Bull. Soc. R. Sci. Liège, 2024, **93**(2), 170–214 *Peer-reviewed conference paper*
doi:10.25518/0037-9565.11641

Dancing with the Stars: a Review on Stellar Multiplicity

Thibault MERLE[1,2]

[1] Royal Observatory of Belgium, Avenue Circulaire 3, 1180 Brussels, Belgium
[2] Institut d'Astronomie et d'Astrophysique, Université Libre de Bruxelles, CP 226 Boulevard du Triomphe, 1050 Bruxelles, Belgium
Correspondence to: thibault.merle@oma.be

Paper presented at the 3rd BINA Workshop on "Scientific Potential of the Indo-Belgian Cooperation", held at the Graphic Era Hill University, Bhimtal (India), 22nd–24th March 2023.

Abstract

Stars like company. They are mostly formed in clusters and their lives are often altered by the presence of one or more companions. Interaction processes between components may lead to complex outcomes like Algols, blue stragglers, chemically altered stars, type Ia supernovae, as well as progenitors of gravitational wave sources, to cite a few. Observational astronomy has entered the era of big data, and thanks to large surveys like spatial missions Kepler, TESS, *Gaia*, and ground-based spectroscopic surveys like RAVE, *Gaia*-ESO, APOGEE, LAMOST, GALAH (to name a few) the field is going through a true revolution, as illustrated by the recent detection of stellar black holes and neutron stars as companions of massive but also low-mass stars. In this review, I will present why it is important to care about stellar multiples, what are the main large surveys in which many binaries are harvested, and finally present some features related to the largest catalogue of astrometric, spectroscopic and eclipsing binaries provided by the Non-Single Star catalogue of *Gaia*, which is, to date, the largest homogeneous catalogue of stellar binaries.

Keywords: binary stars, stellar multiplicity, spectroscopic binaries, eclipsing binaries, astrometric binaries

1. Introduction

Most stars form in binaries and hierarchies, in clusters and associations rather than in isolation (Duchêne and Kraus, 2013). Almost all massive stars have stellar companions (Sana et al., 2012): the multiplicity fraction for O-type main sequence was recently revised to be $94 \pm 14\%$ while the mean number of companions per early-type star reaches 2.1 ± 0.3 (Moe and Di Stefano, 2017) meaning that most massive stars are part of stellar triples. Nevertheless, the early-type stars (OBA spectral types) represent less than 1% of all the galactic stars (Ledrew, 2001) and probe only recent local history, impeding galactic archaeology. For long-lived late-type stars, the multiplicity fraction is estimated to be 40–60%, coming from various samples of the Solar Neighborhood (e .g., Abt and Levy, 1976; Duquennoy and Mayor, 1991;

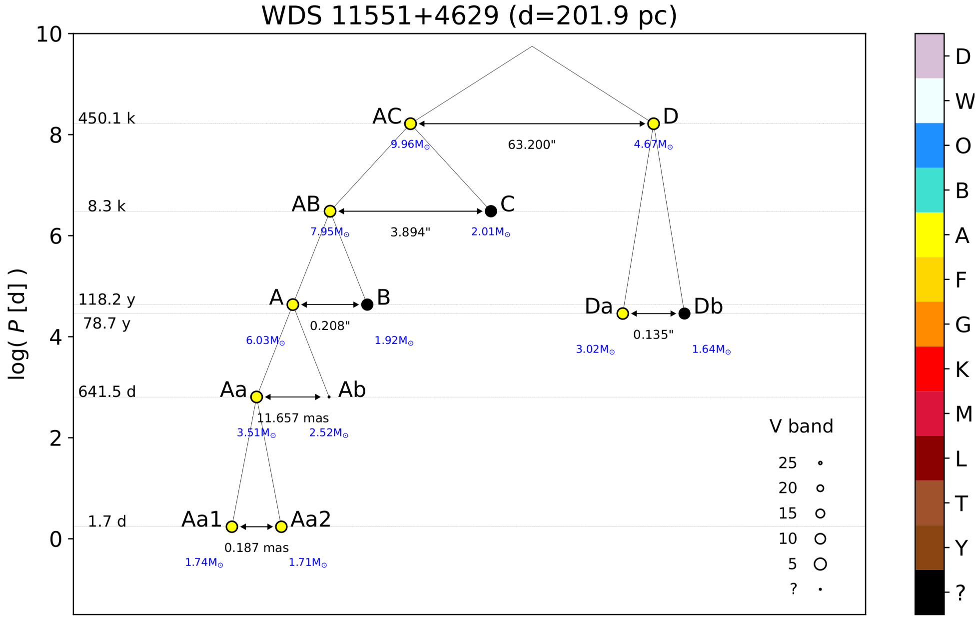

Figure 1: Mobile diagram of the stellar septuple 65 UMa with the highest degree of hierachical levels (5) known so far in a $5+2$ architecture. The black components have unknown spectral types. Component C of $2.01\,M_\odot$ could be itself a spectroscopic binary making this system a potential stellar octuple. That is why the follow-up of component C is of very high interest while being challenging (separation of 3.9 arcsec). 'k' stands for ky.

Raghavan et al., 2010; Tokovinin, 2014; Fuhrmann et al., 2017; Moe and Di Stefano, 2017; Reylé et al., 2021) during the last 50 years (Table 1). But the recent analysis of the 10 pc sample, rather complete and based on *Gaia* data (Reylé et al., 2021), reduces this fraction to 28%, meaning a mean number of companions of 0.51, significantly lower than the 0.61 value from Raghavan et al. (2010). At the stellar low-mass end, Winters et al. (2019) published a complete census of the red dwarfs (M spectral type) in the 25 pc sample, with a multiplicity fraction of 27% marking the lower limit of stellar multiplicity, but in tension with the fraction provided by Moe and Di Stefano (2017) and Fuhrmann et al. (2017). To be complete, we also mention the recent analyses of wide binaries in the 200 pc and the 1 kpc samples, based on successive *Gaia* releases containing the widest bound systems (up to 0.25 pc, El-Badry et al. 2021a). Stable stellar systems are hierarchical in nature and the highest-order systems known can include seven components in five hierarchical levels like 65 UMa, see Fig. 1. The Castor system, one of the first physical binary which has been shown to be gravitationaly bound (Herschel, 1803) is actually a sextuplet made of two binaries orbiting each other with a more distant binary, i.e. a $(2+2)+2$ architecture, where 3D orbits have been only very recently fully characterised thanks to a combination of spectrometry, photometry and interferometry (Torres et al., 2022). We warn the reader that the present review is unavoidably biased, and does not pretend to be exhaustive regarding the many aspects of stellar multiplicity.

Table 1: Multiplicity statistics in late-type stars. The multiplicity fraction is obtained by summing up the second, third and fourth columns. The fourth column represents the fraction of quadruples and higher-order stellar systems. While the multiplicity fraction is always ≤ 1, the mean number of companions can potentially be larger than one, as it is the case for populations of massive OBA stars, present in negligible proportions in the Solar Neighborhood.

Singles [%]	**Binaries** [%]	**Triples** [%]	**Quadruples+** [%]	**Multiplicity fraction** [%]	**Mean number of companions**	**Comments**
72.3	20.6	5.6	1.5	27.7	0.51	10 pc sample (339 systems; Reylé et al. 2021)
60	30	9	1	40	0.50	25 pc solar-type sample (404 systems; Moe and Di Stefano 2017)
47	37	13	5	55	0.78	25 pc solar-type sample (422 systems; Fuhrmann et al. 2017)
54	33	8	5	46	0.64	67 pc FG sample ($\sim$ 4850 systems; Tokovinin 2014)
54	34	9	3	44	0.61	25 pc solar-type sample (454 systems; Raghavan et al. 2010)
57	38	4	1	43	0.49	22 pc FG sample (164 systems; Duquennoy and Mayor 1991)
42	46	9	2	57	0.70	135 bright FG stars with $V < 5.5$ (Abt and Levy 1976)

2. Why Do We Care about Stellar Multiples?

Besides the evidence, given in the introduction, on how common binaries and multiples are, stellar multiples are detected through a large variety of observational techniques that probe different period regimes. In this review we will mainly focus on astrometric (AB), spectroscopic (SB) and eclipsing (EB) binaries. We do care about stellar multiples because they allow us to (i) benchmark single stars, understand stellar (ii) formation and (iii) evolution.

2.1. Benchmarking

The mass of a star is the most fundamental parameter for its structure (e.g., convective and radiative zones), its evolution (i.e., dictates which nuclear reactions are taking place), and its final fate as white dwarf (WD), neutron star (NS) or black hole (BH). The stellar objects that provide the most precise and accurate masses (lower than 2%) are spectroscopic binaries with two visible components that show eclipses (SB2+EB) because they are the least-model dependent (Serenelli et al., 2021). They represent cornerstones on which single star evolutionary models are anchored (e.g., Paczyński, 1970; Iben and Renzini, 1984; Kippenhahn et al., 2013). They can also be used as benchmarks to calibrate the mass-luminosity, mass-radius and other associated scales for main-sequence stars (Eker et al., 2018; Moya et al., 2018).

2.2. Stellar formation

Our current view of stellar formation relies on elementary formation mechanisms summarised, e.g., in Offner et al. (2023). Stars form by hierarchical collapse of giant molecular clouds caused by the Galactic spiral-arms structure and colliding flows in the interstellar medium (Vázquez-Semadeni et al., 2019). The increase of the density of the gas produces a decrease of the Jeans mass that leads to fragmentation in cascade (hierarchical fragmentation, Bodenheimer 1978) which stops when the gas becomes optically thick and heats adiabatically, increasing the Jeans mass as a consequence. The protostars form at the smallest scales of the cascade. Gravitational dynamics implies that small scales collapse faster than large ones. At each scale, gas infalls from the upper scale, shrinking the orbits of the newly formed systems. Tokovinin and Moe (2020) showed with simple prescriptions that most close binaries and compact hierarchical triples are indeed formed by disc fragmentation followed by accretion-driven inward migration. In overall, the inside-out formation in which inner pairs form first seems to be the main scenario to explain the formation of triples and 3+1 quadruples although dynamical interactions (captures, disruptions and collisions) can make the outside-in formation possible, for instance to setup the 2+2 quadruples, at least partially (Tokovinin, 2021).

2.3. Stellar evolution

The fate of stellar binaries, as the building blocks of high-order systems, is mainly driven by the masses of the components and their separations. Observationally, binaries are categorised in three groups, following the General Catalogue of Variable Stars (Samus' et al., 2017): detached, semi-detached and contact binaries. Detached binaries are made of well separated components

($a > 10\,\mathrm{au}$) that are supposed to not have interacted in the past (which is not always the case). The semi-detached and contact binaries are generally (very) close binaries ($a < 10\,\mathrm{au}$) which are currently interacting by means of mass transfer between the components or lost from the system. These binaries are laboratories for studying stellar physics of tidal effects, mass and orbital angular momentum transfers and/or losses (e.g., Han et al., 2020). Such building blocks are then used to understand the evolution of higher-order systems (Toonen et al., 2020).

Binarity in low-mass stars impacts the individual evolution of the components to create a rich zoo of stellar families (e.g., De Marco and Izzard, 2017). Ba stars, CH and carbon-enhanced metal poor (CEMP) stars are classes of chemically-peculiar evolved stars with enhancements in carbon and heavy elements (like barium). These peculiarities originate from binaries that experienced mass transfer in the past, leaving a chemical imprint in the form of an excess of carbon, nitrogen, s-process and/or r-process elements. Such stars are called 'extrinsic'. A correlation between orbital period and [s/Fe] was never clearly observed in CEMP stars, contrary to their relatives at higher metallicity (Ba and CH stars, Jorissen et al. 2019, although not so clear). Metallicity, which modulates the s-process efficiency, may play an important role in that respect (Karinkuzhi et al., 2021). In addition, the most metal-poor stars are challenging to characterise because their low metal content produces less lines, and transitions are affected by strong non-LTE effects (e.g., Ezzeddine et al., 2017) that lead to large uncertainties in their astrophysical parameters and abundances. Progresses in determining accurate atomic data are mandatory to obtain precise abundances (e.g., Merle et al., 2011), especially for iron-peak and heavy elements.

Finally, many astrophysical observations could result from past mergers events occuring in higher-order systems. The supegiant Betelgeuse could be an outcome of a past merger event (Chatzopoulos et al., 2020) to explain its high spin. The XIX$^{\mathrm{th}}$ century giant eruption in η Carinae was suspected to be the result of a merger event in a triple system (Portegies Zwart and van den Heuvel, 2016). R carbon stars could result from a merger of a red giant with a He white dwarf (McClure, 1997; Izzard et al., 2007). Ba stars could arise from pollution of an AGB star to an inner binary that ultimately merges (Gao et al., 2023). Most close binaries, including contact binaries, are thought to be formed in triples that undergo Kozai-Lidov oscillations with tidal friction (Bataille et al., 2018). Stellar hierarchies that evolved differently from simple binaries can also form more exotic systems like blue stragglers (e.g., Geller et al., 2013) or type Ia supernovae through sequence of merger events (Merle et al., 2022). On another side, hierarchical systems can cause false positives in the search of exoplanets (Santerne et al., 2013). It is also probable that we can see stellar mergers through transient events like (luminous) red novae, e.g., the 2002 eruption in V838 Mon (Kamiński et al., 2021) that probably originated from a merger in a triple or higher-order system. Indeed, the increase of luminosity over a short time scale is a sign of accretion through mergers. More dramatic outcomes arise when more massive components interact, as recently revealed by the detection of gravitational waves produced by the merger of neutron stars and black holes (Abbott et al., 2016, 2017).

3. Multiple Stars in the Era of Massive Surveys

The observational astronomy has entered the era of big data with (i) large spatial-based photometric surveys mainly devoted to the detection of exoplanets, and (ii) large ground-based spectroscopic surveys mainly devoted to the Galactic archaeology. While such surveys were not generally thought to optimise binary detection, such large and homogeneous samples have triggered systematic hunting of binaries and higher multiples to produce many catalogues (more or less complete) of thousands binaries. Here we present a non-exhaustive list of photometric and spectroscopic catalogues of binaries, and finally focus on the spectroscopically unresolved cases.

