & Chakrabarty, D. 2008, *ApJS*, 179, 360
- Galloway, D. K., in ‘t Zand, J., Chenevez, J., et al. 2020, *ApJS*, 249, 32
- Giacconi, R., Gursky, H., Paolini, F. R., & Rossi, B. B. 1962, *Phys. Rev. Lett.*, 9, 439
- Gomez, S., Torres, M. A. P., Jonker, P. G., et al. 2021, *MNRAS*, 502, 48
- Harris, D. E., Forman, W., Gioia, I. M., et al. 1990, *Einstein Observatory Catalog of IPC X-ray Sources*, 2
- Hunter, J. D. 2007, *Comput. Sci. Eng.*, 9, 90
- Jonker, P. G., Nelemans, G., & Bassa, C. G. 2007, *MNRAS*, 374, 999
- Landi, R., Bassani, L., Malizia, A., et al. 2010a, *MNRAS*, 403, 945
- Landi, R., Bassani, L., Bazzano, A., et al. 2017a, *MNRAS*, 470, 1107
- Landi, R., Malizia, A., Bassani, L., et al. 2017b, *ATel*, 10467, 1
- Landi, R., Masetti, N., Bazzano, A., et al. 2010b, *ATel*, 3065, 1
- Liu, Q. Z., van Paradijs, J., & van den Heuvel, E. P. J. 2001, *A&A*, 368, 1021
- Liu, Q. Z., van Paradijs, J., & van den Heuvel, E. P. J. 2007, *A&A*, 469, 807
- Maiorano, E., Landi, R., Stephen, J. B., et al. 2011, *MNRAS*, 416, 531
- Malizia, A., Landi, R., Molina, M., et al. 2016, *MNRAS*, 460, 19
- Malizia, A., Landi, R., Bassani, L., et al. 2017, *ATel*, 10468, 1
- Masetti, N., Parisi, P., Jiménez-Bailón, E., et al. 2012, *A&A*, 538, A123
- Masetti, N., Malizia, A., Landi, R., et al. 2017, *ATel*, 10447, 1
- Molina, M., Landi, R., Bassani, L., et al. 2012, *A&A*, 548, A32
- Onori, F., Fionchi, M., Masetti, N., et al. 2021, *MNRAS*, 503, 472
- Özby Arabacı, M., Kalemci, E., Tomsick, J. A., et al. 2012, *ApJ*, 761, 4
- Paliya, V. S., Koss, M., Trakhtenbrot, B., et al. 2019, *ApJ*, 881, 154
- Pooley, D., Lewin, W. H. G., Verbunt, F., et al. 2002, *ApJ*, 573, 184
- Ritter, H., & Kolb, U. 2003, *A&A*, 404, 301
- Ritter, H., & Kolb, U. 2011, *VizieR Online Data Catalog*: B/cb
- Sguera, V., Sidoli, L., Bird, A. J., Paizis, A., & Bazzano, A. 2020, *MNRAS*, 491, 4543
- Tauris, T. M. 2018, *Phys. Rev. Lett.*, 121, 131105
- Tauris, T. M., & van den Heuvel, E. P. J. 2023, *Physics of Binary Star Evolution. From Stars to X-ray Binaries and Gravitational Wave Sources* (Princeton University Press)
- Taylor, M. B. 2005, *ASP Conf. Ser.*, 347, 29
- Tomsick, J. A., Chaty, S., Rodriguez, J., Walter, R., & Kaaret, P. 2009, *ApJ*, 701, 811
- Tomsick, J. A., Bodaghee, A., Chaty, S., et al. 2012, *ApJ*, 754, 145
- Tomsick, J. A., Bodaghee, A., Chaty, S., et al. 2020, *ApJ*, 889, 53
- Ursini, F., Bassani, L., Malizia, A., et al. 2019, *ATel*, 12840, 1
- van der Walt, S., Colbert, C., & Varoquaux, G. 2011, *CSE*, 13
- van Paradijs, J. 1983, in *Accretion-Driven Stellar X-ray Sources*, eds. W. H. G. Lewin, & E. P. J. van den Heuvel, 192
- van Paradijs, J. 1995, in *X-ray Binaries*, 536
- Vasiliev, E., & Baumgardt, H. 2021, *MNRAS*, 505, 5978
- Virtanen, P., Gommers, R., Oliphant, T. E., et al. 2020, *Nature Methods*, 17, 261
- Warwick, R. S., Marshall, N., Fraser, G. W., et al. 1981, *MNRAS*, 197, 865
- Webb, N. A., Coriat, M., Traulsen, I., et al. 2020, *A&A*, 641, A136
- White, N. E., Giommi, P., & Angelini, L. 2000, *VizieR Online Data Catalog*: IX/31
- Wood, K. S., Meekins, J. F., Yentis, D. J., et al. 1984, *ApJS*, 56, 507
- Yungelson, L., & Lasota, J. P. 2008, *New Astron. Rev.*, 51, 860
- Zhang, S., Chen, Y. P., Wang, J. M., Li, T. P., & Ge, J. Q. 2009, *A&A*, 497, 347



## Appendix A: Catalogue of Galactic LMXBs

Tables A.1 and A.2 are only available in electronic form as a single table at the CDS. The data can also be browsed and downloaded on LMXBWebcat (<https://binary-revolution.github.io/LMXBwebcat>).

The relevant references are listed below:

- Albayati, A. C., Altamirano, D., Jaisawal, G. K., et al. 2021, *MNRAS*, 501, 261  
 Albayati, A. C., Bult, P., Altamirano, D., et al. 2023, *MNRAS*, 524, 2477  
 Altamirano, D., Casella, P., Patruno, A., Wijnands, R., & van der Klis, M. 2008a, *ApJ*, 674, L45  
 Altamirano, D., Cavocchi, Y., Patruno, A., et al. 2011, *ApJ*, 727, L18  
 Altamirano, D., Galloway, D., Chenevez, J., et al. 2008b, *The Astronomer's Telegram*, 1651, 1  
 Altamirano, D., Patruno, A., Heinke, C. O., et al. 2010, *ApJ*, 712, L58  
 Altamirano, D., Wijnands, R., Heinke, C. O., Sivakoff, G. R., & Pooley, D. 2012, *The Astronomer's Telegram*, 4264, 1  
 Anderson, S. F., Wachter, S., Margon, B., et al. 1994, *ApJ*, 436, 319  
 Aoki, T., Dotani, T., Ebisawa, K., et al. 1992, *PASJ*, 44, 641  
 Archibald, A. M., Stairs, I. H., Ransom, S. M., et al. 2009, *Science*, 324, 1411  
 Armas Padilla, M., Degenaar, N., Patruno, A., et al. 2011, *MNRAS*, 417, 659  
 Armas Padilla, M., Degenaar, N., & Wijnands, R. 2013, *MNRAS*, 434, 1586  
 Armas Padilla, M., Rodríguez-Gil, P., Muñoz-Darias, T., et al. 2022, *ApJ*, 931, L9  
 Arnason, R. M., Sivakoff, G. R., Heinke, C. O., Cohn, H. N., & Lugger, P. M. 2015, *ApJ*, 807, 52  
 Ashcraft, T. A., Hynes, R. I., & Robinson, E. L. 2012, *MNRAS*, 424, 620  
 Augusteijn, T., Kuulkers, E., & van Kerkwijk, M. H. 2001, *A&A*, 375, 447  
 Bagińska, P., Różańska, A., Czerny, B., & Janiak, A. 2021, *ApJ*, 912, 110  
 Baglio, M. C., D'Avanzo, P., Campana, S., et al. 2016, *A&A*, 587, A102  
 Baglio, M. C., Mainetti, D., D'Avanzo, P., et al. 2014, *A&A*, 572, A99  
 Bahramian, A., Britt, C., & Strader, J. 2018a, *The Astronomer's Telegram*, 11342, 1  
 Bahramian, A., Gladstone, J. C., Heinke, C. O., et al. 2014, *MNRAS*, 441, 640  
 Bahramian, A., Heinke, C. O., Tudor, V., et al. 2017, *MNRAS*, 467, 2199  
 Bahramian, A., Tetarenko, A., Sivakoff, G., et al. 2018b, *The Astronomer's Telegram*, 11646, 1  
 Bailer-Jones, C. A. L., Rybizki, J., Fouesneau, M., Demleitner, M., & Andrae, R. 2021, *AJ*, 161, 147  
 Bailyn, C. D., Orosz, J. A., McClintock, J. E., & Remillard, R. A. 1995, *Nature*, 378, 157  
 Bałucińska-Church, M., Church, M. J., & Smale, A. P. 2004, *MNRAS*, 347, 334  
 Bandopadhyay, R. M., Shahbaz, T., Charles, P. A., & Naylor, T. 1999, *MNRAS*, 306, 417  
 Barnes, A. D., Casares, J., Cornelisse, R., et al. 2007, *MNRAS*, 380, 1182  
 Barret, D., & Grindlay, J. E. 1995, *ApJ*, 440, 841  
 Bassa, C. G., Jonker, P. G., Steeghs, D., & Torres, M. A. P. 2009, *MNRAS*, 399, 2055  
 Baumgardt, H., & Vasiliev, E. 2021, *MNRAS*, 505, 5957  
 Bayless, A. J., Robinson, E. L., Mason, P. A., & Robertson, P. 2011, *ApJ*, 730, 43  
 Becker, W., Swartz, D. A., Pavlov, G. G., et al. 2003, *ApJ*, 594, 798  
 Beri, A., Sharma, R., Roy, P., et al. 2023, *MNRAS*, 521, 5904  
 Bezayiff, N. 2006, PhD thesis, University of California, Santa Cruz  
 Bhattacharyya, S. 2020, *MNRAS*, 498, 728  