3.1. Photometric surveys

Modelling the light curve of an EB provides the sum of the fractional radii relative to the semi-major axis, $(R_1+R_2)/a$, the ratio of effective temperatures, the period, the eccentricity, and the orbital inclination. Since the nineties, several ground- and space-based massive photometric surveys have monitored a large part of the sky.

- The Optical Gravitational Lens Experiment (OGLE, Udalski et al., 1992): since 1992, this Polish survey in the direction of the Galactic Bulge and the Magellanic Clouds has detected 425 000 EB and 25 000 ellipsoidal variables (Wyrzykowski et al., 2003; Graczyk et al., 2011; Soszyński et al., 2016). The orbital period distribution ranges from 0.05 d (75 min) to over 2600 d (7 years) with the bulk of the distribution below 1 d. About 150 doubly EB, i.e. quadruple systems, were also reported (Zasche et al., 2019).
- The *Kepler* mission (Koch et al., 2010): a monitoring of 150 000 main-sequence stars with a field of view in Cygnus, Lyra and Draco constellations with 3 000 EB (Kirk et al., 2016; Yücel and Bakış, 2022) showing an excess at 0.25 d for contact binaries (Kobulnicky et al., 2022) and a broader peak at 2–3 d, and even 100 doubly EB (Kostov et al., 2022).
- The Transiting Exoplanet Survey Satellite (TESS, Ricker et al., 2015): a monitoring of ~ 200000 bright stars covering 85% of the sky with 5 000 EB (Prša et al., 2022; Howard et al., 2022) peaking at 0.25 d for contact binaries and around 3 d for the other, and 15 000 ellipsoidal candidates with $P < 5$ d (Green et al., 2023).
- The All-Sky Automated Survey for Supernovae (ASAS-SN, Kochanek et al., 2017): this survey aims at observing one million variable sources over the sky down to magnitude 17, and 33 000 EB (Christy et al., 2022; Rowan et al., 2023) in the range [0.3, 100] d have been detected.
- The Vista Variables in the Viá Láctea ESO near-IR Galactic survey (VVV, Minniti et al., 2010): this survey covers one billion Galactic stars with 33 globular clusters and 350 open clusters among which 187 000 EB and 18 000 contact EB have been identified using a hierarchical classifier (Molnar et al., 2022).

Such surveys have boosted the development of asteroseismology (Kurtz, 2022) including in binary stars and led to various spectacular discoveries of pulsators like heartbeat stars which are pulsating variables in eccentric orbits where resonances are induced between dynamic tides at periastron and the free oscillation modes in the stars (Welsh et al., 2011); pulsating white dwarfs in EB (Parsons et al., 2020); or led to the precise characterization of masses, chemical composition and ages of binaries like α Cen (e.g., Thévenin et al., 2002). Higher-order systems in EB, like compact hierarchical triples, are reviewed by Borkovits (2022). The first doubly EB were reported by Zasche et al. (2022), and many more are now uncovered (Kostov et al., 2022) from TESS.

3.2. Spectroscopic surveys

Modelling the radial velocity (RV) curve of an SB2 yields the mass ratio of the components $q = M_2/M_1$, the period, the eccentricity, the RV semi-amplitudes, the centre-of-mass velocity and the projected semi-major axes. If only one spectrum is visible, it is not possible to recover the mass ratio and only the mass function is available which depends on the inclination that can be provided either by eclipses or by astrometry/interferometry. Since the new millenium, many ground-based massive spectroscopic surveys have monitored a large part of the sky:

- The RAdial Velocity Experiment (RAVE, Steinmetz et al., 2006): a survey that observed half a million stars in the Southern hemisphere at $R = 7\,500$ in the Ca II triplet region. About 120 SB2 (Matijevič et al., 2010) and 4 000 SB1 (Birko et al., 2019) were detected.
- The *Gaia*-ESO Survey (GES, Gilmore et al., 2022; Randich et al., 2022) which targets 100 000 stars in the Southern hemisphere at medium resolution ($R \sim 18\,000$) and 10 000 stars at high resolution ($R = 48\,000$) among which $\sim$ 1 000 SB1, SB2, SB3 and SB4 (Merle et al., 2017, 2020) and Van der Swaelmen et al. (in prep.) were identified.
- The Apache Point Observatory Galactic Evolution Experiment (APOGEE, Majewski et al., 2017): this Northern hemisphere IR survey at $R \sim 22\,500$ provides a large harvest of SB among the 150 000 stars observed including 100 SB2 (Fernandez et al., 2017), 2 500 unresolved SB2 (El-Badry et al., 2018b), 20 000 SB1 (Price-Whelan et al., 2020), 7 300 SB2, 800 SB3 and 20 SB4 (Kounkel et al., 2021)
- The Galactic Archaeology with HERMES (GALAH, De Silva et al., 2015): targets half a million stars in the Southern sky with $R \sim 28\,000$, currently 13 000 SB2 (Traven et al., 2020) have been detected.
- The Large sky Area Multi-Object fibre Spectroscopic Telescope (LAMOST, Zhao et al., 2012): this Northern survey is, with the 10th release, approaching 10 millions stars with low and medium resolution. 256 000 SB1 or variable candidates (Qian et al., 2019), 2 200 SB2 (Zhang et al., 2022), 3 100 SB2, 130 SB3 (Li et al., 2021), 2 500 (Kovalev et al., 2022) have been identified.

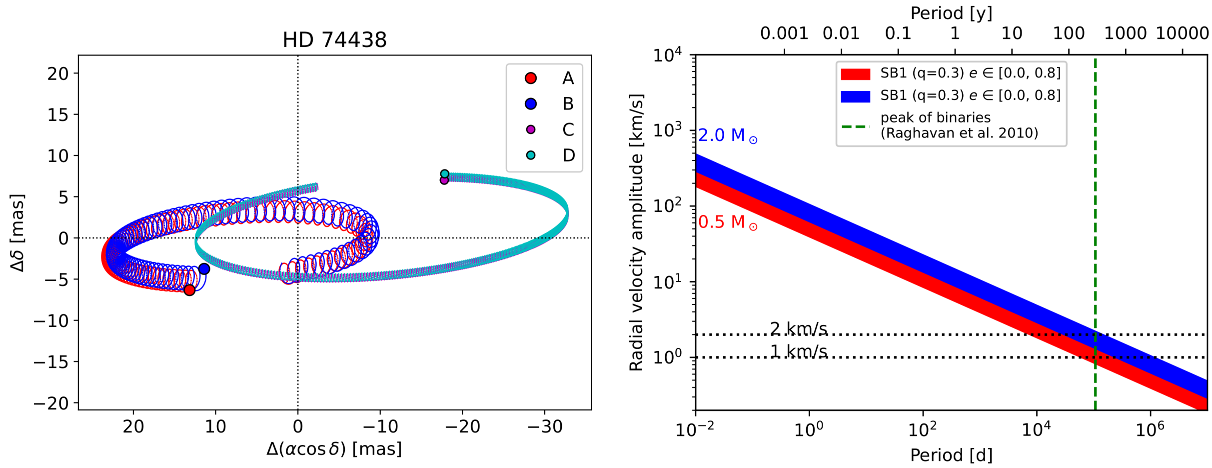

Figure 2: (left) Orbital 'ballet' of the four components with respect of the centre-of-mass of the spectroscopic quadruple HD 74438 from Merle et al. (2022). The four components are spatially unresolved but positions on sky can be deduced from spectroscopic and astrometric/interferometric observations. The AB, CD and AB-CD pairs have orbital periods of 20.6 d, 4.4 d and 5.7 y. We assume ascending node arguments equal to zero for the two inner orbits and a value of 274° for the outer orbit. For readability, the semi-major axes of the two inner orbits are magnified by a factor of two. (right) RV semi-amplitude as a function of the orbital period for simulated SB1 with masses of the primaries at 0.5 (red) and 2.0 (blue) $M_\odot$ with a mass ratio $q = 0.3$ and eccentricities in the range [0, 0.8]. The inclination on the sky is taken at 68°.

The Survey of Surveys (SoS, Tsantaki et al., 2022) have recently combined the above surveys and *Gaia* DR2, providing the largest ever compilation of homogenised radial velocities for the Milky Way, which included about 10% of binaries over the 11 million stars (`flag_binary` = 1). Despite these impressive growing numbers, we stress that only a small fraction of a few hundreds to thousands of these detections have orbital solutions yet. Most of them are SB candidates which will require follow-up monitoring to complete their orbital phases.

An illustrative example is provided by a spectroscopic quadruple (SB4, see left panel of Fig. 2), first identified in GES (Merle et al., 2017) for which monitoring observations have been obtained with high resolution spectrographs (HRS at the Southern African Large telescope and HERCULES at University of Canterbury Mount-John Observatory). These monitoring allows to characterise the 2 + 2 architecture and the orbital parameters of the two inner and outer orbits (Merle et al., 2022) except the mutual inclinations for which interferometric observations would be required.

3.3. The unresolved cases

Unresolved SB are SB with two or more components contributing to the stellar flux of the multiple system but where the components are not resolvable by the spectrograph, either because the RV of the components are, by chance, overimposed at the epoch of the observation, or because the orbital period is long enough to have RV amplitudes smaller or of the order of the resolution of the spectrograph. For a spectrograph with a resolving power of 20 000, this corresponds to an RV amplitude smaller or equal to the instrumental broadening of 15 $\mathrm{km\,s^{-1}}$. That is why higher the resolving power of the spectrograph is, longer the periods it can detect. According to the log-normal distribution of late-type stars binaries (e.g., Raghavan et al., 2010)) the main reservoir of binaries peak at a period of about 270 y. This translates to RV semi-amplitudes between 1 and 2 $\mathrm{km\,s^{-1}}$ for a binary made of late-type primaries in the range [0.5, 2.0] $\mathrm{M_{\odot}}$ with a mass-ratio of 0.3 (right panel of Fig. 2), which would need to have a spectrograph with a resolving power of 150 000–300 000, which is not yet within the capabilities of the today's massive multi-objects spectroscopic surveys.

Such unresolved binaries, despite the lack of sensitivity to the Doppler shift of the components, can nevertheless be identified and characterised. The proof-of-concept has been developed by El-Badry et al. (2018a) and tested on APOGEE, LAMOST and GALAH-like spectra using binary against single star synthetic spectra and showing that temperature biases as large as 300 K can be obtain when a SB is treated as a single star. Using a supervised machine-learning machinery called *The Payne* (Ting et al., 2019) and adapted for binaries, El-Badry et al. (2018b) successfully identified more than 3 000 unresolved SB in APOGEE.

While such an approach is more efficient in the infra-red where the flux ratios are larger than in the visible and in the ultra-violet, it is nowadays desirable to apply systematically this kind of method to unravel many SB hidden in their long-period orbits. An illustrative example in the visible (Fig. 3) is performed around the Mg I b triplet where the SB2 model (red) better reproduces the wings of the Mg lines compared to the best single star model (in blue). The method will be heavily sensitive to the signal-to-noise ratio because the secondary will be detectable only if its contribution to the total flux is larger than the noise.

4. The *Gaia* Revolution

The *Gaia* ESA mission (Perryman et al., 2001) is the first massive survey that simultaneously combined astrometric, photometric and spectroscopic detection techniques. The *Gaia* DR3 (Gaia Collaboration et al., 2023b) indeed provides a new quantitive leap in the study of binaries and multiples with the publication of the Non-Single Star catalogue (NSS, Gaia Collaboration et al., 2023a) which contains the largest homogeneous sample of about 800 000 binaries including 87 000 eclipsing ones, 277 000 spectroscopic ones and 508 000 astrometric ones. Complete orbital parameters are available for a large subset of them (`nss_two_body_orbit`), while partial and tentative solutions complete the sample (`nss_acceleration_astro` and `nss_non_linear_spectro`). We also note that, independently of the NSS catalogue, the variability catalogue `vari_eclipsing_binary` provides more

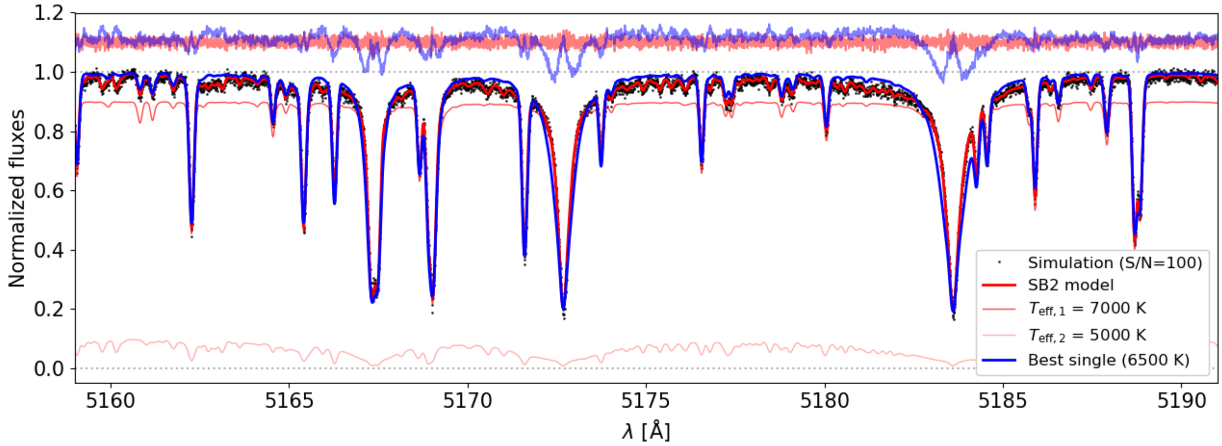

Figure 3: Simulation at a resolving power of 47 000 of an unresolved SB2 around the Mg I b triplet with $S/N = 100$ (black dots) fitted with (i) a single star model in blue, (ii) a binary star model in red. The contributions of the two components are also shown in light red. The residuals are shown around 1.1. The residuals of the single model show significant dispersion compared to the binary model suggesting that such unresolved SB2 can be uncovered when the companion has a flux higher than the noise level, i.e. a few percent in this example.

than two million EB with detections and partial orbital solutions. By combining different methods, the DR3 also provides the estimation of masses for 195 000 primaries and 29 000 secondaries (https://doi.org/10.17876/gaia/dr.3/56).