 Bhattacharyya, S., Strohmayer, T. E., Markwardt, C. B., & Swank, J. H. 2006, *ApJ*, 639, L31  
 Blay, P., Camero, A., Connell, P., et al. 2008, in *The 7th INTEGRAL Workshop*, 78  
 Bogdanov, S., & Halpern, J. P. 2015, *ApJ*, 803, L27  
 Bogomazov, A. I., Cherepashchuk, A. M., Khruzina, T. S., & Tutukov, A. V. 2022, *MNRAS*, 514, 5375  
 Borozdin, K. N., & Trudolyubov, S. P. 2000, *ApJ*, 533, L131  
 Bozzo, E., Bahramian, A., Ferrigno, C., et al. 2018, *A&A*, 613, A22  
 Bozzo, E., Bazzano, A., Kuulkers, E., et al. 2014, *The Astronomer's Telegram*, 5765, 1  
 Bozzo, E., Ferrigno, C., Kuulkers, E., et al. 2009, *The Astronomer's Telegram*, 2198, 1  
 Bozzo, E., Pjanka, P., Romano, P., et al. 2016, *A&A*, 589, A42  
 Bozzo, E., Romano, P., Falanga, M., et al. 2015, *A&A*, 579, A56  
 Bozzo, E., Romano, P., Ferrigno, C., et al. 2013, *A&A*, 556, A30  
 Brandt, S., Budtz-Jørgensen, C., & Chenevez, J. 2006a, *The Astronomer's Telegram*, 778, 1  
 Brandt, S., Budtz-Jørgensen, C., Chenevez, J., et al. 2006b, *The Astronomer's Telegram*, 970, 1  
 Brandt, S., Budtz-Jørgensen, C., Gotz, D., Hurley, K., & Frontera, F. 2007, *The Astronomer's Telegram*, 1054, 1  
 Brandt, S., Kuulkers, E., Bazzano, A., et al. 2005, *The Astronomer's Telegram*, 622, 1  
 Britt, C. T., Strader, J., Chomiuk, L., et al. 2017, *ApJ*, 849, 21  
 Buisson, D. J. K., Altamirano, D., Armas Padilla, M., et al. 2021, *MNRAS*, 503, 5600  
 Buisson, D. J. K., Altamirano, D., Bult, P., et al. 2020, *MNRAS*, 499, 793  
 Bult, P., Altamirano, D., Arzoumanian, Z., et al. 2022a, *ApJ*, 935, L32  
 Bult, P., Altamirano, D., Arzoumanian, Z., et al. 2018, *ApJ*, 864, 14  
 Bult, P., Gorgone, N., Younes, G., Kouveliotou, C., & Harrison, F. 2017, *The Astronomer's Telegram*, 11067, 1  
 Bult, P., Mancuso, G. C., Strohmayer, T. E., et al. 2022b, *ApJ*, 940, 81  
 Bult, P., Markwardt, C. B., Altamirano, D., et al. 2019, *ApJ*, 877, 70  
 Bult, P., Strohmayer, T. E., Malacaria, C., Ng, M., & Wadiasingh, Z. 2021, *ApJ*, 912, 120  
 Bult, P. M., Ng, M., Iwakiri, W., et al. 2022c, *The Astronomer's Telegram*, 15425, 1  
 Cadelano, M., Pallanca, C., Ferraro, F. R., et al. 2017, *ApJ*, 844, 53  
 Cadolle Bel, M., Prat, L., Rodriguez, J., et al. 2009, *A&A*, 501, 1  
 Camilo, F., Reynolds, J. E., Ransom, S. M., et al. 2016, *ApJ*, 820, 6  
 Campana, S., Stella, L., Belloni, T., et al. 2002, *A&A*, 384, 163  
 Cantat-Gaudin, T., & Anders, F. 2020, *A&A*, 633, A99  
 Cao, H.-M., Migliori, G., Giroletti, M., et al. 2022, *A&A*, 657, A104  
 Carotenuto, F., Corbel, S., & Tzioumis, A. 2022, *MNRAS*, 517, L21  
 Casares, J. 2016, *ApJ*, 822, 99  
 Casares, J., Charles, P., & Kuulkers, E. 1998, *ApJ*, 493, L39  
 Casares, J., & Charles, P. A. 1994, *MNRAS*, 271, L5  
 Casares, J., Charles, P. A., & Marsh, T. R. 1995, *MNRAS*, 277, L45  
 Casares, J., Charles, P. A., & Naylor, T. 1992, *Nature*, 355, 614  
 Casares, J., Charles, P. A., Naylor, T., & Pavlenko, E. P. 1993, *MNRAS*, 265, 834  
 Casares, J., Cornelisse, R., Steeghs, D., et al. 2006, *MNRAS*, 373, 1235  
 Casares, J., Dubus, G., Shahbaz, T., Zurita, C., & Charles, P. A. 2002, *MNRAS*, 329, 29  
 Casares, J., González Hernández, J. I., Israelian, G., & Rebolo, R. 2010, *MNRAS*, 401, 2517  
 Casares, J., Muñoz-Darias, T., Torres, M. A. P., et al. 2022, *MNRAS*, 516, 2023  
 Casares, J., Rodríguez-Gil, P., Zurita, C., et al. 2012, *The Astronomer's Telegram*, 4347, 1  
 Casares, J., Yanes-Rizo, I. V., Torres, M. A. P., et al. 2023, *MNRAS*, 526, 5209  
 Casares, J., Zurita, C., Shahbaz, T., Charles, P. A., & Fender, R. P. 2004, *ApJ*, 613, L133  
 Casella, P., Altamirano, D., Patruno, A., Wijnands, R., & van der Klis, M. 2008, *ApJ*, 674, L41  
 Castro-Tirado, A., Gorosabel, J., Walton, N., et al. 1998, *IAU Circ.*, 6931, 1  
 Chakrabarty, D., Jonker, P. G., & Markwardt, C. B. 2019, *The Astronomer's Telegram*, 13247, 1  
 Chakrabarty, D., & Morgan, E. H. 1998, *Nature*, 394, 346  
 Charles, P., Thorstensen, J., & Bowyer, S. 1978, *MNRAS*, 183, 29P  
 Chatterjee, D., Debnath, D., Chakrabarti, S. K., Mondal, S., & Jana, A. 2016, *ApJ*, 827, 88  
 Chaty, S. 2006, in *VI Microquasar Workshop: Microquasars and Beyond*, 14.1  
 Chaty, S., & Bessolaz, N. 2006, *A&A*, 455, 639  
 Chaty, S., Fortin, F., & López-Oramas, A. 2020, *A&A*, 637, A2  
 Chaty, S., Mignani, R. P., & Israel, G. L. 2006, *MNRAS*, 365, 1387  
 Chelovekov, I. V., & Grebenev, S. A. 2007, *The Astronomer's Telegram*, 1094, 1  
 Chelovekov, I. V., Grebenev, S. A., Mereminskiy, I. A., & Prosvetov, A. V. 2017, *Astronomy Letters*, 43, 781  
 Chenevez, J., Alizai, K., Lepingwell, V. A., et al. 2018, *The Astronomer's Telegram*, 11272, 1  
 Chenevez, J., Altamirano, D., Galloway, D. K., et al. 2011, *MNRAS*, 410, 179  
 Chenevez, J., Falanga, M., Kuulkers, E., et al. 2007, *A&A*, 469, L27  
 Chenevez, J., Kuulkers, E., Brandt, S., et al. 2012, *The Astronomer's Telegram*, 4050, 1  
 Cherepashchuk, A. M., Khruzina, T. S., & Bogomazov, A. I. 2021, *MNRAS*, 508, 1389  
 Chevalier, C., Ilovaisky, S. A., & Charles, P. A. 1985, *A&A*, 147, L3  
 Chirenti, C., & Jasiulek, M. 2018, *MNRAS*, 476, 354  
 Chou, Y., & Jhang, Y.-W. 2023, *ApJ*, 951, 42  
 Cocchi, M., Bazzano, A., Natalucci, L., et al. 2001, *A&A*, 378, L37  
 Cocchi, M., Bazzano, A., Natalucci, L., et al. 2000, *A&A*, 357, 527  
 Cocchi, M., Bazzano, A., Natalucci, L., et al. 1999a, *A&A*, 346, L45  
 Cocchi, M., Bazzano, A., Natalucci, L., et al. 1998, *ApJ*, 508, L163  
 Cocchi, M., Natalucci, L., in 't Zand, J., et al. 1999b, *IAU Circ.*, 7247, 3  
 Corbet, R. H. D. 2003, *ApJ*, 595, 1086  
 Corbet, R. H. D., Thorstensen, J. R., Charles, P. A., et al. 1986, *MNRAS*, 222, 15P  
 Cornelisse, R., Casares, J., Charles, P. A., & Steeghs, D. 2013, *MNRAS*, 432, 1361  
 Cornelisse, R., D'Avanzo, P., Campana, S., et al. 2012, *MNRAS*, 420, 3538

- Cornelisse, R., Verbunt, F., in't Zand, J. J. M., Kuulkers, E., & Heise, J. 2002a, A&A, 392, 931
- Cornelisse, R., Verbunt, F., in't Zand, J. J. M., et al. 2002b, A&A, 392, 885
- Cornelisse, R., Wijnands, R., & Homan, J. 2007, MNRAS, 380, 1637
- Corral-Santana, J. M., Torres, M. A. P., Shahbaz, T., et al. 2018, MNRAS, 475, 1036
- Coti Zelati, F., de Ugarte Postigo, A., Russell, T. D., et al. 2021, A&A, 650, A69
- Coti Zelati, F., Papitto, A., de Martino, D., et al. 2019, A&A, 622, A211
- Courvoisier, T. J. L., Peacock, A., & Pakull, M. 1984, IAU Circ., 3932, 2
- Crawford, F., Lyne, A. G., Stairs, I. H., et al. 2013, ApJ, 776, 20
- Cui, W., Heindl, W. A., Swank, J. H., et al. 1997, ApJ, 487, L73
- D'Avanzo, P., Campana, S., Casares, J., et al. 2009, A&A, 508, 297
- Davidson, A., Malina, R., & Bowyer, S. 1977, ApJ, 211, 866
- De, K., Chakrabarty, D., Soria, R., et al. 2022a, ApJ, 928, L8
- De, K., Mereminskiy, I., Soria, R., et al. 2022b, ApJ, 935, 36
- De Cesare, G., Bazzano, A., Stratta, G., et al. 2006, in ESA Special Publication, Vol. 604, The X-ray Universe 2005, ed. A. Wilson, 259
- de Martino, D., Casares, J., Mason, E., et al. 2014, MNRAS, 444, 3004
- de Martino, D., Papitto, A., Belloni, T., et al. 2015, MNRAS, 454, 2190
- Deeter, J. E., Boynton, P. E., & Pravdo, S. H. 1981, ApJ, 247, 1003
- Degenaar, N., Altamirano, D., & Wijnands, R. 2012a, The Astronomer's Telegram, 4219, 1
- Degenaar, N., Jonker, P. G., Torres, M. A. P., et al. 2010, MNRAS, 404, 1591
- Degenaar, N., Linares, M., Altamirano, D., & Wijnands, R. 2012b, ApJ, 759, 8
- Degenaar, N., Wijnands, R., & Miller, J. M. 2014a, ApJ, 787, 67
- Degenaar, N., Wijnands, R., Reynolds, M. T., et al. 2014b, ApJ, 792, 109
- Dehiwalage, D. D., Clavel, M., Petrucci, P. O., & Henri, G. 2022, in SF2A-2022: Proceedings of the Annual meeting of the French Society of Astronomy and Astrophysics. Eds.: J. Richard, ed. J. Richard, A. Siebert, E. Lagarde, N. Lagarde, O. Venot, J. Malzac, J. B. Marquette, M. N'Diaye, & B. Briot, 39–42
- Del Santo, M., Chenevez, J., Brandt, S., Bazzano, A., & Ubertini, P. 2007, The Astronomer's Telegram, 1207, 1
- Del Santo, M., Sidoli, L., Bazzano, A., et al. 2006, A&A, 456, 1105
- Deloye, C. J., Heinke, C. O., Taam, R. E., & Jonker, P. G. 2008, MNRAS, 391, 1619
- Deutsch, E. W., Margon, B., & Anderson, S. F. 2000, ApJ, 530, L21
- Dieball, A., Knigge, C., Zurek, D. R., et al. 2005, ApJ, 634, L105
- Dotani, T., Inoue, H., Murakami, T., Nagase, F., & Tanaka, Y. 1990, Nature, 347, 534
- Draghis, P. A., Miller, J. M., Brumback, M. C., et al. 2023, ApJ, 954, 62
- Ducci, L., Malacaria, C., Romano, P., et al. 2023, A&A, 674, A100
- Echiburú, C. S., Guillot, S., Zhao, Y., et al. 2020, MNRAS, 495, 4508
- Elebert, P., Reynolds, M. T., Callanan, P. J., et al. 2009, MNRAS, 395, 884
- Engel, M. C., Heinke, C. O., Sivakoff, G. R., Elshamouty, K. G., & Edmonds, P. D. 2012, ApJ, 747, 119
- Ferrigno, C., Bozzo, W., Sanna, A., et al. 2018, The Astronomer's Telegram, 11957, 1
- Filippenko, A. V., Leonard, D. C., Matheson, T., et al. 1999, PASP, 111, 969
- Filippenko, A. V., Matheson, T., & Ho, L. C. 1995, ApJ, 455, 614
- Filippenko, A. V., Matheson, T., Leonard, D. C., Barth, A. J., & van Dyk, S. D. 1997, PASP, 109, 461
- Filippova, E., Bozzo, E., & Ferrigno, C. 2014, A&A, 563, A124
- Finger, M. H., Koh, D. T., Nelson, R. W., et al. 1996, Nature, 381, 291
- Fiocchi, M., Bazzano, A., Natalucci, L., Landi, R., & Ubertini, P. 2011, MNRAS, 414, L41
- Focke, W. B., Markwardt, C. B., Swank, J. H., & Taam, R. E. 1999, in American Astronomical Society Meeting Abstracts, Vol. 195, American Astronomical Society Meeting Abstracts, 126.02
- Fortin, F., Chaty, S., Coleiro, A., Tomsick, J. A., & Nitschelm, C. H. R. 2018, A&A, 618, A150
- Fox, D. & Lewin, W. 1998, IAU Circ., 6964, 2
- Fox, D. W., Lewin, W. H. G., Rutledge, R. E., et al. 2001, MNRAS, 321, 776
- Galloway, D. K., Chakrabarty, D., & Lin, J. R. 2009, The Astronomer's Telegram, 2094, 1
- Galloway, D. K., Chakrabarty, D., Morgan, E. H., & Remillard, R. A. 2002a, ApJ, 576, L137
- Galloway, D. K., Chakrabarty, D., Muno, M. P., & Savov, P. 2001, ApJ, 549, L85
- Galloway, D. K., in't Zand, J., Chenevez, J., et al. 2020, ApJS, 249, 32
- Galloway, D. K., Markwardt, C. B., Morgan, E. H., Chakrabarty, D., & Strohmayer, T. E. 2005, ApJ, 622, L45
- Galloway, D. K., Muno, M. P., Hartman, J. M., Psaltis, D., & Chakrabarty, D. 2008, ApJS, 179, 360
- Galloway, D. K., Psaltis, D., Chakrabarty, D., & Muno, M. P. 2003, ApJ, 590, 999
- Galloway, D. K., Sokoloski, J. L., & Kenyon, S. J. 2002b, ApJ, 580, 1065
- Gambino, A. F., Iaria, R., Di Salvo, T., et al. 2016, A&A, 589, A34
- Gandolfi, G., Coletta, A., Ricci, D., et al. 1999, IAU Circ., 7174, 1
- Gangopadhyay, T., Li, X.-D., Ray, S., Dey, M., & Dey, J. 2012, New A, 17, 43
- Garcia, M., Baliunas, S. L., Doxsey, R., et al. 1983, ApJ, 267, 291
- Garcia, M. R., Bailyn, C. D., Grindlay, J. E., & Molnar, L. A. 1989, ApJ, 341, L75
- Garcia, M. R. & Grindlay, J. E. 1987, ApJ, 313, L59
- Gendre, B., Barret, D., & Webb, N. 2003, A&A, 403, L11
- Gilfanov, M., Revnivtsev, M., Sunyaev, R., & Churazov, E. 1998, A&A, 338, L83
- González Hernández, J. I., Rebolo, R., & Casares, J. 2012, ApJ, 744, L25
- González Hernández, J. I., Rebolo, R., Israelian, G., et al. 2008, ApJ, 679, 732
- González Hernández, J. I., Rebolo, R., Israelian, G., et al. 2006, ApJ, 644, L49
- Goodwin, A. J., Galloway, D. K., in't Zand, J. J. M., et al. 2019, MNRAS, 486, 4149
- Goodwin, A. J. & Woods, T. E. 2020, MNRAS, 495, 796
- Gorgone, N. M., Kouveliotou, C., Negoro, H., et al. 2019, ApJ, 884, 168
- Gosling, A. J., Bandyopadhyay, R. M., Miller-Jones, J. C. A., & Farrell, S. A. 2007, MNRAS, 380, 1511
- Gögüş, E., Finger, M. H., Kouveliotou, C., et al. 2004, ApJ, 609, 977
- Grebenev, S. A., Molkov, S. V., Revnivtsev, M. G., & Sunyaev, R. A. 2007, in ESA Special Publication, Vol. 622, The Obscured Universe. Proceedings of the VI INTEGRAL Workshop, 3730376
- Greenstein, G. 1972, Nature Physical Science, 238, 71
- Greiner, J., Dennerl, K., & Predehl, P. 1996, A&A, 314, L21
- Grindlay, J., Gursky, H., Schnopper, H., et al. 1976, ApJ, 205, L127
- Guillot, S., Rutledge, R. E., Bildsten, L., et al. 2009, MNRAS, 392, 665
- Güver, T. & Özel, F. 2013, ApJ, 765, L1
- Hammerstein, E. K., Cackett, E. M., Reynolds, M. T., & Miller, J. M. 2018, MNRAS, 478, 4317
- Hare, J., Kargaltsev, O., & Rangelov, B. 2018, ApJ, 865, 33
- Harlaftis, E. T., Horne, K., & Filippenko, A. V. 1996, PASP, 108, 762
- Hasinger, G. & van der Klis, M. 1989, A&A, 225, 79
- Heida, M., Jonker, P. G., Torres, M. A. P., & Chivassava, A. 2017, ApJ, 846, 132
- Heinke, C. O., Bahramian, A., Degenaar, N., & Wijnands, R. 2015, MNRAS, 447, 3034
- Heinke, C. O., Grindlay, J. E., & Edmonds, P. D. 2005, ApJ, 622, 556
- Heinke, C. O., Grindlay, J. E., Lloyd, D. A., & Edmonds, P. D. 2003, ApJ, 588, 452
- Hemphill, P. B., Schulz, N. S., Marshall, H. L., & Chakrabarty, D. 2021, ApJ, 920, 142
- Hertz, P. & Wood, K. S. 1988, ApJ, 331, 764
- Hertz, P., Wood, K. S., & Cominsky, L. R. 1997, ApJ, 486, 1000
- Hinkle, K. H., Fekel, F. C., Joyce, R. R., et al. 2006, ApJ, 641, 479
- Hjellming, R. M. & Rupen, M. P. 1995, Nature, 375, 464
- Hoffman, J. A., Lewin, W. H. G., & Doty, J. 1977, ApJ, 217, L23