4.1. The Hertzsprung–Russell diagram

The Hertzsprung-Russell diagram already benefited from the precision, accuracy, and homogeneity of both astrometry and photometry from *Gaia* DR2 (Gaia Collaboration et al., 2018b, 2019) allowing detailed studies of the various Milky Way stellar populations and stellar evolutionary phases. In particular, the 100 pc sample clearly reveals a spread above the sequence of normal stars (Gaia Collaboration et al., 2018a, their Fig. 8) and white dwarfs (Rebassa-Mansergas et al., 2021, their Fig. 1) that reaches -0.75 mag corresponding to a sequence of equal-mass binaries which are photometrically unresolved. Such unresolved populations of binaries are well illustrated in the *Gaia* Catalogue of Nearby Stars (GCNS, Gaia Collaboration et al., 2021, their Fig. 32). For the Hyades, the closest open cluster located at 47 pc, the authors estimate a binary fraction of 34% for stars with masses in the range [0.2, 1.4] $M_{\odot}$. At the end of stellar evolution, we can mention short-period, post-common envelope binaries including a white-dwarf and (i) a main sequence companion which are progenitors of normal cataclysmic variables (CV) as classical/dwarf novae or other polars like AM Her; or (ii) an evolved companion (evolved CV) which are progenitors of extremely low-mass WD, double white dwarfs, or AM CVn systems (El-Badry et al., 2021b; Ren et al., 2023).

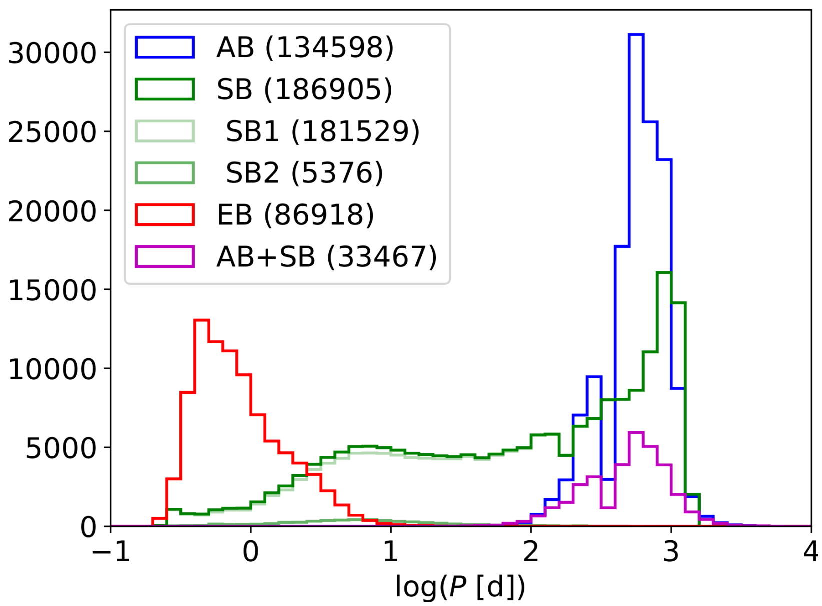

Figure 4: *Gaia* DR3 orbital distribution of NSS targets sorted by their astrometric (AB), spectroscopic (SB) or photometric (EB) detection method. The numbers in each category are given. The SB cover the largest number of period decades (about four) while EB and AB cover, respectively, the short periods (below 10 d) and the longer periods (above 100 d). Note the bump around 10 d for the SB orbital period distribution.

4.2. The orbital period distribution

The binaries characterised in *Gaia* DR3 are those for which an orbital solution has been derived from the 34 months (2.8 years) of data collection. The SB, AB and EB reach the limiting G magnitudes of ~ 13, 16 and 19, respectively. The distribution of their orbital periods are displayed on Fig. 4. EB and AB probe very different period regimes (90% of the distribution ranging from 0.3 to 3.4 d and 207 to 1090 d, respectively). On the contrary, SB cover the widest range from 0.3 to 1452 d (1.5 to 1091 d for 90% of the distribution) except when restricted to SB2, that have periods lower than 100 d (with 50% of them having periods lower than 6 d). In addition, 33 000 systems have a combined astrometric+spectroscopic solution covering the same period range as AB. 155 systems also have eclipsing+spectroscopic solutions with a magnitude range from 9 to 13. The lack of AB around $\log P = 2.5$ (i.e., systems with period of one year) is related to the difficulty to decouple the orbital motion from the parallactic effect. For EB, the peak at ~ 0.5 d corresponds to contact binaries, when both stars fill their respective Roche lobe. The gradual drop-off at the right tail of the EB distribution is mainly due to geometrical effects that decrease the probability of the eclipses at longer periods. Rowan et al. 2023 show that the eclipse probability for main sequence stars follow a $P^{-2/3}$ law.

Concerning the 187 000 binaries identified as SB alone, about 3% are SB2 (5 400 systems) and about 0.5% (950 systems) have a circular orbit. The shape of the SB orbital distribution shows a bump located just below 10 d and a peak at 1000 d. The latter peak is an observational bias because the log-normal distribution of all binaries (Raghavan et al., 2010, peaking at $\log P \sim 5$, i.e., ~ 270 years) is truncated by the 2.8 years timespan of the *Gaia* DR3. The bump below 10 d is more complicated to explain and does not seem to be the result of an observational bias. Indeed, it is also clearly visible on the orbital distribution of the 4 000 SB of *The 9th Catalogue of Spectroscopic Binary Orbits* (SB9, Pourbaix et al., 2004, their Fig. 3), but not discussed. In the *Multiple Star Catalogue* (MSC, Tokovinin, 2018), an overdensity of inner binaries in triples is also reported around 10 d but assumed to be a possible selection effect. Using LAMOST and GALAH data, Bashi et al. (2022) have produced a clean selection of DR3 SB1 where the peak at 10 d is well visible in the most significant sample. Physical models have been developed to explain such a bump, involving early stages of star formation with disc fragmentation and migration (e.g., Tokovinin and Moe, 2020). Some other scenarios involved effects occurring at later stages like tidal effects in binaries with main-sequence stars (e.g., Witte and Savonije, 2002), outcome of common-envelope evolution (e.g., Podsiadlowski, 2014), secular evolution through Kozai-Lidov cycles and tidal friction implying a distant companion (e.g., Fabrycky and Tremaine, 2007; Bataille et al., 2018). The latter scenario is also supported by the stellar triples found by comparing Gaia NSS astrometric acceleration and SB solutions (Gaia Collaboration et al., 2023a), and the ones found by cross-matching with the catalogue of wide binaries (El-Badry et al., 2021a), which all show a peak between 5 and 10 d (see Figs. 52, 53, and 54 in Gaia Collaboration et al. 2023a).

4.3. Binaries including a quiet compact object

About ~ 350 compact stellar remnants are identified in X-ray binaries, i.e., with high X-ray luminosities, where a neutron star (NS, e.g., Sco X-1, Sandage et al. 1966) or a black hole (BH, e.g., Cyg X-1, Miller-Jones et al. 2021) accretes gas from a companion through mass-transfer processes like Roche-lobe overflow or stellar winds (Chaty, 2022).

The recent discoveries of binary candidates including quiescent compact companions like NS (Mazeh et al., 2022; Escorza et al., 2023) or stellar BH (Shenar et al., 2022), have open the lanes to hunt such candidates in a more systematic way (e.g., Mahy et al. 2022; Shahaf et al. 2023), allowing the detailed investigations of the stellar graveyard of the Milky Way and its surroundings. This happened after the *BH police* (https://www.eso.org/public/news/eso2210/) discarded several claims of such detections of binaries with radio-quiet compact objects. For instance, thanks to the infrared spectro-interferometry, Frost et al. (2022) rejected for HR 6819 the model of a hierarchical triple with an inner binary harbouring a dormant BH.

Very recently, the first *Gaia* binaries hosting quiet BH, and coined *Gaia* BH1 and BH2, have been convincingly identified (El-Badry et al., 2023b,a), albeit the authors still considered them as candidates. *Gaia* BH1 is the first confirmed Sun-like star orbiting a black hole (El-Badry et al., 2023b), and *Gaia* BH2 is a red giant orbiting a black hole (El-Badry et al., 2023a), which make them both the widest systems that include a BH (186 d and 1280 d) but most importantly, the two BH closest to our Solar System (0.5 and 1.2 kpc).

5. Conclusion

We are living in an exciting era where astronomers are not limited any more by the quantity, the quality and the homogeneity of the data. But this should not prevent us to forget about the founding works of our elders, and in addition to the massive photometric and spectroscopic surveys presented in Sections 3.1 and 3.2 which often host their own databases, it is also important to acknowledge the huge efforts performed to maintain ancillary databases of binary stars:

- The Washington Double Star catalogue (WDS, Mason et al., 2001) maintained by the US Naval Observatory since 1964 is the largest database of visual/astrometric/interferometric binaries and multiples including more than 155 000 systems;
- The Binary star DataBase (BDB, Kovaleva et al., 2015) hosted since 2008 by the Russian Academy of Science was originally developed at the BesanÃ§on Observatory in 1995 in collaboration with D. Pourbaix who laid the first computing foundations, provides the most comprehensive information about all types of binaries and contains about 120 000 systems;
- The General Catalogue of Variable Stars (GCVS 5.1, Samus' et al., 2017) hosted by the Russian Academy of Science and NASA which includes cataclysmic variables, EB systems and variable X-ray sources;
- The Ninth Catalogue of Spectroscopic Binary Orbits (SB9, Pourbaix et al., 2004) hosted at ULB since 2000 and founded more than a century ago by Campbell and Curtis (1905), contains more than 4 000 SB (2 800 SB1 and 1 200 SB2) in the last update by D. Pourbaix in 2021-03-02;
- The Multiple Star Catalogue (MSC, Tokovinin, 2018) hosted at NOIRLab and containing more than 5 000 stellar triples and higher-order systems (including septuplets) in the last release (2023-02-07);
- The Detached Eclipsing Binary Catalogue (DEBCat, Southworth, 2015) hosted at Keele University and containing more than 320 well-characterised systems.

Obviously, this list is far from being complete, and many additional binary catalogues can be found on the VizieR catalogue service (Ochsenbein et al., 2000) by querying, in the 'Astronomy' field: `Binaries:eclipsing`, `Binaries:spectroscopic` and `Binaries:cataclysmic` which return 350+, 790 and 300+ catalogues, respectively (not all of them being relevant, though).

Acknowledgments

I would like to thank A. Jorissen and S. Van Eck for the careful proof-reading of this manuscript and the useful discussions we had. The Indian and Belgian funding agencies DST (DST/INT/Belg/P-09/2017) and BELSPO (BL/33/IN12) are acknowledged for providing financial support to participate in the third BINA workshop. This research has made use of NASA's Astrophysics Data System Bibliographic Services; of the SIMBAD database and the VizieR catalogue access tool provided and operated at CDS, Strasbourg, France. This work has made use of data from the European Space Agency (ESA) mission Gaia (https://www.cosmos.esa.int/gaia), processed by the Gaia Data Processing and Analysis Consortium (DPAC, https://www.cosmos.esa.int/web/gaia/dpac/consortium). Funding for the DPAC has been provided by national institutions, in particular the institutions participating in the Gaia Multilateral Agreement. This work has made use of python 3.x (https://www.python.org) and of the following python's modules: astropy (https://www.astropy.org), a community-developed core Python package and an ecosystem of tools and resources for astronomy; matplotlib (https://matplotlib.org/); numpy (https://numpy.org/) and scipy (https://scipy.org/). The author is granted by the BELSPO Belgian federal research program FED-tWIN under the research profile Prf-2020-033_BISTRO.

Further Information

Author's ORCID identifier

0000-0001-8253-1603 (Thibault MERLE)

Conflicts of interest

The author declares no conflict of interest.