- Homan, J., Belloni, T., van der Klis, M., et al. 2006, The Astronomer's Telegram, 748, 1
- Homan, J., Gendreau, K. C., Sanna, A., et al. 2021, The Astronomer's Telegram, 14606, 1
- Homan, J., van den Berg, M., Heinke, C., & Pooley, D. 2022, The Astronomer's Telegram, 15640, 1
- Homan, J. & Wijnands, R. 2003, The Astronomer's Telegram, 169, 1
- Homer, L., Anderson, S. F., Margon, B., Deutsch, E. W., & Downes, R. A. 2001a, ApJ, 550, L155
- Homer, L., Charles, P. A., Hakala, P., et al. 2001b, MNRAS, 322, 827
- Horne, K., Verbunt, F., & Schneider, D. P. 1986, MNRAS, 218, 63
- Hynes, R. I., Schaefer, B. E., Baum, Z. A., et al. 2016, MNRAS, 459, 3596
- Hynes, R. I., Steeghs, D., Casares, J., Charles, P. A., & O'Brien, K. 2003, ApJ, 583, L95
- Iaria, R., D'Ái, A., di Salvo, T., et al. 2009, A&A, 505, 1143
- Iaria, R., Di Salvo, T., Matranga, M., et al. 2015, A&A, 577, A63
- Iaria, R., Gambino, A. F., Di Salvo, T., et al. 2018, MNRAS, 473, 3490
- Ilovaisky, S. A., Auriere, M., Koch-Miramond, L., et al. 1993, A&A, 270, 139
- in't Zand, J. J. M., Verbunt, F., Heise, J., et al. 1998, A&A, 329, L37
- in't Zand, J. J. M., Verbunt, F., Strohmayer, T. E., et al. 1999, A&A, 345, 100
- in't Zand, J., Linares, M., & Markwardt, C. 2014, The Astronomer's Telegram, 5972, 1
- in't Zand, J., Verbunt, F., Heise, J., et al. 2004, Nuclear Physics B Proceedings Supplements, 132, 486
- in't Zand, J. J. M., Cornelisse, R., & Méndez, M. 2005a, A&A, 440, 287
- in't Zand, J. J. M., Cumming, A., van der Sluys, M. V., Verbunt, F., & Pols, O. R. 2005b, A&A, 441, 675
- in't Zand, J. J. M., Galloway, D. K., Kuulkers, E., & Goodwin, A. 2017, The Astronomer's Telegram, 10567, 1
- In't Zand, J. J. M., Heise, J., Muller, J. M., et al. 1999, Nuclear Physics B Proceedings Supplements, 69, 228
- in't Zand, J. J. M., Hulleman, F., Markwardt, C. B., et al. 2003, A&A, 406, 233
- in't Zand, J. J. M., Jonker, P. G., Bassa, C. G., Markwardt, C. B., & Levine, A. M. 2009, A&A, 506, 857

- in't Zand, J. J. M., Markwardt, C. B., Bazzano, A., et al. 2002a, A&A, 390, 597
- in't Zand, J. J. M., van Kerkwijk, M. H., Pooley, D., et al. 2001, ApJ, 563, L41
- in't Zand, J. J. M., Verbunt, F., Kuulkers, E., et al. 2002b, A&A, 389, L43
- Ioannou, Z., Robinson, E. L., Welsh, W. F., & Haswell, C. A. 2004, AJ, 127, 481
- Iwakiri, W. B., Pottschmidt, K., Falkner, S., et al. 2019, ApJ, 878, 121
- Iyer, N., Nandi, A., & Mandal, S. 2015, ApJ, 807, 108
- Jain, C. & Paul, B. 2011, MNRAS, 413, 2
- Jain, C., Paul, B., & Dutta, A. 2010, MNRAS, 409, 755
- Jain, C., Paul, B., Joshi, K., Dutta, A., & Raichur, H. 2007, Journal of Astrophysics and Astronomy, 28, 175
- Jaisawal, G. K., Naik, S., Gupta, S., Chenevez, J., & Epili, P. 2018, MNRAS, 478, 448
- Jonker, P. G., Bassa, C. G., & Wachter, S. 2007a, MNRAS, 377, 1295
- Jonker, P. G., Miller-Jones, J., Homan, J., et al. 2010, MNRAS, 401, 1255
- Jonker, P. G., Steeghs, D., Chakrabarty, D., & Juett, A. M. 2007b, ApJ, 665, L147
- Jonker, P. G., Steeghs, D., Nelemans, G., & van der Klis, M. 2005, MNRAS, 356, 621
- Jonker, P. G. & van der Klis, M. 2001, ApJ, 553, L43
- Jonker, P. G., van der Klis, M., & Groot, P. J. 2003a, MNRAS, 339, 663
- Jonker, P. G., van der Klis, M., Homan, J., et al. 2001, ApJ, 553, 335
- Jonker, P. G., van der Klis, M., Kouveliotou, C., et al. 2003b, MNRAS, 346, 684
- Juett, A. M. & Chakrabarty, D. 2003, ApJ, 599, 498
- Kaaret, P., in 't Zand, J. J. M., Heise, J., & Tomsick, J. A. 2002, ApJ, 575, 1018
- Kaaret, P., in 't Zand, J. J. M., Heise, J., & Tomsick, J. A. 2003, ApJ, 598, 481
- Kaaret, P., Morgan, E. H., Vanderspek, R., & Tomsick, J. A. 2006, ApJ, 638, 963
- Kaaret, P., Prieskorn, Z., in 't Zand, J. J. M., et al. 2007, ApJ, 657, L97
- Kalamkar, M., Yang, Y., Altamirano, D., et al. 2010, The Astronomer's Telegram, 2881, 1
- Kaluzny, J., Rozanska, A., Rozyczka, M., Krzeminski, W., & Thompson, I. B. 2012, ApJ, 750, L3
- Kaptejn, R. G., in't Zand, J. J. M., Kuulkers, E., et al. 2000, A&A, 358, L71
- Karitskaya, E. A. & Bochkarev, N. G. 1987, Astronomicheskij Tsirkulyar, 1477, 1
- Kaur, R., Wijnands, R., Kamble, A., et al. 2017, MNRAS, 464, 170
- Kaur, R., Wijnands, R., Patruno, A., et al. 2009, MNRAS, 394, 1597
- Kennea, J. A. 2018, The Astronomer's Telegram, 11311, 1
- Kennea, J. A., Burrows, D. N., Chester, M., et al. 2005, The Astronomer's Telegram, 632, 1
- Kennea, J. A., Campana, S., Wijnands, R., et al. 2007, The Astronomer's Telegram, 1209, 1
- Kennea, J. A. & Negoro, H. 2019, The Astronomer's Telegram, 12434, 1
- Kennea, J. A., Palmer, D. M., Siegel, M. H., et al. 2020, The Astronomer's Telegram, 13452, 1
- Kennedy, M. R., Breton, R. P., Clark, C. J., et al. 2020, MNRAS, 494, 3912
- Kirsch, M. G. F., Mukerjee, K., Breitfellner, M. G., et al. 2004, A&A, 423, L9
- Kitamura, Y., Takahashi, H., & Fukazawa, Y. 2014, PASJ, 66, 6
- Klein-Wolt, M., Wijnands, R., Swank, J. H., & Markwardt, C. B. 2007, The Astronomer's Telegram, 1065, 1
- Knight, A. H., Ingram, A., & Middleton, M. 2022, MNRAS, 514, 1908
- Koo, J. W. C. & Haymes, R. C. 1980, ApJ, 239, L57
- Kouveliotou, C., Finger, M. H., Fishman, G. J., et al. 1993, in American Institute of Physics Conference Series, Vol. 280, Compton Gamma-ray Observatory, ed. M. Friedlander, N. Gehrels, & D. J. Macomb, 319–323
- Koyama, K., Kunieda, H., Takeuchi, Y., & Tawara, Y. 1991, ApJ, 370, L77
- Krimm, H. A., Markwardt, C. B., Deloye, C. J., et al. 2007, ApJ, 668, L147
- Krimm, H. A., Tomsick, J. A., Markwardt, C. B., et al. 2011, ApJ, 735, 104
- Kuiper, L., Tsygankov, S. S., Falanga, M., et al. 2020, A&A, 641, A37
- Kushwaha, A., Jayasurya, K. M., Agrawal, V. K., & Nandi, A. 2023, MNRAS, 524, L15
- Kuśmierek, K., Madej, J., & Kuulkers, E. 2011, MNRAS, 415, 3344
- Kuulkers, E., Homan, J., van der Klis, M., Lewin, W. H. G., & Méndez, M. 2002, A&A, 382, 947
- Kuulkers, E., Kouveliotou, C., van der Horst, A. J., et al. 2011, arXiv e-prints, arXiv:1102.2102
- Kuulkers, E. & Levine, A. M. 2006, The Astronomer's Telegram, 837, 1
- Kuulkers, E. & van der Klis, M. 1998, A&A, 332, 845
- Lamer, G., Schwöpe, A. D., Predehl, P., et al. 2021, A&A, 647, A7
- Langmeier, A., Sztajno, M., Vacca, W. D., Truemper, J., & Pietsch, W. 1986, in NATO Advanced Study Institute (ASI) Series C, Vol. 167, The Evolution of Galactic X-Ray Binaries, ed. J. Truemper, W. H. G. Lewin, & W. Brinkmann, 253
- Leahy, D. A., Morsink, S. M., & Chou, Y. 2011, ApJ, 742, 17
- Lewin, W. H. G., Clark, G., & Doty, J. 1976a, IAU Circ., 2922, 1
- Lewin, W. H. G., Doty, J., Clark, G. W., et al. 1976b, ApJ, 207, L95
- Li, Z., Qu, Z., Chen, L., et al. 2015, ApJ, 798, 56
- Li, Z., Yu, W., Lu, Y., Pan, Y., & Falanga, M. 2022, ApJ, 935, 123
- Liao, N.-H., Chou, Y., Hsieh, H.-E., & Chuang, P.-S. 2015, Publication of Korean Astronomical Society, 30, 593
- Lin, D., Altamirano, D., Homan, J., et al. 2009, ApJ, 699, 60
- Lin, J. & Yu, W. 2020, ApJ, 903, 37
- Lindström, C., Griffin, J., Kiss, L. L., et al. 2005, MNRAS, 363, 882
- López, K. M., Jonker, P. G., Torres, M. A. P., et al. 2019, MNRAS, 482, 2149
- Luna, G. J. M. 2023, A&A, 676, L2
- Lutovinov, A., Revnivtsev, M., Molkov, S., & Sunyaev, R. 2005, A&A, 430, 997
- MacDonald, R. K. D., Bailyn, C. D., Buxton, M., et al. 2014, ApJ, 784, 2
- Maeda, Y., Koyama, K., Sakano, M., Takeshima, T., & Yamauchi, S. 1996, PASJ, 48, 417
- Majczyna, A., Madej, J., Należyty, M., Różańska, A., & Udalski, A. 2016, in 37th Meeting of the Polish Astronomical Society, ed. A. Różańska & M. Bejger, Vol. 3, 133–136
- Makishima, K., Mitsuda, K., Inoue, H., et al. 1983, ApJ, 267, 310
- Mandal, M., Pal, S., Chauhan, J., Lohfink, A., & Bharali, P. 2023, MNRAS, 521, 881
- Marino, A., Anitra, A., Mazzola, S. M., et al. 2022, MNRAS, 515, 3838
- Markwardt, C., Swank, J., & Smith, E. 2001a, IAU Circ., 7707, 2
- Markwardt, C. B., Cummings, J., & Krimm, H. 2008a, The Astronomer's Telegram, 1616, 1
- Markwardt, C. B., Halpern, J. P., Holland, S. T., et al. 2008b, The Astronomer's Telegram, 1716, 1
- Markwardt, C. B., Juda, M., & Swank, J. H. 2003a, IAU Circ., 8095, 2
- Markwardt, C. B., Klein-Wolt, M., Swank, J. H., & Wijnands, R. 2007a, The Astronomer's Telegram, 1069, 1
- Markwardt, C. B., Krimm, H. A., & Swank, J. H. 2007b, The Astronomer's Telegram, 1108, 1
- Markwardt, C. B., Strohmayer, T. E., & Swank, J. H. 1999, ApJ, 512, L125
- Markwardt, C. B., Strohmayer, T. E., & Swank, J. H. 2003b, The Astronomer's Telegram, 164, 1
- Markwardt, C. B., Strohmayer, T. E., & Swank, J. H. 2008c, The Astronomer's Telegram, 1443, 1
- Markwardt, C. B., Strohmayer, T. E., Swank, J. H., & Zhang, W. 2000, IAU Circ., 7482, 2
- Markwardt, C. B., Swank, J. H., Krimm, H. A., Pereira, D., & Strohmayer, T. E. 2009, The Astronomer's Telegram, 2107, 1
- Markwardt, C. B., Swank, J. H., & Strohmayer, T. E. 2001b, in American Astronomical Society Meeting Abstracts, Vol. 199, American Astronomical Society Meeting Abstracts, 27.04
- Markwardt, C. B., Swank, J. H., & Strohmayer, T. E. 2004, The Astronomer's Telegram, 353, 1
- Markwardt, C. B., Swank, J. H., Strohmayer, T. E., in 't Zand, J. J. M., & Marshall, F. E. 2002, ApJ, 575, L21
- Marsh, T. R., Robinson, E. L., & Wood, J. H. 1994, MNRAS, 266, 137
- Marshall, F. E., Ueda, Y., & Markwardt, C. B. 1999, IAU Circ., 7133, 3
- Martí, J., Luque-Escamilla, P. L., & Muñoz-Arjonilla, Á. J. 2016, A&A, 596, A46
- Martí, J., Mirabel, I. F., Duc, P. A., & Rodríguez, L. F. 1997, A&A, 323, 158
- Masetti, N., Bianchini, A., Bonibaker, J., della Valle, M., & Vio, R. 1996, A&A, 314, 123
- Masetti, N., Dal Fiume, D., Cusumano, G., et al. 2002, A&A, 382, 104
- Masetti, N., Landi, R., Pretorius, M. L., et al. 2007, A&A, 470, 331
- Masetti, N., Parisi, P., Jiménez-Bailón, E., et al. 2012, A&A, 538, A123
- Mason, K. O., Bell-Burnell, S. J., & White, N. E. 1976, Nature, 262, 474
- Mason, K. O., Middleditch, J., Nelson, J. E., et al. 1980, ApJ, 242, L109
- Mason, P. A., Robinson, E. L., Gray, C. L., & Hynes, R. I. 2008, ApJ, 685, 428
- Mata Sánchez, D., Muñoz-Darias, T., Casares, J., Corral-Santana, J. M., & Shahbaz, T. 2015, MNRAS, 454, 2199
- Mata Sanchez, D., Munoz-Darias, T., Casares, J., et al. 2015, MNRAS, 449, L1
- Mata Sánchez, D., Rau, A., Álvarez Hernández, A., et al. 2021, MNRAS, 506, 581
- Matsuba, E., Dotani, T., Mitsuda, K., et al. 1995, PASJ, 47, 575
- McClintock, J. E. & Remillard, R. A. 1986, ApJ, 308, 110
- Mereminskiy, I. A., Grebenev, S. A., Krivonos, R. A., Chelovekov, I. V., & Sunyaev, R. A. 2017a, The Astronomer's Telegram, 10256, 1
- Mereminskiy, I. A., Grebenev, S. A., & Sunyaev, R. A. 2017b, Astronomy Letters, 43, 656
- Meshcheryakov, A. V., Revnivtsev, M. G., Pavlinsky, M. N., Khamitov, I., & Bikmaev, I. F. 2010, Astronomy Letters, 36, 738
- Migliari, S., Di Salvo, T., Belloni, T., et al. 2003, MNRAS, 342, 909
- Mignani, R. P., Chaty, S., Mirabel, I. F., & Mereghetti, S. 2002, A&A, 389, L11
- Mikhailov, K., van Leeuwen, J., & Jonker, P. G. 2017, ApJ, 840, 9
- Mikołajewska, J., Zdziarski, A. A., Ziółkowski, J., Torres, M. A. P., & Casares, J. 2022, ApJ, 930, 9
- Miller, J. M., Swihart, S. J., Strader, J., et al. 2020, ApJ, 904, 49
- Miller-Jones, J. C. A., Sivakoff, G. R., Rupen, M., & Altamirano, D. 2011, The Astronomer's Telegram, 3628, 1
- Molina, M., Malizia, A., Masetti, N., et al. 2021, MNRAS, 507, 3423
- Molla, A. A., Chakrabarti, S. K., Debnath, D., & Mondal, S. 2017, ApJ, 834, 88

- Mondal, S. 2020, *Advances in Space Research*, 65, 693
- Mondal, S. & Jithesh, V. 2023, *MNRAS*, 522, 2065
- Morgan, E., Kaaret, P., & Vanderspek, R. 2005a, *The Astronomer's Telegram*, 523, 1
- Morgan, E., Swank, J., Markwardt, C., & Gehrels, N. 2005b, *The Astronomer's Telegram*, 550, 1
- Mori, H., Maeda, Y., Pavlov, G. G., Sakano, M., & Tsuboi, Y. 2005, *Advances in Space Research*, 35, 1137
- Morihana, K., Sugizaki, M., Nakahira, S., et al. 2013, *PASJ*, 65, L10
- Motch, C., Pedersen, H., Beuermann, K., Pakull, M. W., & Courvoisier, T. J. L. 1987, *ApJ*, 313, 792
- Motta, S. E., Belloni, T. M., Stella, L., Muñoz-Darias, T., & Fender, R. 2014, *MNRAS*, 437, 2554
- Muñoz-Darias, T., de Ugarte Postigo, A., Russell, D. M., et al. 2013, *MNRAS*, 432, 1133
- Muller, J. M., in 't Zand, J., Smith, M. J. S., et al. 1998a, *IAU Circ.*, 6842, 2
- Muller, J. M., Smith, M. J. S., D'Andreta, G., et al. 1998b, *IAU Circ.*, 6867, 2
- Muno, M. P., Chakrabarty, D., Galloway, D. K., & Savov, P. 2001, *ApJ*, 553, L157
- Munoz-Darias, T., Motta, S., Stiele, H., & Belloni, T. 2011, *The Astronomer's Telegram*, 3341, 1
- Murakami, T., Inoue, H., Koyama, K., et al. 1983, *PASJ*, 35, 531
- Murdin, P., Allen, D. A., Morton, D. C., Whelan, J. A. J., & Thomas, R. M. 1980, *MNRAS*, 192, 709
- Najar, S., Rangelov, B., & Kargaltsev, O. 2020, in *American Astronomical Society Meeting Abstracts*, Vol. 235, American Astronomical Society Meeting Abstracts #235, 170.09
- Natalucci, L., Bazzano, A., Cocchi, M., et al. 2000a, *ApJ*, 536, 891
- Natalucci, L., Bazzano, A., Cocchi, M., et al. 2000b, *ApJ*, 543, L73
- Natalucci, L., Cornelisse, R., Bazzano, A., et al. 1999, *ApJ*, 523, L45
- Nath, S. K., Debnath, D., Chatterjee, K., et al. 2023, *Advances in Space Research*, 71, 1045