References

Abbott, B. P., Abbott, R., Abbott, T. D., Abernathy, M. R., Acernese, F., Ackley, K., Adams, C., Adams, T., Addesso, P., Adhikari, R. X., Adya, V. B., Affeldt, C., Agathos, M., Agatsuma, K., Aggarwal, N., Aguiar, O. D., Aiello, L., Ain, A., Ajith, P., Allen, B., Allocca, A., Altin, P. A., Anderson, S. B., Anderson, W. G., Arai, K., Arain, M. A., Araya, M. C., Arceneaux, C. C., Areeda, J. S., Arnaud, N., Arun, K. G., Ascenzi, S., Ashton, G., Ast, M., Aston, S. M., Astone, P., Aufmuth, P., Aulbert, C., Babak, S., Bacon, P., Bader, M. K. M., Baker, P. T., Baldaccini, F., Ballardin, G., Ballmer, S. W., Barayoga, J. C., Barclay, S. E., Barish, B. C., Barker, D., Barone, F., Barr, B., Barsotti, L., Barsuglia, M., Barta, D., Bartlett, J., Barton, M. A., Bartos, I., Bassiri, R., Basti, A., Batch, J. C., Baune, C., Bavigadda, V., Bazzan, M., Behnke, B., Bejger, M., Belczynski, C., Bell, A. S., Bell, C. J., Berger, B. K., Bergman, J., Bergmann, G., Berry, C. P. L., Bersanetti, D., Bertolini, A., Betzwieser, J., Bhagwat, S., Bhandare, R., Bilenko, I. A., Billingsley, G., Birch, J., Birney, R., Birnholtz, O., Biscans, S., Bisht, A., Bitossi, M., Biwer, C., Bizouard, M. A., Blackburn, J. K., Blair, C. D., Blair, D. G., Blair, R. M., Bloemen, S., Bock, O., Bodiya, T. P., Boer, M., Bogaert, G., Bogan, C., Bohe, A., Bojtos, P., Bond, C., Bondu, F., Bonnand, R., Boom, B. A., Bork, R., Boschi, V., Bose, S., Bouffanais, Y., Bozzi, A., Bradaschia, C., Brady, P. R., Braginsky, V. B., Branchesi, M., Brau, J. E., Briant, T., Brillet, A., Brinkmann, M., Brisson, V., Brockill, P., Brooks, A. F., Brown, D. A., Brown, D. D., Brown, N. M., Buchanan, C. C., Buikema, A., Bulik, T., Bulten, H. J., Buonanno, A., Buskulic, D., Buy, C., Byer, R. L., Cabero, M., Cadonati, L., Cagnoli, G., Cahillane, C., Bustillo, J. C., Callister, T., Calloni, E., Camp, J. B., Cannon, K. C., Cao, J., Capano, C. D., Capocasa, E., Carbognani, F., Caride, S., Casanueva Diaz, J., Casentini, C., Caudill, S., Cavaglià, M., Cavalier, F., Cavalieri, R., Cella, G., Cepeda, C. B., Baiardi, L. C., Cerretani, G., Cesarini, E., Chakraborty, R., Chalermsongsak, T., Chamberlin, S. J., Chan, M., Chao, S., Charlton, P., Chassande-Mottin, E., Chen, H. Y., Chen, Y., Cheng, C., Chincarini, A., Chiummo, A., Cho, H. S., Cho, M., Chow, J. H., Christensen, N., Chu, Q., Chua, S., Chung, S., Ciani, G., Clara, F., Clark, J. A., Cleva, F., Coccia, E., Cohadon, P. F., Colla, A., Collette, C. G., Cominsky, L., Constancio, M., Conte, A., Conti, L., Cook, D., Corbitt, T. R., Cornish, N., Corsi, A., Cortese, S., Costa, C. A., Coughlin, M. W., Coughlin, S. B., Coulon, J. P., Countryman, S. T., Couvares, P., Cowan, E. E., Coward, D. M., Cowart, M. J., Coyne, D. C., Coyne, R., Craig, K., Creighton, J. D. E., Creighton, T. D., Cripe, J., Crowder, S. G., Cruise, A. M., Cumming, A., Cunningham, L., Cuoco, E., Dal Canton, T., Danilishin, S. L., D'Antonio, S., Danzmann, K., Darman, N. S., Da Silva Costa, C. F., Dattilo, V., Dave, I., Daveloza, H. P., Davier, M., Davies, G. S., Daw, E. J., Day, R., De, S., DeBra, D., Debreczeni, G., Degallaix, J., De Laurentis, M., Deléglise, S., Del Pozzo, W., Denker, T., Dent, T., Dereli, H., Dergachev, V., DeRosa, R. T., De Rosa, R., DeSalvo, R., Dhurandhar, S., Díaz, M. C., Di Fiore, L., Di Giovanni, M., Di Lieto, A., Di Pace, S., Di Palma, I., Di Virgilio, A., Dojcinoski, G., Dolique, V., Donovan, F., Dooley, K. L., Doravari, S., Douglas, R., Downes, T. P., Drago, M., Drever, R. W. P., Driggers, J. C., Du, Z., Ducrot, M., Dwyer, S. E., Edo, T. B., Edwards, M. C., Effler, A., Eggenstein, H. B., Ehrens, P., Eichholz, J., Eikenberry, S. S., Engels, W., Essick, R. C., Etzel, T., Evans, M., Evans, T. M., Everett, R., Factourovich, M., Fafone, V., Fair, H., Fairhurst, S., Fan, X., Fang, Q., Farinon, S., Farr, B., Farr, W. M., Favata, M., Fays, M., Fehrmann, H., Fejer, M. M., Feldbaum, D., Ferrante, I., Ferreira, E. C., Ferrini, F., Fidecaro, F., Finn, L. S., Fiori, I., Fiorucci, D., Fisher, R. P., Flaminio, R., Fletcher, M., Fong, H., Fournier, J. D., Franco, S., Frasca, S., Frasconi, F., Frede, M., Frei, Z., Freise, A., Frey, R., Frey, V., Fricke, T. T., Fritschel, P., Frolov, V. V., Fulda, P., Fyffe, M., Gabbard, H. A. G., Gair, J. R., Gammaitoni, L., Gaonkar, S. G., Garufi, F., Gatto, A., Gaur, G., Gehrels, N., Gemme, G., Gendre, B., Genin, E., Gennai, A., George, J., Gergely, L., Germain, V., Ghosh, A., Ghosh, A., Ghosh, S., Giaime, J. A., Giardina, K. D., Giazotto, A., Gill, K., Glaefke, A., Gleason, J. R., Goetz, E., Goetz, R., Gondan, L., González, G., Castro, J. M. G., Gopakumar, A., Gordon, N. A., Gorodetsky, M. L., Gossan, S. E., Gosselin, M., Gouaty, R., Graef, C., Graff, P. B., Granata, M., Grant, A., Gras, S., Gray, C., Greco, G., Green, A. C., Greenhalgh, R. J. S., Groot, P., Grote, H., Grunewald, S., Guidi, G. M., Guo, X., Gupta, A., Gupta, M. K., Gushwa, K. E., Gustafson, E. K., Gustafson, R., Hacker, J. J., Hall, B. R., Hall, E. D., Hammond, G., Haney, M., Hanke, M. M., Hanks, J., Hanna, C., Hannam, M. D., Hanson, J., Hardwick, T., Harms, J., Harry, G. M., Harry, I. W., Hart, M. J., Hartman, M. T., Haster, C. J., Haughian, K., Healy, J., Heefner, J., Heidmann, A., Heintze, M. C., Heinzel, G., Heitmann, H., Hello, P., Hemming, G., Hendry, M., Heng, I. S., Hennig, J., Heptonstall, A. W., Heurs, M., Hild, S., Hoak, D., Hodge, K. A., Hofman, D., Hollitt, S. E., Holt, K., Holz, D. E., Hopkins, P., Hosken, D. J., Hough, J., Houston, E. A., Howell,

E. J., Hu, Y. M., Huang, S., Huerta, E. A., Huet, D., Hughey, B., Husa, S., Huttner, S. H., Huynh-Dinh, T., Idrisy, A., Indik, N., Ingram, D. R., Inta, R., Isa, H. N., Isac, J. M., Isi, M., Islas, G., Isogai, T., Iyer, B. R., Izumi, K., Jacobson, M. B., Jacqmin, T., Jang, H., Jani, K., Jaranowski, P., Jawahar, S., Jiménez-Forteza, F., Johnson, W. W., Johnson-McDaniel, N. K., Jones, D. I., Jones, R., Jonker, R. J. G., Ju, L., Haris, K., Kalaghatgi, C. V., Kalogera, V., Kandhasamy, S., Kang, G., Kanner, J. B., Karki, S., Kasprzack, M., Katsavounidis, E., Katzman, W., Kaufer, S., Kaur, T., Kawabe, K., Kawazoe, F., Kéfélian, F., Kehl, M. S., Keitel, D., Kelley, D. B., Kells, W., Kennedy, R., Keppel, D. G., Key, J. S., Khalaidovski, A., Khalili, F. Y., Khan, I., Khan, S., Khan, Z., Khazanov, E. A., Kijbunchoo, N., Kim, C., Kim, J., Kim, K., Kim, N.-G., Kim, N., Kim, Y. M., King, E. J., King, P. J., Kinzel, D. L., Kissel, J. S., Kleybolte, L., Klimenko, S., Koehlenbeck, S. M., Kokeyama, K., Koley, S., Kondrashov, V., Kontos, A., Koranda, S., Korobko, M., Korth, W. Z., Kowalska, I., Kozak, D. B., Kringel, V., Krishnan, B., Królak, A., Krueger, C., Kuehn, G., Kumar, P., Kumar, R., Kuo, L., Kutynia, A., Kwee, P., Lackey, B. D., Landry, M., Lange, J., Lantz, B., Lasky, P. D., Lazzarini, A., Lazzaro, C., Leaci, P., Leavey, S., Lebigot, E. O., Lee, C. H., Lee, H. K., Lee, H. M., Lee, K., Lenon, A., Leonardi, M., Leong, J. R., Leroy, N., Letendre, N., Levin, Y., Levine, B. M., Li, T. G. F., Libson, A., Littenberg, T. B., Lockerbie, N. A., Logue, J., Lombardi, A. L., London, L. T., Lord, J. E., Lorenzini, M., Loriette, V., Lormand, M., Losurdo, G., Lough, J. D., Lousto, C. O., Lovelace, G., Lück, H., Lundgren, A. P., Luo, J., Lynch, R., Ma, Y., MacDonald, T., Machenschalk, B., MacInnis, M., Macleod, D. M., Magaña-Sandoval, F., Magee, R. M., Mageswaran, M., Majorana, E., Maksimovic, I., Malvezzi, V., Man, N., Mandel, I., Mandic, V., Mangano, V., Mansell, G. L., Manske, M., Mantovani, M., Marchesoni, F., Marion, F., Márka, S., Márka, Z., Markosyan, A. S., Maros, E., Martelli, F., Martellini, L., Martin, I. W., Martin, R. M., Martynov, D. V., Marx, J. N., Mason, K., Masserot, A., Massinger, T. J., Masso-Reid, M., Matichard, F., Matone, L., Mavalvala, N., Mazumder, N., Mazzolo, G., McCarthy, R., McClelland, D. E., McCormick, S., McGuire, S. C., McIntyre, G., McIver, J., McManus, D. J., McWilliams, S. T., Meacher, D., Meadors, G. D., Meidam, J., Melatos, A., Mendell, G., Mendoza-Gandara, D., Mercer, R. A., Merilh, E., Merzougui, M., Meshkov, S., Messenger, C., Messick, C., Meyers, P. M., Mezzani, F., Miao, H., Michel, C., Middleton, H., Mikhailov, E. E., Milano, L., Miller, J., Millhouse, M., Minenkov, Y., Ming, J., Mirshekari, S., Mishra, C., Mitra, S., Mitrofanov, V. P., Mitselmakher, G., Mittleman, R., Moggi, A., Mohan, M., Mohapatra, S. R. P., Montani, M., Moore, B. C., Moore, C. J., Moraru, D., Moreno, G., Morriss, S. R., Mossavi, K., Mours, B., Mow-Lowry, C. M., Mueller, C. L., Mueller, G., Muir, A. W., Mukherjee, A., Mukherjee, D., Mukherjee, S., Mukund, N., Mullavey, A., Munch, J., Murphy, D. J., Murray, P. G., Mytidis, A., Nardecchia, I., Naticchioni, L., Nayak, R. K., Necula, V., Nedkova, K., Nelemans, G., Neri, M., Neunzert, A., Newton, G., Nguyen, T. T., Nielsen, A. B., Nissanke, S., Nitz, A., Nocera, F., Nolting, D., Normandin, M. E. N., Nuttall, L. K., Oberling, J., Ochsner, E., O'Dell, J., Oelker, E., Ogin, G. H., Oh, J. J., Oh, S. H., Ohme, F., Oliver, M., Oppermann, P., Oram, R. J., O'Reilly, B., O'Shaughnessy, R., Ott, C. D., Ottaway, D. J., Ottens, R. S., Overmier, H., Owen, B. J., Pai, A., Pai, S. A., Palamos, J. R., Palashov, O., Palomba, C., Pal-Singh, A., Pan, H., Pan, Y., Pankow, C., Pannarale, F., Pant, B. C., Paoletti, F., Paoli, A., Papa,