- Nättälä, J., Miller, M. C., Steiner, A. W., et al. 2017, *A&A*, 608, A31
- Negoro, H., Kawase, T., Sugizaki, M., et al. 2017, *The Astronomer's Telegram*, 10708, 1
- Negoro, H., Shidatsu, M., Mihara, T., et al. 2018, *The Astronomer's Telegram*, 11696, 1
- Neilsen, J., Steeghs, D., & Vrtilik, S. D. 2008, *MNRAS*, 384, 849
- Nelson, L. A., Rappaport, S. A., & Joss, P. C. 1986, *ApJ*, 304, 231
- Nespoli, E., Fabregat, J., & Mennickent, R. E. 2010, *A&A*, 516, A94
- Ng, M., Bult, P. M., Sanna, A., et al. 2021a, *The Astronomer's Telegram*, 14695, 1
- Ng, M., Ray, P. S., Bult, P., et al. 2021b, *ApJ*, 908, L15
- Ng, M., Ray, P. S., Strohmayer, T. E., et al. 2020, *The Astronomer's Telegram*, 14124, 1
- Novarino, M. L., Echeveste, M., Benvenuto, O. G., De Vito, M. A., & Ferrero, G. A. 2021, *MNRAS*, 508, 3812
- Oda, S., Shidatsu, M., Nakahira, S., et al. 2019, *PASJ*, 71, 108
- Onori, F., Fionchi, M., Masetti, N., et al. 2021, *MNRAS*, 503, 472
- Oosterbroek, T., Orlandini, M., Parmar, A. N., et al. 1999, *A&A*, 351, L33
- Orosz, J. A., Groot, P. J., van der Klis, M., et al. 2002, *ApJ*, 568, 845
- Orosz, J. A., Jain, R. K., Bailyn, C. D., McClintock, J. E., & Remillard, R. A. 1998, *ApJ*, 499, 375
- Orosz, J. A. & Kuulkers, E. 1999, *MNRAS*, 305, 132
- Orosz, J. A., Kuulkers, E., van der Klis, M., et al. 2001, *ApJ*, 555, 489
- Orosz, J. A., McClintock, J. E., Remillard, R. A., & Corbel, S. 2004, *ApJ*, 616, 376
- Özbey Arabacı, M., Kalemci, E., Tomsick, J. A., et al. 2012, *ApJ*, 761, 4
- Özel, F., Gould, A., & Güver, T. 2012, *ApJ*, 748, 5
- Özel, F., Güver, T., & Psaltis, D. 2009, *ApJ*, 693, 1775
- Paduano, A., Bahramian, A., Miller-Jones, J. C. A., et al. 2021, *MNRAS*, 506, 4107
- Pahari, M., Misra, R., Dewangan, G. C., & Pawar, P. 2015, *ApJ*, 814, 158
- Paizis, A., Nowak, M. A., Chaty, S., et al. 2007, *ApJ*, 657, L109
- Paizis, A., Nowak, M. A., Rodriguez, J., et al. 2015, *ApJ*, 808, 34
- Paizis, A., Nowak, M. A., Wilms, J., et al. 2011, *ApJ*, 738, 183
- Pan, H. C., Skinner, G. K., Sunyaev, R. A., & Borozdin, K. N. 1995, *MNRAS*, 274, L15
- Papitto, A., Bozzo, E., Ferrigno, C., et al. 2011a, *A&A*, 535, L4
- Papitto, A., Bozzo, E., Ferrigno, C., et al. 2013a, *The Astronomer's Telegram*, 4959, 1
- Papitto, A., D'Ai, A., Motta, S., et al. 2011b, *A&A*, 526, L3
- Papitto, A., di Salvo, T., Burderi, L., et al. 2007, *MNRAS*, 375, 971
- Papitto, A., Ferrigno, C., Bozzo, E., et al. 2011c, *The Astronomer's Telegram*, 3556, 1
- Papitto, A., Ferrigno, C., Bozzo, E., et al. 2013b, *Nature*, 501, 517
- Papitto, A., Riggio, A., di Salvo, T., et al. 2010, *MNRAS*, 407, 2575
- Parikh, A., Wijnands, R., Degenaar, N., & Altamirano, D. 2017, *The Astronomer's Telegram*, 10612, 1
- Park, S. Q., Miller, J. M., McClintock, J. E., & Murray, S. S. 2005, *ApJ*, 618, L45
- Parmar, A. N., Gottwald, M., Haberl, F., Giommi, P., & White, N. E. 1985a, in *Recent Results on Cataclysmic Variables. The Importance of IUE and Exosat Results on Cataclysmic Variables and Low-Mass X-Ray Binaries*, ed. W. R. Burke, 119
- Parmar, A. N., Stella, L., & White, N. E. 1986, *ApJ*, 304, 664
- Parmar, A. N., White, N. E., Giommi, P., et al. 1985b, *IAU Circ.*, 4058, 2
- Patel, S. K., Kouveliotou, C., Tennant, A., et al. 2004, *Nuclear Physics B Proceedings Supplements*, 132, 542
- Patel, S. K., Zurita, J., Del Santo, M., et al. 2007, *ApJ*, 657, 994
- Patruno, A., Haskell, B., & D'Angelo, C. 2012, *ApJ*, 746, 9
- Paul, J., Goldwurm, A., Jourdain, E., et al. 1997, *IAU Circ.*, 6746, 2
- Pavlinsky, M. N., Grebenev, S. A., Lutovinov, A. A., Sunyaev, R. A., & Finoguenov, A. V. 2001, *Astronomy Letters*, 27, 297
- Peterson, B. A., Wallace, P., Elliott, K. H., Hill, P. W., & Manchester, R. N. 1980, *MNRAS*, 190, 33P
- Pike, S. N., Harrison, F. A., Tomsick, J. A., et al. 2021, *ApJ*, 918, 9
- Pike, S. N., Negoro, H., Tomsick, J. A., et al. 2022, *ApJ*, 927, 190
- Pintore, F., Sanna, A., Riggio, A., et al. 2014, *The Astronomer's Telegram*, 5901, 1
- Ponti, G., Bianchi, S., Muñoz-Darias, T., & Nandra, K. 2018, *MNRAS*, 481, L94
- Ponti, G., De, K., Muñoz-Darias, T., Stella, L., & Nandra, K. 2017, *MNRAS*, 464, 840
- Porquet, D., Grosso, N., Bélanger, G., et al. 2005a, *A&A*, 443, 571
- Porquet, D., Grosso, N., Burwitz, V., et al. 2005b, *A&A*, 430, L9
- Priedhorsky, W. 1986, *Ap&SS*, 126, 89
- Prodan, S. & Murray, N. 2015, *ApJ*, 798, 117
- Qiu, H., Zhou, P., Yu, W., Li, X., & Xu, X. 2017, *ApJ*, 847, 44
- Rappaport, S., Nelson, L. A., Ma, C. P., & Joss, P. C. 1987, *ApJ*, 322, 842
- Ratti, E. M., Bassa, C. G., Torres, M. A. P., et al. 2010, *MNRAS*, 408, 1866
- Ratti, E. M., Jonker, P. G., Miller-Jones, J. C. A., et al. 2012a, *MNRAS*, 423, 2656
- Ratti, E. M., Steeghs, D. T. H., Jonker, P. G., et al. 2012b, *MNRAS*, 420, 75
- Ratti, E. M., van Grunsven, T. F. J., Torres, M. A. P., et al. 2013, *MNRAS*, 431, L10
- Ravi, V. 2017, *ApJ*, 851, 114
- Reig, P., Papadakis, I., & Kylafis, N. D. 2003, *A&A*, 398, 1103
- Reis, R. C., Reynolds, M. T., Miller, J. M., et al. 2013, *ApJ*, 778, 155
- Remillard, R., Levine, A. M., Morgan, E. H., Markwardt, C. B., & Swank, J. H. 2006, *The Astronomer's Telegram*, 714, 1
- Revnivtsev, M. & Sunyaev, R. 2003, *A&A*, 399, 699
- Revnivtsev, M. G., Kniazev, A., Karasev, D. I., Berdnikov, L., & Barway, S. 2013, *Astronomy Letters*, 39, 523
- Reynolds, A. P., Quaintrell, H., Still, M. D., et al. 1997, *MNRAS*, 288, 43
- Rout, S. K., Vadawale, S., García, J., & Connors, R. 2023, *ApJ*, 944, 68
- Roy, J., Bhattacharyya, B., & Ray, P. S. 2014, *The Astronomer's Telegram*, 5890, 1
- Rupen, M. P., Dhawan, V., & Mioduszewski, A. J. 2002, *IAU Circ.*, 7893, 2
- Russell, D. M., Lewis, F., Doran, R., & Roberts, S. 2011, *The Astronomer's Telegram*, 3116, 1
- Russell, T. D., Del Santo, M., Marino, A., et al. 2022, *MNRAS*, 513, 6196
- Russell, T. D., Miller-Jones, J. C. A., Sivakoff, G. R., Tetarenko, A. J., & JACPO T XRB Collaboration. 2018, *The Astronomer's Telegram*, 11356, 1
- Russell, T. D., Soria, R., Motch, C., et al. 2014, *MNRAS*, 439, 1381
- Saha, D., Mandal, M., & Pal, S. 2023, *MNRAS*, 519, 519
- Sakano, M., Warwick, R. S., Decourchelle, A., & Wang, Q. D. 2005, *MNRAS*, 357, 1211
- Sanna, A., Bahramian, A., Bozzo, E., et al. 2018, *A&A*, 610, L2
- Sanna, A., Bult, P., Ng, M., et al. 2022, *MNRAS*, 516, L76
- Sanna, A., Papitto, A., Burderi, L., et al. 2017, *A&A*, 598, A34
- Sanna, A., Uttley, P., Altamirano, D., et al. 2019, *The Astronomer's Telegram*, 12447, 1
- Sasaki, R., Maeda, T., Tsuboi, Y., et al. 2021, in *Astronomical Society of the Pacific Conference Series*, Vol. 528, *New Horizons in Galactic Center Astronomy and Beyond*, ed. M. Tsuboi & T. Oka, 391
- Schultz, J. 2003, *A&A*, 397, 249
- Seifina, E., Titarchuk, L., & Shaposhnikov, N. 2014, *ApJ*, 789, 57
- Serino, M., Shidatsu, M., Ueda, Y., et al. 2015, *PASJ*, 67, 30
- Shahbaz, T., González-Hernández, J. I., Breton, R. P., et al. 2022, *MNRAS*, 513, 71
- Shahbaz, T., Kuulkers, E., Charles, P. A., et al. 1999, *A&A*, 344, 101
- Shahbaz, T., Russell, D. M., Zurita, C., et al. 2013, *MNRAS*, 434, 2696
- Shahbaz, T., Watson, C. A., & Hernandez-Peralta, H. 2007, *MNRAS*, 376, 1886
- Shaposhnikov, N., Markwardt, C., Swank, J., & Krimm, H. 2010, *ApJ*, 723, 1817
- Shaposhnikov, N., Markwardt, C. B., & Swank, J. H. 2009, *The Astronomer's Telegram*, 2269, 1

- Shaposhnikov, N., Titarchuk, L., & Haberl, F. 2003, *ApJ*, 593, L35
- Sharma, P., Sharma, R., Jain, C., Dewangan, G. C., & Dutta, A. 2021, *Research in Astronomy and Astrophysics*, 21, 214
- Shaw, A. W., Degenaar, N., Maccarone, T. J., et al. 2024, *MNRAS*, 527, 7603
- Shaw, A. W., Heinke, C. O., Degenaar, N., et al. 2017, *MNRAS*, 471, 2508
- Shaw, A. W., Heinke, C. O., Maccarone, T. J., et al. 2020, *MNRAS*, 492, 4344
- Shi, C.-S. & Zhang, S.-N. 2020, *MNRAS*, 494, 4382
- Shidatsu, M., Kobayashi, K., Negoro, H., et al. 2022, *ApJ*, 927, 151
- Sidoli, L., Paizis, A., Mereghetti, S., Götz, D., & Del Santo, M. 2011, *MNRAS*, 415, 2373
- Skinner, G. K., Foster, A. J., Willmore, A. P., & Eyles, C. J. 1990, *MNRAS*, 243, 72
- Smale, A. P. 1991, *PASP*, 103, 636
- Smale, A. P., Church, M. J., & Bałucińska-Church, M. 2001, *ApJ*, 550, 962
- Smith, D. A., Morgan, E. H., & Bradt, H. 1997, *ApJ*, 479, L137
- Smith, D. M., Heindl, W. A., & Swank, J. H. 2002, *ApJ*, 578, L129
- Smith, D. M., Markwardt, C. B., Swank, J. H., & Negueruela, I. 2012, *MNRAS*, 422, 2661
- Soria, R., Ma, R., Tao, L., & Zhang, S.-N. 2022, *MNRAS*, 515, 3105
- Sridhar, N., Bhattacharyya, S., Chandra, S., & Antia, H. M. 2019, *MNRAS*, 487, 4221
- Staubert, R., Klochov, D., & Wilms, J. 2009, *A&A*, 500, 883
- Steeeghs, D. & Casares, J. 2002, *ApJ*, 568, 273
- Steeeghs, D. & Jonker, P. G. 2007, *ApJ*, 669, L85
- Steeeghs, D., McClintock, J. E., Parsons, S. G., et al. 2013, *ApJ*, 768, 185
- Steiner, J. F., McClintock, J. E., & Reid, M. J. 2012, *ApJ*, 745, L7
- Stoop, M., van den Eijnden, J., Degenaar, N., et al. 2021, *MNRAS*, 507, 330
- Strader, J., Chomiuk, L., Cheung, C. C., et al. 2015, *ApJ*, 804, L12
- Strader, J., Li, K.-L., Chomiuk, L., et al. 2016, *ApJ*, 831, 89
- Strader, J., Swihart, S. J., Urquhart, R., et al. 2021, *ApJ*, 917, 69
- Strohmayer, T. E., Arzoumanian, Z., Bogdanov, S., et al. 2018a, *ApJ*, 858, L13
- Strohmayer, T. E., Jahoda, K., Giles, A. B., & Lee, U. 1997a, *ApJ*, 486, 355
- Strohmayer, T. E. & Markwardt, C. B. 2010, *The Astronomer's Telegram*, 2929, 1
- Strohmayer, T. E. & Markwardt, C. B. 2011, *The Astronomer's Telegram*, 3121, 1
- Strohmayer, T. E., Markwardt, C. B., & Kuulkers, E. 2008, *ApJ*, 672, L37
- Strohmayer, T. E. & Nicer Observatory Science Working Group. 2020, in *American Astronomical Society Meeting Abstracts*, Vol. 235, American Astronomical Society Meeting Abstracts #235, 159.02
- Strohmayer, T. E., Ray, P. S., Gendreau, K. C., et al. 2018b, *The Astronomer's Telegram*, 11507, 1
- Strohmayer, T. E., Zhang, W., & Swank, J. H. 1997b, *ApJ*, 487, L77
- Suleimanov, V. F., Poutanen, J., Nättälä, J., et al. 2017, *MNRAS*, 466, 906
- Suleimanov, V. F., Poutanen, J., & Werner, K. 2020, *A&A*, 639, A33
- Sunyaev, R. 1990, *IAU Circ.*, 5104, 1
- Sunyaev, R., Gilfanov, M., Churazov, E., et al. 1991, *Pisma v Astronomicheskii Zhurnal*, 17, 116
- Sunyaev, R. & Kwant Team. 1989, *IAU Circ.*, 4839, 1
- Suzuki, K., Fukushima, K., Negoro, H., et al. 2015, *The Astronomer's Telegram*, 7233, 1
- Suzuki, M. & HETE Collaboration. 2005, in *American Astronomical Society Meeting Abstracts*, Vol. 207, American Astronomical Society Meeting Abstracts, 32.04
- Swank, J. H., Becker, R. H., Pravdo, S. H., & Serlemitsos, P. J. 1976, *IAU Circ.*, 2963, 1
- Swank, J. H., Strohmayer, T. E., & Markwardt, C. B. 2003, in *American Astronomical Society Meeting Abstracts*, Vol. 203, American Astronomical Society Meeting Abstracts, 125.01
- Sztajno, M., Fujimoto, M. Y., van Paradijs, J., et al. 1987, *MNRAS*, 226, 39
- Sztajno, M., Langmeier, A., Frank, J., et al. 1985, *IAU Circ.*, 4111, 1
- Tananbaum, H., Gursky, H., Kellogg, E. M., et al. 1972, *ApJ*, 174, L143
- Tetarenko, B. E., Sivakoff, G. R., Heinke, C. O., & Gladstone, J. C. 2016, *ApJS*, 222, 15
- Thomas, N. T., Gudennavar, S. B., & Bubbly, S. G. 2023, *MNRAS*, 521, 433
- Thorstensen, J., Charles, P., Bowyer, S., et al. 1979, *ApJ*, 233, L57
- Thorstensen, J. R. & Armstrong, E. 2005, *AJ*, 130, 759
- Titarchuk, L. & Seifina, E. 2023, *A&A*, 669, A57
- Tomsick, J. A., Garcia, J., Fabian, A., et al. 2019, *The Astronomer's Telegram*, 13270, 1
- Tomsick, J. A., Halpern, J. P., Kemp, J., & Kaaret, P. 1999, *ApJ*, 521, 341
- Tomsick, J. A., Heindl, W. A., Chakrabarty, D., & Kaaret, P. 2002, *ApJ*, 581, 570
- Torrejón, J. M., Negueruela, I., Smith, D. M., & Harrison, T. E. 2010, *A&A*, 510, A61
- Torres, M. A. P., Casares, J., Jiménez-Ibarra, F., et al. 2020, *ApJ*, 893, L37
- Torres, M. A. P., Casares, J., Jiménez-Ibarra, F., et al. 2019a, *ApJ*, 882, L21
- Torres, M. A. P., Casares, J., Martínez-Pais, I. G., & Charles, P. A. 2002, *MNRAS*, 334, 233
- Torres, M. A. P., Jonker, P. G., Britt, C. T., et al. 2014, *MNRAS*, 440, 365
- Torres, M. A. P., Jonker, P. G., Casares, J., Miller-Jones, J. C. A., & Steeghs, D. 2021, *MNRAS*, 501, 2174
- Torres, M. A. P., Jonker, P. G., Miller-Jones, J. C. A., et al. 2015, *MNRAS*, 450, 4292
- Torres, M. A. P., Jonker, P. G., Steeghs, D., et al. 2008, *ApJ*, 672, 1079
- Torres, M. A. P., McClintock, J. E., Garcia, M. R., & Murray, S. S. 2004, *The Astronomer's Telegram*, 233, 1
- Torres, M. A. P., Repetto, S., Wevers, T., et al. 2019b, *MNRAS*, 487, 2296
- Tse, K., Chou, Y., & Hsieh, H.-E. 2020, *ApJ*, 899, 120
- Tucker, M. A., Shappee, B. J., Holoien, T. W. S., et al. 2018, *ApJ*, 867, L9
- Ubertini, P., Bazzano, A., Cocchi, M., et al. 1999, *ApJ*, 514, L27
- Uemura, M., Kato, T., Matsumoto, K., et al. 2000, *PASJ*, 52, L15
- Urquhart, R., Bahramian, A., Strader, J., et al. 2020, *ApJ*, 904, 147
- van den Berg, M. & Homan, J. 2017, *ApJ*, 834, 71
- van den Berg, M., Homan, J., Fridriksson, J. K., & Linares, M. 2014, *ApJ*, 793, 128
- van der Klis, M., Kitamoto, S., Tsunemi, H., & Miyamoto, S. 1991, *MNRAS*, 248, 751