M. A., Paris, H. R., Parker, W., Pascucci, D., Pasqualetti, A., Passaquieti, R., Passuello, D., Patricelli, B., Patrick, Z., Pearlstone, B. L., Pedraza, M., Pedurand, R., Pekowsky, L., Pele, A., Penn, S., Perreca, A., Pfeiffer, H. P., Phelps, M., Piccinni, O., Pichot, M., Pickenpack, M., Piergiovanni, F., Pierro, V., Pillant, G., Pinard, L., Pinto, I. M., Pitkin, M., Poeld, J. H., Poggiani, R., Popolizio, P., Post, A., Powell, J., Prasad, J., Predoi, V., Premachandra, S. S., Prestegard, T., Price, L. R., Prijatelj, M., Principe, M., Privitera, S., Prix, R., Prodi, G. A., Prokhorov, L., Puncken, O., Punturo, M., Puppo, P., Pürrer, M., Qi, H., Qin, J., Quetschke, V., Quintero, E. A., Quitzow-James, R., Raab, F. J., Rabeling, D. S., Radkins, H., Raffai, P., Raja, S., Rakhmanov, M., Ramet, C. R., Rapagnani, P., Raymond, V., Razzano, M., Re, V., Read, J., Reed, C. M., Regimbau, T., Rei, L., Reid, S., Reitze, D. H., Rew, H., Reyes, S. D., Ricci, F., Riles, K., Robertson, N. A., Robie, R., Robinet, F., Rocchi, A., Rolland, L., Rollins, J. G., Roma, V. J., Romano, J. D., Romano, R., Romanov, G., Romie, J. H., Rosińska, D., Rowan, S., Rüdiger, A., Ruggi, P., Ryan, K., Sachdev, S., Sadecki, T., Sadeghian, L., Salconi, L., Saleem, M., Salemi, F., Samajdar, A., Sammut, L., Sampson, L. M., Sanchez, E. J., Sandberg, V., Sandeen, B., Sanders, G. H., Sanders, J. R., Sassolas, B., Sathyaprakash, B. S., Saulson, P. R., Sauter, O., Savage, R. L., Sawadsky, A., Schale, P., Schilling, R., Schmidt, J., Schmidt, P., Schnabel, R., Schofield, R. M. S., Schönbeck, A., Schreiber, E., Schuette, D., Schutz, B. F., Scott, J., Scott, S. M., Sellers, D., Sengupta, A. S., Sentenac, D., Sequino, V., Sergeev, A., Serna, G., Setyawati, Y., Sevigny, A., Shaddock, D. A., Shaffer, T., Shah, S., Shahriar, M. S., Shaltev, M., Shao, Z., Shapiro, B., Shawhan, P., Sheperd, A., Shoemaker, D. H., Shoemaker, D. M., Siellez, K., Siemens, X., Sigg, D., Silva, A. D., Simakov, D., Singer, A., Singer, L. P., Singh, A., Singh, R., Singhal, A., Sintes, A. M., Slagmolen, B. J. J., Smith, J. R., Smith, M. R., Smith, N. D., Smith, R. J. E., Son, E. J., Sorazu, B., Sorrentino, F., Souradeep, T., Srivastava, A. K., Staley, A., Steinke, M., Steinlechner, J., Steinlechner, S., Steinmeyer, D., Stephens, B. C., Stevenson, S. P., Stone, R., Strain, K. A., Straniero, N., Stratta, G., Strauss, N. A., Strigin, S., Sturani, R., Stuver, A. L., Summerscales, T. Z., Sun, L., Sutton, P. J., Swinkels, B. L., Szczepańczyk, M. J., Tacca, M., Talukder, D., Tanner, D. B., Tápai, M., Tarabrin, S. P., Taracchini, A., Taylor, R., Theeg, T., Thirugnanasambandam, M. P., Thomas, E. G., Thomas, M., Thomas, P., Thorne, K. A., Thorne, K. S., Thrane, E., Tiwari, S., Tiwari, V., Tokmakov, K. V., Tomlinson, C., Tonelli, M., Torres, C. V., Torrie, C. I., Töyrä, D., Travasso, F., Traylor, G., Trifirò, D., Tringali, M. C., Trozzo, L., Tse, M., Turconi, M., Tuyenbayev, D., Ugolini, D., Unnikrishnan, C. S., Urban, A. L., Usman, S. A., Vahlbruch, H., Vajente, G., Valdes, G., Vallisneri, M., van Bakel, N., van Beuzekom, M., van den Brand, J. F. J., Van Den Broeck, C., Vander-Hyde, D. C., van der Schaaf, L., van Heijningen, J. V., van Veggel, A. A., Vardaro, M., Vass, S., Vasúth, M., Vaulin, R., Vecchio, A., Vedovato, G., Veitch, J., Veitch, P. J., Venkateswara, K., Verkindt, D., Vetrano, F., Viceré, A., Vinciguerra, S., Vine, D. J., Vinet, J. Y., Vitale, S., Vo, T., Vocca, H., Vorvick, C., Voss, D., Vousden, W. D., Vyatchanin, S. P., Wade, A. R., Wade, L. E., Wade, M., Waldman, S. J., Walker, M., Wallace, L., Walsh, S., Wang, G., Wang, H., Wang, M., Wang, X., Wang, Y., Ward, H., Ward, R. L., Warner, J., Was, M., Weaver, B., Wei, L. W., Weinert, M., Weinstein, A. J., Weiss, R., Welborn, T., Wen, L., Weßels, P., Westphal, T., Wette, K., Whelan, J. T., Whitcomb, S. E., White, D. J., Whiting, B. F., Wiesner, K., Wilkinson, C., Willems, P. A., Williams, L., Williams, R. D., Williamson, A. R., Willis, J. L., Willke, B., Wimmer, M. H., Winkelmann, L., Winkler, W., Wipf, C. C., Wiseman, A. G., Wittel, H., Woan, G., Worden, J., Wright, J. L., Wu, G., Yablon, J., Yakushin, I., Yam, W., Yamamoto, H., Yancey, C. C., Yap, M. J., Yu, H., Yvert, M., ZadroŻny, A., Zangrando, L., Zanolin, M., Zendri, J. P., Zevin, M., Zhang, F., Zhang, L., Zhang, M., Zhang, Y., Zhao, C., Zhou, M., Zhou, Z., Zhu, X. J., Zucker, M. E., Zuraw, S. E., Zweizig, J., LIGO Scientific Collaboration and Virgo Collaboration (2016) Observation of gravitational waves from a binary black hole merger. PhRvL, 116(6), 061102. https://doi.org/10.1103/PhysRevLett.116.061102.

Abbott, B. P., Abbott, R., Abbott, T. D., Acernese, F., Ackley, K., Adams, C., Adams, T., Addesso, P., Adhikari, R. X., Adya, V. B., Affeldt, C., Afrough, M., Agarwal, B., Agathos, M., Agatsuma, K., Aggarwal, N., Aguiar, O. D., Aiello, L., Ain, A., Ajith, P., Allen, B., Allen, G., Allocca, A., Altin, P. A., Amato, A., Ananyeva, A., Anderson, S. B., Anderson, W. G., Angelova, S. V., Antier, S., Appert, S., Arai, K., Araya, M. C., Areeda, J. S., Arnaud, N., Arun, K. G., Ascenzi, S., Ashton, G., Ast, M., Aston, S. M., Astone, P., Atallah, D. V., Aufmuth, P., Aulbert, C., AultONeal, K., Austin, C., Avila-Alvarez, A., Babak, S., Bacon, P., Bader, M. K. M., Bae, S., Bailes, M., Baker, P. T., Baldaccini, F., Ballardin, G., Ballmer, S. W., Banagiri, S., Barayoga, J. C., Barclay, S. E., Barish, B. C., Barker, D., Barkett, K., Barone, F., Barr, B., Barsotti, L., Barsuglia, M., Barta, D., Barthelmy, S. D., Bartlett, J., Bartos, I., Bassiri, R., Basti, A., Batch, J. C., Bawaj, M., Bayley, J. C., Bazzan, M., Bécsy, B., Beer, C., Bejger, M., Belahcene, I., Bell, A. S., Berger, B. K., Bergmann, G., Bernuzzi, S., Bero, J. J., Berry, C. P. L., Bersanetti, D., Bertolini, A., Betzwieser, J., Bhagwat, S., Bhandare, R., Bilenko, I. A., Billingsley, G., Billman, C. R., Birch, J., Birney, R., Birnholtz, O., Biscans, S., Biscoveanu, S., Bisht, A., Bitossi, M., Biwer, C., Bizouard, M. A., Blackburn, J. K., Blackman, J., Blair, C. D., Blair, D. G., Blair, R. M., Bloemen, S., Bock, O., Bode, N., Boer, M., Bogaert, G., Bohe, A., Bondu, F., Bonilla, E., Bonnand, R., Boom, B. A., Bork, R., Boschi, V., Bose, S., Bossie, K., Bouffanais, Y., Bozzi, A., Bradaschia, C., Brady, P. R., Branchesi, M., Brau, J. E., Briant, T., Brillet, A., Brinkmann, M., Brisson, V., Brockill, P., Broida, J. E., Brooks, A. F., Brown, D. A., Brown, D. D., Brunett, S., Buchanan, C. C., Buikema, A., Bulik, T., Bulten, H. J., Buonanno, A., Buskulic, D., Buy, C., Byer, R. L., Cabero, M., Cadonati, L., Cagnoli, G., Cahillane, C., Calderón Bustillo, J., Callister, T. A., Calloni, E., Camp, J. B., Canepa, M., Canizares, P., Cannon, K. C., Cao, H., Cao, J., Capano, C. D., Capocasa, E., Carbognani, F., Caride, S., Carney, M. F., Carullo, G., Casanueva Diaz, J., Casentini, C., Caudill, S., Cavaglià, M., Cavalier, F., Cavalieri, R., Cella, G., Cepeda, C. B., Cerdá-Durán, P., Cerretani, G., Cesarini, E., Chamberlin, S. J., Chan, M., Chao, S., Charlton, P., Chase, E., Chassande-Mottin, E., Chatterjee, D., Chatziioannou, K., Cheeseboro, B. D., Chen, H. Y., Chen, X., Chen, Y., Cheng, H. P., Chia, H., Chincarini, A., Chiummo, A., Chmiel, T., Cho, H. S., Cho, M., Chow, J. H., Christensen, N., Chu, Q., Chua, A. J. K., Chua, S., Chung, A. K. W., Chung, S., Ciani, G., Ciolfi, R., Cirelli, C. E., Cirone, A., Clara, F., Clark, J. A., Clearwater, P., Cleva, F., Cocchieri, C., Coccia, E., Cohadon, P. F., Cohen, D., Colla, A., Collette, C. G., Cominsky, L. R., Constancio, M., Conti, L., Cooper, S. J., Corban, P., Corbitt, T. R., Cordero-Carrión, I., Corley, K. R., Cornish, N., Corsi, A., Cortese, S., Costa, C. A., Coughlin, M. W., Coughlin, S. B., Coulon, J. P., Countryman, S. T., Couvares, P., Covas, P. B., Cowan, E. E., Coward, D. M., Cowart, M. J., Coyne, D. C., Coyne, R., Creighton, J. D. E., Creighton, T. D., Cripe, J., Crowder, S. G., Cullen, T. J., Cumming, A., Cunningham, L., Cuoco, E., Dal Canton, T., Dálya, G., Danilishin, S. L., D'Antonio, S., Danzmann, K., Dasgupta, A., Da Silva Costa, C. F., Dattilo, V., Dave, I., Davier, M., Davis, D., Daw, E. J., Day, B., De, S., DeBra, D., Degallaix, J., De Laurentis, M., Deléglise, S., Del Pozzo, W., Demos, N., Denker, T., Dent, T., De Pietri, R., Dergachev, V., De Rosa, R., DeRosa, R. T., De Rossi, C., DeSalvo, R., de Varona, O., Devenson, J., Dhurandhar, S., Díaz, M. C., Dietrich, T., Di Fiore, L., Di Giovanni, M., Di Girolamo, T., Di Lieto, A., Di Pace, S., Di Palma, I., Di Renzo, F., Doctor, Z., Dolique, V., Donovan, F., Dooley, K. L., Doravari, S., Dorrington, I., Douglas, R., Dovale Álvarez, M., Downes, T. P., Drago, M., Dreissigacker, C., Driggers, J. C., Du, Z., Ducrot, M., Dudi, R., Dupej, P., Dwyer, S. E., Edo, T. B., Edwards, M. C., Effler, A., Eggenstein, H. B., Ehrens, P., Eichholz, J., Eikenberry, S. S., Eisenstein, R. A., Essick, R. C., Estevez, D., Etienne, Z. B., Etzel, T., Evans, M., Evans, T. M., Factourovich, M., Fafone, V., Fair, H., Fairhurst, S., Fan, X., Farinon, S., Farr, B., Farr, W. M., Fauchon-Jones, E. J., Favata, M., Fays, M., Fee, C., Fehrmann, H., Feicht, J., Fejer, M. M., Fernandez-Galiana, A., Ferrante, I., Ferreira, E. C., Ferrini, F., Fidecaro, F., Finstad, D., Fiori, I., Fiorucci, D., Fishbach, M., Fisher, R. P., Fitz-Axen, M., Flaminio, R., Fletcher, M., Fong, H., Font, J. A., Forsyth, P. W. F., Forsyth, S. S., Fournier, J. D., Frasca, S., Frasconi, F., Frei, Z., Freise, A., Frey, R., Frey, V., Fries, E. M., Fritschel, P., Frolov, V. V., Fulda, P., Fyffe, M., Gabbard, H., Gadre, B. U., Gaebel, S. M., Gair, J. R., Gammaitoni, L., Ganija, M. R., Gaonkar, S. G., Garcia-Quiros, C., Garufi, F., Gateley, B., Gaudio, S., Gaur, G., Gayathri, V., Gehrels, N., Gemme, G., Genin, E., Gennai, A., George, D., George, J., Gergely, L., Germain, V., Ghonge, S., Ghosh, A., Ghosh, A., Ghosh, S., Giaime, J. A., Giardina, K. D., Giazotto, A., Gill, K., Glover, L., Goetz, E., Goetz, R., Gomes, S., Goncharov, B., González, G., Gonzalez Castro, J. M., Gopakumar, A., Gorodetsky, M. L., Gossan, S. E., Gosselin, M., Gouaty, R., Grado, A., Graef, C., Granata, M., Grant, A., Gras, S., Gray, C., Greco, G., Green, A. C., Gretarsson, E. M., Groot, P., Grote, H., Grunewald, S., Gruning, P., Guidi, G. M., Guo, X., Gupta, A., Gupta, M. K., Gushwa, K. E., Gustafson, E. K., Gustafson, R., Halim, O., Hall, B. R., Hall, E. D., Hamilton, E. Z., Hammond, G., Haney, M., Hanke, M. M., Hanks, J., Hanna, C., Hannam, M. D., Hannuksela, O. A., Hanson, J., Hardwick, T., Harms, J., Harry, G. M., Harry, I. W., Hart, M. J., Haster, C. J., Haughian, K., Healy, J., Heidmann, A., Heintze, M. C., Heitmann, H., Hello, P., Hemming, G., Hendry, M., Heng, I. S., Hennig, J., Heptonstall, A. W., Heurs, M., Hild, S., Hinderer, T., Ho, W. C. G., Hoak, D., Hofman, D., Holt, K., Holz, D. E., Hopkins, P., Horst, C., Hough, J., Houston, E. A., Howell, E. J., Hreibi, A., Hu, Y. M., Huerta, E. A., Huet, D., Hughey, B., Husa, S., Huttner, S. H., Huynh-Dinh, T., Indik, N., Inta, R., Intini, G., Isa, H. N., Isac, J. M., Isi, M., Iyer, B. R., Izumi, K., Jacqmin, T., Jani, K., Jaranowski, P., Jawahar, S., Jiménez-Forteza, F., Johnson, W. W., Johnson-McDaniel, N. K., Jones, D. I., Jones, R., Jonker, R. J. G., Ju, L., Junker, J., Kalaghatgi, C. V., Kalogera, V., Kamai, B., Kandhasamy, S., Kang, G., Kanner, J. B., Kapadia, S. J., Karki, S., Karvinen, K. S., Kasprzack, M., Kastaun, W., Katolik, M., Katsavounidis, E., Katzman, W., Kaufer, S., Kawabe, K., Kéfélian, F., Keitel, D., Kemball, A. J., Kennedy, R., Kent, C., Key, J. S., Khalili, F. Y., Khan, I., Khan, S., Khan, Z., Khazanov,