- van der Klis, M., Parmar, A., van Paradijs, J., et al. 1985, *IAU Circ.*, 4044, 1
- van Grunsven, T. F. J., Jonker, P. G., Verbunt, F. W. M., & Robinson, E. L. 2017, *MNRAS*, 472, 1907
- van Paradijs, J., Penninx, W., Lewin, W. H. G., Sztajno, M., & Truemper, J. 1988, *A&A*, 192, 147
- van Paradijs, J., van der Klis, M., van Amerongen, S., et al. 1990, *A&A*, 234, 181
- Vargas, M., Goldwurm, A., Denis, M., et al. 1996, *A&AS*, 120, 291
- Vincentelli, F. M., Cavecchi, Y., Casella, P., et al. 2020, *MNRAS*, 495, L37
- Wachter, S. 1997, *ApJ*, 490, 401
- Wachter, S., Hoard, D. W., Bailyn, C. D., Corbel, S., & Kaaret, P. 2002, *ApJ*, 568, 901
- Wagner, R. M., Kreidl, T. J., Howell, S. B., & Starrfield, S. G. 1992, *ApJ*, 401, L97
- Walter, R., Lubiński, P., Paltani, S., et al. 2007, *A&A*, 461, L17
- Wang, L., Steeghs, D., Casares, J., et al. 2017, *MNRAS*, 466, 2261
- Wang, S., Kawai, N., Shidatsu, M., et al. 2022, *MNRAS*, 514, 5320
- Wang, S., Kawai, N., Shidatsu, M., et al. 2018, *PASJ*, 70, 67
- Wang, Z. & Chakrabarty, D. 2004, *ApJ*, 616, L139
- Watson, M. G. & Ricketts, M. J. 1978, *MNRAS*, 183, 35P
- Webb, N. A., Naylor, T., Ioannou, Z., Charles, P. A., & Shahbaz, T. 2000, *MNRAS*, 317, 528
- Welsh, W. F., Robinson, E. L., & Young, P. 2000, *AJ*, 120, 943
- Weng, S.-S., Zhang, S.-N., Yi, S.-X., Rong, Y., & Gao, X.-D. 2015, *MNRAS*, 450, 2915
- Werner, N., in't Zand, J. J. M., Natalucci, L., et al. 2004, *A&A*, 416, 311
- Wetuskki, J., Hynes, R. I., Maccarone, T. J., et al. 2021, *MNRAS*, 506, 5619
- White, N. E., Parmar, A. N., Sztajno, M., et al. 1984, *ApJ*, 283, L9
- Wijnands, R., Homan, J., van der Klis, M., et al. 1997, *ApJ*, 490, L157
- Wijnands, R., Méndez, M., van der Klis, M., et al. 1998, *ApJ*, 504, L35
- Wijnands, R., Rol, E., Cackett, E., Starling, R. L. C., & Remillard, R. A. 2009, *MNRAS*, 393, 126
- Wijnands, R., Strohmayer, T., & Franco, L. M. 2001, *ApJ*, 549, L71
- Wijnands, R., Yang, Y. J., & Altamirano, D. 2012, *MNRAS*, 422, L91
- Williams, D. R. A., Motta, S. E., Fender, R., et al. 2022, *MNRAS*, 517, 2801
- Wilson, R. B., Zhang, S. N., Scott, M., et al. 1995, *IAU Circ.*, 6207, 3
- Wu, J., Jonker, P. G., Torres, M. A. P., et al. 2015a, *MNRAS*, 448, 1900
- Wu, J., Orosz, J. A., McClintock, J. E., et al. 2016, *ApJ*, 825, 46
- Wu, J., Orosz, J. A., McClintock, J. E., et al. 2015b, *ApJ*, 806, 92
- Xu, Y., Harrison, F. A., Tomsick, J. A., et al. 2020, *ApJ*, 893, 30
- Yadlapalli, N., Ravi, V., Yao, Y., Kulkarni, S. R., & Briskin, W. 2021, *ApJ*, 909, L27
- Yanes-Rizo, I. V., Torres, M. A. P., Casares, J., et al. 2024, *MNRAS*, 527, 5949
- Yanes-Rizo, I. V., Torres, M. A. P., Casares, J., et al. 2022, *MNRAS*, 517, 1476
- Yao, Y., Kulkarni, S. R., Burdge, K. B., et al. 2021a, *ApJ*, 920, 120
- Yao, Y., Kulkarni, S. R., Gendreau, K. C., et al. 2021b, *ApJ*, 920, 121
- Yoshii, T., Kawai, N., Yatsu, Y., et al. 2016, in 41st COSPAR Scientific Assembly, Vol. 41, E1.16–24–16
- Zdziarski, A. A., Ziółkowski, J., Bozzo, E., & Pjanka, P. 2016, *A&A*, 595, A52
- Zhang, S. N., Harmon, B. A., Wilson, C. A., et al. 1994, *IAU Circ.*, 6096, 1
- Zhang, W., Swank, J. H., White, N. E., & Lapidus, I. 1997, in *American Astronomical Society Meeting Abstracts*, Vol. 190, American Astronomical Society Meeting Abstracts #190, 36.03
- Zhong, J. & Wang, Z. 2011, *ApJ*, 729, 8
- Zurita, C., Durant, M., Torres, M. A. P., et al. 2008, *ApJ*, 681, 1458

## Appendix B: INTEGRAL sources

Table B.1. Unidentified INTEGRAL sources from Bird et al. (2016) with available identification in the literature.

Identifier	R.A. [deg]	Dec. [deg]	Simbad Type	Identification	Ref.
IGR J00486-4241	12.151	-42.719	gamma	AGN ?	[1]
IGR J04069+5042	61.73	50.702	gamma	RS CVn	[2]
IGR J04539+4502	73.46	45.038	gamma	AGN	[3]
IGR J05511-1218	87.776	-12.322	gamma	AGN	[4]
IGR J06552-1146	103.792	-11.77	gamma	RS CVn ?	[2]
IGR J07072-1227	106.801	-12.427	gamma	AGN	[4]
IGR J08004-4309	120.092	-43.166	X	CV	[5]
IGR J08262+4051	126.556	40.855	gamma	AGN	[6]
IGR J10252-6829	156.25204	-68.45758	gamma	early type	[7]
2MASS J10445192-6025115	161.21635	-60.41987	YSO	AGN	[8]
IGR J12341-6143	188.467	-61.796	gamma	SFXT	[9]
IGR J12562+2554	194.05	25.905	gamma	AGN	[10]
IGR J13045-5630	196.13125	-56.51522	gamma	AGN	[11]
IGR J13402-6428	205.05	-64.48	gamma	AGN	[12]
IGR J14043-6148	211.123	-61.789	gamma	blazar ?	[13]
IGR J14059-6116	211.485	-61.275	gamma	Gamma HMXB	[14]
IGR J14385+8553	219.616	85.883	gamma	AGN	[6]
IGR J14466-3352	221.656	-33.875	gamma	AGN ?	[15]
IGR J14557-5448	223.862	-54.786	gamma	AGN ?	[16]
HD 132658	224.99804	12.02395	Star	AGN ?	[5]
IGR J15391-5307	234.82	-53.138	gamma	AGN	[17]
UCAC4 170-140217	238.55406	-56.15832	Star	AGN ?	[18]
IGR J16173-5023	244.314	-50.386	gamma	magnetic CV ?	[17]
IGR J16316-4028	247.9	-40.467	gamma	gamma ray pulsar?	[19]
IGR J16413-4046	250.331	-40.794	gamma	AGN ?	[17]
IGR J16447-5138	251.178	-51.649	gamma	YSO or AGN	[5]
IGR J16460+0849	251.488	8.818	gamma	extragalactic	[20]
IGR J16560-4958	253.989	-49.967	gamma	AGN	[17]
IGR J17259+2603	261.521	25.905	gamma	Type 1 QSO	[4]
IGR J17348-2045	263.745	-20.759	gamma	AGN ?	[21]
IGR J17375-3022	264.3946	-30.3817	gamma	SFXT	[9]
IGR J18293-1213	277.342	-12.222	gamma	CV	[22]
SWIFT J1839.1-5717	279.7762	-57.2511	X	AGN	[5]
IGR J18457+0244	281.42	2.702	gamma	AGN	[8]
IGR J18485-0047	282.106027	-0.776356	gamma	AGN ?	[23]
IGR J18532+0416	283.318	4.297	gamma	AGN	[8]
IGR J19386-4653	294.653	-46.886	gamma	AGN ?	[24]
IGR J20155+3827	303.875	38.45	gamma	HMXB	[25]
IGR J21171+3930	319.306	39.515	gamma	AGN ?	[3]
IGR J21268+6203	321.692	62.062	gamma	AGN ?	[26]
IGR J21485+4306	327.127	43.104	gamma	AGN ?	[1]
2MASX J21561518+1722525	329.06346	17.38128	X	AGN ?	[27]
IGR J22234-4116	335.85	-41.262	gamma	AGN ?	[28]
1SWXRT J230642.8+550817	346.727	55.173	X	CV	[5]

**References.** [1] Landi et al. (2017b); [2] Özbey Arabacı et al. (2012); [3] Malizia et al. (2017); [4] Masetti et al. (2017); [5] Landi et al. (2017a); [6] Masetti et al. (2012); [7] Fortin et al. in prep; [8] Fortin et al. (2018); [9] Sguera et al. (2020); [10] Flocchi et al. (2010); [11] Paliya et al. (2019); [12] Fortin et al. (2023a); [13] Cowperthwaite et al. (2013); [14] Corbet et al. (2019); [15] Landi et al. (2010b); [16] Ursini et al. (2019); [17] Tomsick et al. (2012); [18] Tomsick et al. (2020); [19] Foschini (2002); [20] Zhang et al. (2009); [21] Bozzo et al. (2012); [22] Clavel et al. (2016); [23] Tomsick et al. (2009); [24] Molina et al. (2012); [25] Onori et al. (2021); [26] Maiorano et al. (2011); [27] Malizia et al. (2016); [28] Landi et al. (2010a).