E. A., Kijbunchoo, N., Kim, C., Kim, J. C., Kim, K., Kim, W., Kim, W. S., Kim, Y. M., Kimbrell, S. J., King, E. J., King, P. J., Kinley-Hanlon, M., Kirchhoff, R., Kissel, J. S., Kleybolte, L., Klimenko, S., Knowles, T. D., Koch, P., Koehlenbeck, S. M., Koley, S., Kondrashov, V., Kontos, A., Korobko, M., Korth, W. Z., Kowalska, I., Kozak, D. B., Krämer, C., Kringel, V., Krishnan, B., Królak, A., Kuehn, G., Kumar, P., Kumar, R., Kumar, S., Kuo, L., Kutynia, A., Kwang, S., Lackey, B. D., Lai, K. H., Landry, M., Lang, R. N., Lange, J., Lantz, B., Lanza, R. K., Larson, S. L., Lartaux-Vollard, A., Lasky, P. D., Laxen, M., Lazzarini, A., Lazzaro, C., Leaci, P., Leavey, S., Lee, C. H., Lee, H. K., Lee, H. M., Lee, H. W., Lee, K., Lehmann, J., Lenon, A., Leon, E., Leonardi, M., Leroy, N., Letendre, N., Levin, Y., Li, T. G. F., Linker, S. D., Littenberg, T. B., Liu, J., Liu, X., Lo, R. K. L., Lockerbie, N. A., London, L. T., Lord, J. E., Lorenzini, M., Loriette, V., Lormand, M., Losurdo, G., Lough, J. D., Lousto, C. O., Lovelace, G., Lück, H., Lumaca, D., Lundgren, A. P., Lynch, R., Ma, Y., Macas, R., Macfoy, S., Machenschalk, B., MacInnis, M., Macleod, D. M., Magaña Hernandez, I., Magaña-Sandoval, F., Magaña Zertuche, L., Magee, R. M., Majorana, E., Maksimovic, I., Man, N., Mandic, V., Mangano, V., Mansell, G. L., Manske, M., Mantovani, M., Marchesoni, F., Marion, F., Márka, S., Márka, Z., Markakis, C., Markosyan, A. S., Markowitz, A., Maros, E., Marquina, A., Marsh, P., Martelli, F., Martellini, L., Martin, I. W., Martin, R. M., Martynov, D. V., Marx, J. N., Mason, K., Massera, E., Masserot, A., Massinger, T. J., Masso-Reid, M., Mastrogiovanni, S., Matas, A., Matichard, F., Matone, L., Mavalvala, N., Mazumder, N., McCarthy, R., McClelland, D. E., McCormick, S., McCuller, L., McGuire, S. C., McIntyre, G., McIver, J., McManus, D. J., McNeill, L., McRae, T., McWilliams, S. T., Meacher, D., Meadors, G. D., Mehmet, M., Meidam, J., Mejuto-Villa, E., Melatos, A., Mendell, G., Mercer, R. A., Merilh, E. L., Merzougui, M., Meshkov, S., Messenger, C., Messick, C., Metzdorff, R., Meyers, P. M., Miao, H., Michel, C., Middleton, H., Mikhailov, E. E., Milano, L., Miller, A. L., Miller, B. B., Miller, J., Millhouse, M., Milovich-Goff, M. C., Minazzoli, O., Minenkov, Y., Ming, J., Mishra, C., Mitra, S., Mitrofanov, V. P., Mitselmakher, G., Mittleman, R., Moffa, D., Moggi, A., Mogushi, K., Mohan, M., Mohapatra, S. R. P., Molina, I., Montani, M., Moore, C. J., Moraru, D., Moreno, G., Morisaki, S., Morriss, S. R., Mours, B., Mow-Lowry, C. M., Mueller, G., Muir, A. W., Mukherjee, A., Mukherjee, D., Mukherjee, S., Mukund, N., Mullavey, A., Munch, J., Muñiz, E. A., Muratore, M., Murray, P. G., Nagar, A., Napier, K., Nardecchia, I., Naticchioni, L., Nayak, R. K., Neilson, J., Nelemans, G., Nelson, T. J. N., Nery, M., Neunzert, A., Nevin, L., Newport, J. M., Newton, G., Ng, K. K. Y., Nguyen, P., Nguyen, T. T., Nichols, D., Nielsen, A. B., Nissanke, S., Nitz, A., Noack, A., Nocera, F., Nolting, D., North, C., Nuttall, L. K., Oberling, J., O'Dea, G. D., Ogin, G. H., Oh, J. J., Oh, S. H., Ohme, F., Okada, M. A., Oliver, M., Oppermann, P., Oram, R. J., O'Reilly, B., Ormiston, R., Ortega, L. F., O'Shaughnessy, R., Ossokine, S., Ottaway, D. J., Overmier, H., Owen, B. J., Pace, A. E., Page, J., Page, M. A., Pai, A., Pai, S. A., Palamos, J. R., Palashov, O., Palomba, C., Pal-Singh, A., Pan, H., Pan, H.-W., Pang, B., Pang, P. T. H., Pankow, C., Pannarale, F., Pant, B. C., Paoletti, F., Paoli, A., Papa, M. A., Parida, A., Parker, W., Pascucci, D., Pasqualetti, A., Passaquieti, R., Passuello, D., Patil, M., Patricelli, B., Pearlstone, B. L., Pedraza, M., Pedurand, R., Pekowsky, L., Pele, A., Penn, S., Perez, C. J., Perreca, A., Perri, L. M., Pfeiffer, H. P., Phelps, M., Piccinni, O. J., Pichot, M., Piergiovanni, F., Pierro, V., Pillant, G., Pinard, L., Pinto, I. M., Pirello, M., Pitkin, M., Poe, M., Poggiani, R., Popolizio, P., Porter, E. K., Post, A., Powell, J., Prasad, J., Pratt, J. W. W., Pratten, G., Predoi, V., Prestegard, T., Prijatelj, M., Principe, M., Privitera, S., Prix, R., Prodi, G. A., Prokhorov, L. G., Puncken, O., Punturo, M., Puppo, P., Pürrer, M., Qi, H., Quetschke, V., Quintero, E. A., Quitzow-James, R., Raab, F. J., Rabeling, D. S., Radkins, H., Raffai, P., Raja, S., Rajan, C., Rajbhandari, B., Rakhmanov, M., Ramirez, K. E., Ramos-Buades, A., Rapagnani, P., Raymond, V., Razzano, M., Read, J., Regimbau, T., Rei, L., Reid, S., Reitze, D. H., Ren, W., Reyes, S. D., Ricci, F., Ricker, P. M., Rieger, S., Riles, K., Rizzo, M., Robertson, N. A., Robie, R., Robinet, F., Rocchi, A., Rolland, L., Rollins, J. G., Roma, V. J., Romano, J. D., Romano, R., Romel, C. L., Romie, J. H., Rosińska, D., Ross, M. P., Rowan, S., Rüdiger, A., Ruggi, P., Rutins, G., Ryan, K., Sachdev, S., Sadecki, T., Sadeghian, L., Sakellariadou, M., Salconi, L., Saleem, M., Salemi, F., Samajdar, A., Sammut, L., Sampson, L. M., Sanchez, E. J., Sanchez, L. E., Sanchis-Gual, N., Sandberg, V., Sanders, J. R., Sassolas, B., Sathyaprakash, B. S., Saulson, P. R., Sauter, O., Savage, R. L., Sawadsky, A., Schale, P., Scheel, M., Scheuer, J., Schmidt, J., Schmidt, P., Schnabel, R., Schofield, R. M. S., Schönbeck, A., Schreiber, E., Schuette, D., Schulte, B. W., Schutz, B. F., Schwalbe, S. G., Scott, J., Scott, S. M., Seidel, E., Sellers, D., Sengupta, A. S., Sentenac, D., Sequino, V., Sergeev, A., Shaddock, D. A., Shaffer, T. J., Shah, A. A., Shahriar, M. S., Shaner, M. B., Shao, L., Shapiro, B., Shawhan, P., Sheperd, A., Shoemaker, D. H., Shoemaker, D. M., Siellez, K., Siemens, X., Sieniawska, M., Sigg, D., Silva, A. D., Singer, L. P., Singh, A., Singhal, A., Sintes, A. M., Slagmolen, B. J. J., Smith, B., Smith, J. R., Smith, R. J. E., Somala, S., Son, E. J., Sonnenberg, J. A., Sorazu, B., Sorrentino, F., Souradeep, T., Spencer, A. P., Srivastava, A. K., Staats, K., Staley, A., Steinke, M., Steinlechner, J., Steinlechner, S., Steinmeyer, D., Stevenson, S. P., Stone, R., Stops, D. J., Strain, K. A., Stratta, G., Strigin, S. E., Strunk, A., Sturani, R., Stuver, A. L., Summerscales, T. Z., Sun, L., Sunil, S., Suresh, J., Sutton, P. J., Swinkels, B. L., Szczepańczyk, M. J., Tacca, M., Tait, S. C., Talbot, C., Talukder, D., Tanner, D. B., Tápai, M., Taracchini, A., Tasson, J. D., Taylor, J. A., Taylor, R., Tewari, S. V., Theeg, T., Thies, F., Thomas, E. G., Thomas, M., Thomas, P., Thorne, K. A., Thorne, K. S., Thrane, E., Tiwari, S., Tiwari, V., Tokmakov, K. V., Toland, K., Tonelli, M., Tornasi, Z., Torres-Forné, A., Torrie, C. I., Töyrä, D., Travasso, F., Traylor, G., Trinastic, J., Tringali, M. C., Trozzo, L., Tsang, K. W., Tse, M., Tso, R., Tsukada, L., Tsuna, D., Tuyenbayev, D., Ueno, K., Ugolini, D., Unnikrishnan, C. S., Urban, A. L., Usman, S. A., Vahlbruch, H., Vajente, G., Valdes, G., Vallisneri, M., van Bakel, N., van Beuzekom, M., van den Brand, J. F. J., Van Den Broeck, C., Vander-Hyde, D. C., van der Schaaf, L., van Heijningen, J. V., van Veggel, A. A., Vardaro, M., Varma, V., Vass, S., Vasúth, M., Vecchio, A., Vedovato, G., Veitch, J., Veitch, P. J., Venkateswara, K., Venugopalan, G., Verkindt, D., Vetrano, F., Viceré, A., Viets, A. D., Vinciguerra, S., Vine, D. J., Vinet, J. Y., Vitale, S., Vo, T., Vocca, H., Vorvick, C., Vyatchanin, S. P., Wade, A. R., Wade, L. E., Wade, M., Walet, R., Walker, M., Wallace, L., Walsh, S., Wang, G., Wang, H., Wang, J. Z., Wang, W. H., Wang, Y. F., Ward, R. L., Warner, J., Was, M., Watchi, J., Weaver, B., Wei, L. W., Weinert, M., Weinstein, A. J., Weiss, R., Wen, L., Wessel, E. K., Weßels, P., Westerweck, J., Westphal, T., Wette, K., Whelan, J. T., Whitcomb, S. E., Whiting, B. F., Whittle, C., Wilken, D., Williams, D., Williams, R. D., Williamson,

A. R., Willis, J. L., Willke, B., Wimmer, M. H., Winkler, W., Wipf, C. C., Wittel, H., Woan, G., Woehler, J., Wofford, J., Wong, K. W. K., Worden, J., Wright, J. L., Wu, D. S., Wysocki, D. M., Xiao, S., Yamamoto, H., Yancey, C. C., Yang, L., Yap, M. J., Yazback, M., Yu, H., Yu, H., Yvert, M., ZadroŻny, A., Zanolin, M., Zelenova, T., Zendri, J. P., Zevin, M., Zhang, L., Zhang, M., Zhang, T., Zhang, Y. H., Zhao, C., Zhou, M., Zhou, Z., Zhu, S. J., Zhu, X. J., Zimmerman, A. B., Zucker, M. E., Zweizig, J., LIGO Scientific Collaboration and Virgo Collaboration (2017) GW170817: Observation of gravitational waves from a binary neutron star inspiral. PhRvL, 119(16), 161101. https://doi.org/10.1103/PhysRevLett.119.161101.

Abt, H. A. and Levy, S. G. (1976) Multiplicity among solar-type stars. ApJS, 30, 273–306. https://doi.org/10.1086/190363.

Bashi, D., Shahaf, S., Mazeh, T., Faigler, S., Dong, S., El-Badry, K., Rix, H. W. and Jorissen, A. (2022) *Gaia* spectroscopic orbits validated with LAMOST and GALAH radial velocities. MNRAS, 517(3), 3888–3903. https://doi.org/10.1093/mnras/stac2928.

Bataille, M., Libert, A. S. and Correia, A. C. M. (2018) Dynamical evolution of triple-star systems by Lidov–Kozai cycles and tidal friction. MNRAS, 479(4), 4749–4759. https://doi.org/10.1093/mnras/sty1758.

Birko, D., Zwitter, T., Grebel, E. K., Parker, Q. A., Kordopatis, G., Bland-Hawthorn, J., Freeman, K., Guiglion, G., Gibson, B. K., Navarro, J., Reid, W., Seabroke, G. M., Steinmetz, M. and Watson, F. (2019) Single-lined spectroscopic binary star candidates from a combination of the RAVE and *Gaia* DR2 surveys. AJ, 158(4), 155. https://doi.org/10.3847/1538-3881/ab3cc1.

Bodenheimer, P. (1978) Evolution of rotating interstellar clouds. III. On the formation of multiple star systems. ApJ, 224, 488–496. https://doi.org/10.1086/156396.

Borkovits, T. (2022) Eclipsing binaries in dynamically interacting close, multiple systems. Galax, 10(1), 9. https://doi.org/10.3390/galaxies10010009.

Campbell, W. W. and Curtis, H. D. (1905) First catalogue of spectroscopic binaries. LicOB, 79, 136–146. https://doi.org/10.5479/ADS/bib/1905LicOB.3.136C.

Chaty, S. (2022) Accreting Binaries. Nature, formation, and evolution. IOP Publishing, Bristol (UK). https://doi.org/10.1088/2514-3433/ac595f.

Chatzopoulos, E., Frank, J., Marcello, D. C. and Clayton, G. C. (2020) Is Betelgeuse the outcome of a past merger? ApJ, 896(1), 50. https://doi.org/10.3847/1538-4357/ab91bb.

Christy, C. T., Jayasinghe, T., Stanek, K. Z., Kochanek, C. S., Way, Z., Prieto, J. L., Shappee, B. J., Holoien, T. W. S., Thompson, T. A. and Schneider, A. (2022) Citizen ASAS-SN data release. I. Variable star classification using citizen science. PASP, 134(1032), 024201. https://doi.org/10.1088/1538-3873/ac44f0.

De Marco, O. and Izzard, R. G. (2017) Dawes Review 6: The impact of companions on stellar evolution. PASA, 34, e001. https://doi.org/10.1017/pasa.2016.52.

De Silva, G. M., Freeman, K. C., Bland-Hawthorn, J., Martell, S., de Boer, E. W., Asplund, M., Keller, S., Sharma, S., Zucker, D. B., Zwitter, T., Anguiano, B., Bacigalupo, C., Bayliss, D., Beavis, M. A., Bergemann, M., Campbell, S., Cannon, R., Carollo, D., Casagrande, L., Casey, A. R., Da Costa, G., D'Orazi, V., Dotter, A., Duong, L., Heger, A., Ireland, M. J., Kafle, P. R., Kos, J., Lattanzio, J., Lewis, G. F., Lin, J., Lind, K., Munari, U., Nataf, D. M., O'Toole, S., Parker, Q., Reid, W., Schlesinger, K. J., Sheinis, A., Simpson, J. D., Stello, D., Ting, Y. S., Traven, G., Watson, F., Wittenmyer, R., Yong, D. and Žerjal, M. (2015) The GALAH survey: scientific motivation. MNRAS, 449(3), 2604–2617. https://doi.org/10.1093/mnras/stv327.

Duchêne, G. and Kraus, A. (2013) Stellar multiplicity. ARA&A, 51(1), 269–310. https://doi.org/10.1146/annurev-astro-081710-102602.

Duquennoy, A. and Mayor, M. (1991) Multiplicity among solar type stars in the solar neighbourhood – Part Two – distribution of the orbital elements in an unbiased sample. A&A, 248, 485.

Eker, Z., Bakış, V., Bilir, S., Soydugan, F., Steer, I., Soydugan, E., Bakış, H., Aliçavuş, F., Aslan, G. and Alpsoy, M. (2018) Interrelated main-sequence mass-luminosity, mass-radius, and mass-effective temperature relations. MNRAS, 479(4), 5491–5511. https://doi.org/10.1093/mnras/sty1834.

El-Badry, K., Rix, H.-W., Cendes, Y., Rodriguez, A. C., Conroy, C., Quataert, E., Hawkins, K., Zari, E., Hobson, M., Breivik, K., Rau, A., Berger, E., Shahaf, S., Seeburger, R., Burdge, K. B., Latham, D. W., Buchhave, L. A., Bieryla, A., Bashi, D., Mazeh, T. and Faigler, S. (2023a) A red giant orbiting a black hole. MNRAS, 521(3), 4323–4348. https://doi.org/10.1093/mnras/stad799.

El-Badry, K., Rix, H.-W. and Heintz, T. M. (2021a) A million binaries from *Gaia* eDR3: sample selection and validation of *Gaia* parallax uncertainties. MNRAS, 506(2), 2269–2295. https://doi.org/10.1093/mnras/stab323.

El-Badry, K., Rix, H.-W., Quataert, E., Howard, A. W., Isaacson, H., Fuller, J., Hawkins, K., Breivik, K., Wong, K. W. K., Rodriguez, A. C., Conroy, C., Shahaf, S., Mazeh, T., Arenou, F., Burdge, K. B., Bashi, D., Faigler, S., Weisz, D. R., Seeburger, R., Almada Monter, S. and Wojno, J. (2023b) A Sun–like star orbiting a black hole. MNRAS, 518(1), 1057–1085. https://doi.org/10.1093/mnras/stac3140.

El-Badry, K., Rix, H.-W., Quataert, E., Kupfer, T. and Shen, K. J. (2021b) Birth of the ELMs: a ZTF survey for evolved cataclysmic variables turning into extremely low-mass white dwarfs. MNRAS, 508(3), 4106–4139. https://doi.org/10.1093/mnras/stab2583.

El-Badry, K., Rix, H.-W., Ting, Y.-S., Weisz, D. R., Bergemann, M., Cargile, P., Conroy, C. and Eilers, A.-C. (2018a) Signatures of unresolved binaries in stellar spectra: implications for spectral fitting. MNRAS, 473(4), 5043–5049. https://doi.org/10.1093/mnras/stx2758.

El-Badry, K., Ting, Y.-S., Rix, H.-W., Quataert, E., Weisz, D. R., Cargile, P., Conroy, C., Hogg, D. W., Bergemann, M. and Liu, C. (2018b) Discovery and characterization of 3000+ main-sequence binaries from APOGEE spectra. MNRAS, 476(1), 528–553. https://doi.org/10.1093/mnras/sty240.

Escorza, A., Karinkuzhi, D., Jorissen, A., Van Eck, S., Schmelz, J. T., Verschuur, G. L., Boffin, H. M. J., De Rosa, R. J. and Van Winckel, H. (2023) A neutron star candidate in the long-period binary 56 UMa. A&A, 670, L14. https://doi.org/10.1051/0004-6361/202245796.

Ezzeddine, R., Frebel, A. and Plez, B. (2017) Ultra-metal-poor stars: Spectroscopic determination of stellar atmospheric parameters using iron non-LTE line abundances. ApJ, 847(2), 142. https://doi.org/10.3847/1538-4357/aa8875.

Fabrycky, D. and Tremaine, S. (2007) Shrinking binary and planetary orbits by Kozai cycles with tidal friction. ApJ, 669(2), 1298–1315. https://doi.org/10.1086/521702.

Fernandez, M. A., Covey, K. R., De Lee, N., Chojnowski, S. D., Nidever, D., Ballantyne, R., Cottaar, M., Da Rio, N., Foster, J. B., Majewski, S. R., Meyer, M. R., Reyna, A. M., Roberts, G. W., Skinner, J., Stassun, K., Tan, J. C., Troup, N. and Zasowski, G. (2017) IN-SYNC VI. Identification and radial velocity extraction for 100+ double-lined spectroscopic binaries in the APOGEE/IN-SYNC fields. PASP, 129(978), 084201. https://doi.org/10.1088/1538-3873/aa77e0.

Frost, A. J., Bodensteiner, J., Rivinius, T., Baade, D., Merand, A., Selman, F., Abdul-Masih, M., Banyard, G., Bordier, E., Dsilva, K., Hawcroft, C., Mahy, L., Reggiani, M., Shenar, T., Cabezas, M., Hadrava, P., Heida, M., Klement, R. and Sana, H. (2022) HR 6819 is a binary system with no black hole. Revisiting the source with infrared interferometry and optical integral field spectroscopy. A&A, 659, L3. https://doi.org/10.1051/0004-6361/202143004.

Fuhrmann, K., Chini, R., Kaderhandt, L. and Chen, Z. (2017) Multiplicity among solar-type stars. ApJ, 836(1), 139. https://doi.org/10.3847/1538-4357/836/1/139.

Gaia Collaboration, Arenou, F., Babusiaux, C., Barstow, M. A., Faigler, S., Jorissen, A., Kervella, P., Mazeh, T., Mowlavi, N., Panuzzo, P., Sahlmann, J., Shahaf, S., Sozzetti, A., Bauchet, N., Damerdji, Y., Gavras, P., Giacobbe, P., Gosset, E., Halbwachs, J. L., Holl, B., Lattanzi, M. G., Leclerc, N., Morel, T., Pourbaix, D., Re Fiorentin, P., Sadowski, G., Ségransan, D., Siopis, C., Teyssier, D., Zwitter, T., Planquart, L., Brown, A. G. A., Vallenari, A., Prusti, T., de Bruijne, J. H. J., Biermann, M., Creevey, O. L., Ducourant, C., Evans, D. W., Eyer, L., Guerra, R., Hutton, A., Jordi, C., Klioner, S. A., Lammers, U. L., Lindegren, L., Luri, X., Mignard, F., Panem, C., Randich, S., Sartoretti, P., Soubiran, C., Tanga, P., Walton, N. A., Bailer-Jones, C. A. L., Bastian, U., Drimmel, R., Jansen, F., Katz, D., van Leeuwen, F., Bakker, J., Cacciari, C., Castañeda, J., De Angeli, F., Fabricius, C., Fouesneau, M., Frémat, Y., Galluccio, L., Guerrier, A., Heiter, U., Masana, E., Messineo, R., Nicolas, C., Nienartowicz, K., Pailler, F., Riclet, F., Roux, W., Seabroke, G. M., Sordo, R., Thévenin, F., Gracia-Abril, G., Portell, J., Altmann, M., Andrae, R., Audard, M., Bellas-Velidis, I., Benson, K., Berthier, J., Blomme, R., Burgess, P. W., Busonero, D., Busso, G., Cánovas, H., Carry, B., Cellino, A., Cheek, N., Clementini, G., Davidson, M., de Teodoro, P., Nuñez Campos, M., Delchambre, L., Dell'Oro, A., Esquej, P., Fernández-Hernández, J., Fraile, E., Garabato, D., García-Lario, P., Haigron, R., Hambly, N. C., Harrison, D. L., Hernández, J., Hestroffer, D., Hodgkin, S. T., Janßen, K., Jevardat de Fombelle, G., Jordan, S., Krone-Martins, A., Lanzafame, A. C., Löffler, W., Marchal, O., Marrese, P. M., Moitinho, A., Muinonen, K., Osborne, P., Pancino, E., Pauwels, T., Recio-Blanco, A., Reylé, C., Riello, M., Rimoldini, L., Roegiers, T., Rybizki, J., Sarro, L. M., Smith, M., Utrilla, E., van Leeuwen, M., Abbas, U., Ábrahám, P., Abreu Aramburu, A., Aerts, C., Aguado, J. J., Ajaj, M., Aldea-Montero, F., Altavilla, G., Álvarez, M. A., Alves, J., Anders, F., Anderson, R. I., Anglada Varela, E., Antoja, T., Baines, D., Baker, S. G., Balaguer-Núñez, L., Balbinot, E., Balog, Z., Barache, C., Barbato, D., Barros, M., Bartolomé, S., Bassilana, J. L., Becciani, U., Bellazzini, M., Berihuete, A., Bernet, M., Bertone, S., Bianchi, L., Binnenfeld, A., Blanco-Cuaresma, S., Blazere, A., Boch, T., Bombrun, A., Bossini, D., Bouquillon, S., Bragaglia, A., Bramante, L., Breedt, E., Bressan, A., Brouillet, N., Brugaletta, E., Bucciarelli, B., Burlacu, A., Butkevich, A. G., Buzzi, R., Caffau, E., Cancelliere, R., Cantat-Gaudin, T., Carballo, R., Carlucci, T., Carnerero, M. I., Carrasco, J. M., Casamiquela, L., Castellani, M., Castro-Ginard, A., Chaoul, L., Charlot, P., Chemin, L., Chiaramida, V., Chiavassa, A., Chornay, N., Comoretto, G., Contursi, G., Cooper, W. J., Cornez, T., Cowell, S., Crifo, F., Cropper, M., Crosta, M., Crowley, C., Dafonte, C., Dapergolas, A., David, P., de Laverny, P., De Luise, F., De March, R., De Ridder, J., de Souza, R., de Torres, A., del Peloso, E. F., del Pozo, E., Delbo, M., Delgado, A., Delisle, J. B., Demouchy, C., Dharmawardena, T. E., Diakite, S., Diener, C., Distefano, E., Dolding, C., Enke, H., Fabre, C., Fabrizio, M., Fedorets, G., Fernique, P., Figueras, F., Fournier, Y., Fouron, C., Fragkoudi, F., Gai, M., Garcia-Gutierrez, A., Garcia-Reinaldos, M., García-Torres, M., Garofalo, A., Gavel, A., Gerlach, E., Geyer, R., Gilmore, G., Girona, S., Giuffrida, G., Gomel, R., Gomez, A., González-Núñez, J., González-Santamaría, I., González-Vidal, J. J., Granvik, M., Guillout, P., Guiraud, J., Gutiérrez-Sánchez, R., Guy, L. P., Hatzidimitriou, D., Hauser, M., Haywood, M., Helmer, A., Helmi, A., Sarmiento, M. H., Hidalgo, S. L., Hilger, T., Hładczuk, N., Hobbs, D., Holland, G., Huckle, H. E., Jardine, K., Jasniewicz, G., Jean-Antoine Piccolo, A., Jiménez-Arranz, Ó., Juaristi Campillo, J., Julbe, F., Karbevska, L., Khanna, S., Kordopatis, G., Korn, A. J., Kóspál, Á., Kostrzewa-Rutkowska, Z., Kruszyńska, K., Kun, M., Laizeau, P., Lambert, S., Lanza, A. F., Lasne, Y., Le Campion, J. F., Lebreton, Y., Lebzelter, T., Leccia, S., Lecoeur-Taibi, I., Liao, S., Licata, E. L., Lindstrøm, H. E. P., Lister, T. A., Livanou, E., Lobel, A., Lorca, A., Loup, C., Madrero Pardo, P., Magdaleno Romeo, A., Managau, S., Mann, R. G., Manteiga, M., Marchant, J. M., Marconi, M., Marcos, J., Marcos Santos, M. M. S., Marín Pina, D., Marinoni, S., Marocco, F., Marshall, D. J., Martin Polo, L., Martín-Fleitas, J. M., Marton, G., Mary, N., Masip, A., Massari, D., Mastrobuono-Battisti, A., McMillan,

P. J., Messina, S., Michalik, D., Millar, N. R., Mints, A., Molina, D., Molinaro, R., Molnár, L., Monari, G., Monguió, M., Montegriffo, P., Montero, A., Mor, R., Mora, A., Morbidelli, R., Morris, D., Muraveva, T., Murphy, C. P., Musella, I., Nagy, Z., Noval, L., Ocaña, F., Ogden, A., Ordenovic, C., Osinde, J. O., Pagani, C., Pagano, I., Palaversa, L., Palicio, P. A., Pallas-Quintela, L., Panahi, A., Payne-Wardenaar, S., Peñalosa Esteller, X., Penttilä, A., Pichon, B., Piersimoni, A. M., Pineau, F. X., Plachy, E., Plum, G., Poggio, E., Prša, A., Pulone, L., Racero, E., Ragaini, S., Rainer, M., Raiteri, C. M., Ramos, P., Ramos-Lerate, M., Regibo, S., Richards, P. J., Rios Diaz, C., Ripepi, V., Riva, A., Rix, H. W., Rixon, G., Robichon, N., Robin, A. C., Robin, C., Roelens, M., Rogues, H. R. O., Rohrbasser, L., Romero-Gómez, M., Rowell, N., Royer, F., Ruz Mieres, D., Rybicki, K. A., Sáez Núñez, A., Sagristà Sellés, A., Salguero, E., Samaras, N., Sanchez Gimenez, V., Sanna, N., Santoveña, R., Sarasso, M., Schultheis, M., Sciacca, E., Segol, M., Segovia, J. C., Semeux, D., Siddiqui, H. I., Siebert, A., Siltala, L., Silvelo, A., Slezak, E., Slezak, I., Smart, R. L., Snaith, O. N., Solano, E., Solitro, F., Souami, D., Souchay, J., Spagna, A., Spina, L., Spoto, F., Steele, I. A., Steidelmüller, H., Stephenson, C. A., Süveges, M., Surdej, J., Szabados, L., Szegedi-Elek, E., Taris, F., Taylor, M. B., Teixeira, R., Tolomei, L., Tonello, N., Torra, F., Torra, J., Torralba Elipe, G., Trabucchi, M., Tsounis, A. T., Turon, C., Ulla, A., Unger, N., Vaillant, M. V., van Dillen, E., van Reeven, W., Vanel, O., Vecchiato, A., Viala, Y., Vicente, D., Voutsinas, S., Weiler, M., Wevers, T., Wyrzykowski, Ł., Yoldas, A., Yvard, P., Zhao, H., Zorec, J. and Zucker, S. (2023a) *Gaia* Data Release 3. Stellar multiplicity, a teaser for the hidden treasure. A&A, 674, A34. https://doi.org/10.1051/0004-6361/202243782.

Gaia Collaboration, Babusiaux, C., van Leeuwen, F., Barstow, M. A., Jordi, C., Vallenari, A., Bossini, D., Bressan, A., Cantat-Gaudin, T., van Leeuwen, M., Brown, A. G. A., Prusti, T., de Bruijne, J. H. J., Bailer-Jones, C. A. L., Biermann, M., Evans, D. W., Eyer, L., Jansen, F., Klioner, S. A., Lammers, U., Lindegren, L., Luri, X., Mignard, F., Panem, C., Pourbaix, D., Randich, S., Sartoretti, P., Siddiqui, H. I., Soubiran, C., Walton, N. A., Arenou, F., Bastian, U., Cropper, M., Drimmel, R., Katz, D., Lattanzi, M. G., Bakker, J., Cacciari, C., Castañeda, J., Chaoul, L., Cheek, N., De Angeli, F., Fabricius, C., Guerra, R., Holl, B., Masana, E., Messineo, R., Mowlavi, N., Nienartowicz, K., Panuzzo, P., Portell, J., Riello, M., Seabroke, G. M., Tanga, P., Thévenin, F., Gracia-Abril, G., Comoretto, G., Garcia-Reinaldos, M., Teyssier, D., Altmann, M., Andrae, R., Audard, M., Bellas-Velidis, I., Benson, K., Berthier, J., Blomme, R., Burgess, P., Busso, G., Carry, B., Cellino, A., Clementini, G., Clotet, M., Creevey, O., Davidson, M., De Ridder, J., Delchambre, L., Dell'Oro, A., Ducourant, C., Fernández-Hernández, J., Fouesneau, M., Frémat, Y., Galluccio, L., García-Torres, M., González-Núñez, J., González-Vidal, J. J., Gosset, E., Guy, L. P., Halbwachs, J. L., Hambly, N. C., Harrison, D. L., Hernández, J., Hestroffer, D., Hodgkin, S. T., Hutton, A., Jasniewicz, G., Jean-Antoine-Piccolo, A., Jordan, S., Korn, A. J., Krone-Martins, A., Lanzafame, A. C., Lebzelter, T., Löffler, W., Manteiga, M., Marrese, P. M., Martín-Fleitas, J. M., Moitinho, A., Mora, A., Muinonen, K., Osinde, J., Pancino, E., Pauwels, T., Petit, J. M., Recio-Blanco, A., Richards, P. J., Rimoldini, L., Robin, A. C., Sarro, L. M., Siopis, C., Smith, M., Sozzetti, A., Süveges, M., Torra, J., van Reeven, W., Abbas, U., Abreu Aramburu, A., Accart, S., Aerts, C., Altavilla, G., Álvarez, M. A., Alvarez, R., Alves, J., Anderson,

R. I., Andrei, A. H., Anglada Varela, E., Antiche, E., Antoja, T., Arcay, B., Astraatmadja, T. L., Bach, N., Baker, S. G., Balaguer-Núñez, L., Balm, P., Barache, C., Barata, C., Barbato, D., Barblan, F., Barklem, P. S., Barrado, D., Barros, M., Bartholomé Muñoz, L., Bassilana, J. L., Becciani, U., Bellazzini, M., Berihuete, A., Bertone, S., Bianchi, L., Bienaymé, O., Blanco-Cuaresma, S., Boch, T., Boeche, C., Bombrun, A., Borrachero, R., Bouquillon, S., Bourda, G., Bragaglia, A., Bramante, L., Breddels, M. A., Brouillet, N., Brüsemeister, T., Brugaletta, E., Bucciarelli, B., Burlacu, A., Busonero, D., Butkevich, A. G., Buzzi, R., Caffau, E., Cancelliere, R., Cannizzaro, G., Carballo, R., Carlucci, T., Carrasco, J. M., Casamiquela, L., Castellani, M., Castro-Ginard, A., Charlot, P., Chemin, L., Chiavassa, A., Cocozza, G., Costigan, G., Cowell, S., Crifo, F., Crosta, M., Crowley, C., Cuypers, J., Dafonte, C., Damerdji, Y., Dapergolas, A., David, P., David, M., de Laverny, P., De Luise, F., De March, R., de Martino, D., de Souza, R., de Torres, A., Debosscher, J., del Pozo, E., Delbo, M., Delgado, A., Delgado, H. E., Diakite, S., Diener, C., Distefano, E., Dolding, C., Drazinos, P., Durán, J., Edvardsson, B., Enke, H., Eriksson, K., Esquej, P., Eynard Bontemps, G., Fabre, C., Fabrizio, M., Faigler, S., Falcão, A. J., Farràs Casas, M., Federici, L., Fedorets, G., Fernique, P., Figueras, F., Filippi, F., Findeisen, K., Fonti, A., Fraile, E., Fraser, M., Frézouls, B., Gai, M., Galleti, S., Garabato, D., García-Sedano, F., Garofalo, A., Garralda, N., Gavel, A., Gavras, P., Gerssen, J., Geyer, R., Giacobbe, P., Gilmore, G., Girona, S., Giuffrida, G., Glass, F., Gomes, M., Granvik, M., Gueguen, A., Guerrier, A., Guiraud, J., Gutié, R., Haigron, R., Hatzidimitriou, D., Hauser, M., Haywood, M., Heiter, U., Helmi, A., Heu, J., Hilger, T., Hobbs, D., Hofmann, W., Holland, G., Huckle, H. E., Hypki, A., Icardi, V., Janßen, K., Jevardat de Fombelle, G., Jonker, P. G., Juhász, Á. L., Julbe, F., Karampelas, A., Kewley, A., Klar, J., Kochoska, A., Kohley, R., Kolenberg, K., Kontizas, M., Kontizas, E., Koposov, S. E., Kordopatis, G., Kostrzewa-Rutkowska, Z., Koubsky, P., Lambert, S., Lanza, A. F., Lasne, Y., Lavigne, J. B., Le Fustec, Y., Le Poncin-Lafitte, C., Lebreton, Y., Leccia, S., Leclerc, N., Lecoeur-Taibi, I., Lenhardt, H., Leroux, F., Liao, S., Licata, E., Lindstrøm, H. E. P., Lister, T. A., Livanou, E., Lobel, A., López, M., Managau, S., Mann, R. G., Mantelet, G., Marchal, O., Marchant, J. M., Marconi, M., Marinoni, S., Marschalkó, G., Marshall, D. J., Martino, M., Marton, G., Mary, N., Massari, D., Matijevič, G., Mazeh, T., McMillan, P. J., Messina, S., Michalik, D., Millar, N. R., Molina, D., Molinaro, R., Molnár, L., Montegriffo, P., Mor, R., Morbidelli, R., Morel, T., Morris, D., Mulone, A. F., Muraveva, T., Musella, I., Nelemans, G., Nicastro, L., Noval, L., O'Mullane, W., Ordénovic, C., Ordóñez-Blanco, D., Osborne, P., Pagani, C., Pagano, I., Pailler, F., Palacin, H., Palaversa, L., Panahi, A., Pawlak, M., Piersimoni, A. M., Pineau, F. X., Plachy, E., Plum, G., Poggio, E., Poujoulet, E., Prša, A., Pulone, L., Racero, E., Ragaini, S., Rambaux, N., Ramos-Lerate, M., Regibo, S., Reylé, C., Riclet, F., Ripepi, V., Riva, A., Rivard, A., Rixon, G., Roegiers, T., Roelens, M., Romero-Gómez, M., Rowell, N., Royer, F., Ruiz-Dern, L., Sadowski, G., Sagristà Sellés, T., Sahlmann, J., Salgado, J., Salguero, E., Sanna, N., Santana-Ros, T., Sarasso, M., Savietto, H., Schultheis, M., Sciacca, E., Segol, M., Segovia, J. C., Ségransan, D., Shih, I. C., Siltala, L., Silva, A. F., Smart, R. L., Smith, K. W., Solano, E., Solitro, F., Sordo, R., Soria Nieto, S., Souchay, J., Spagna, A., Spoto, F., Stampa, U., Steele, I. A., Steidelmüller, H., Stephenson, C. A., Stoev, H., Suess, F. F., Surdej, J., Szabados, L., Szegedi-Elek, E., Tapiador, D., Taris, F., Tauran, G., Taylor, M. B., Teixeira, R., Terrett, D., Teyssandier, P., Thuillot, W., Titarenko, A., Torra Clotet, F., Turon, C., Ulla, A., Utrilla, E., Uzzi, S., Vaillant, M., Valentini, G., Valette, V., van Elteren, A., Van Hemelryck, E., Vaschetto, M., Vecchiato, A., Veljanoski, J., Viala, Y., Vicente, D., Vogt, S., von Essen, C., Voss, H., Votruba, V., Voutsinas, S., Walmsley, G., Weiler, M., Wertz, O., Wevers, T., Wyrzykowski, Ł., Yoldas, A., Žerjal, M., Ziaeepour, H., Zorec, J., Zschocke, S., Zucker, S., Zurbach, C. and Zwitter, T. (2018a) *Gaia* Data Release 2. Observational Hertzsprung–Russell diagrams. A&A, 616, A10. https://doi.org/10.1051/0004-6361/201832843.

Gaia Collaboration, Brown, A. G. A., Vallenari, A., Prusti, T., de Bruijne, J. H. J., Babusiaux, C., Bailer-Jones, C. A. L., Biermann, M., Evans, D. W., Eyer, L., Jansen, F., Jordi, C., Klioner, S. A., Lammers, U., Lindegren, L., Luri, X., Mignard, F., Panem, C., Pourbaix, D., Randich, S., Sartoretti, P., Siddiqui, H. I., Soubiran, C., van Leeuwen, F., Walton, N. A., Arenou, F., Bastian, U., Cropper, M., Drimmel, R., Katz, D., Lattanzi, M. G., Bakker, J., Cacciari, C., Castañeda, J., Chaoul, L., Cheek, N., De Angeli, F., Fabricius, C., Guerra, R., Holl, B., Masana, E., Messineo, R., Mowlavi, N., Nienartowicz, K., Panuzzo, P., Portell, J., Riello, M., Seabroke, G. M., Tanga, P., Thévenin, F., Gracia-Abril, G., Comoretto, G., Garcia-Reinaldos, M., Teyssier, D., Altmann, M., Andrae, R., Audard, M., Bellas-Velidis, I., Benson, K., Berthier, J., Blomme, R., Burgess, P., Busso, G., Carry, B., Cellino, A., Clementini, G., Clotet, M., Creevey, O., Davidson, M., De Ridder, J., Delchambre, L., Dell'Oro, A., Ducourant, C., Fernández-Hernández, J., Fouesneau, M., Frémat, Y., Galluccio, L., García-Torres, M., González-Núñez, J., González-Vidal, J. J., Gosset, E., Guy, L. P., Halbwachs, J. L., Hambly, N. C., Harrison, D. L., Hernández, J., Hestroffer, D., Hodgkin, S. T., Hutton, A., Jasniewicz, G., Jean-Antoine-Piccolo, A., Jordan, S., Korn, A. J., Krone-Martins, A., Lanzafame, A. C., Lebzelter, T., Löffler, W., Manteiga, M., Marrese, P. M., Martín-Fleitas, J. M., Moitinho, A., Mora, A., Muinonen, K., Osinde, J., Pancino, E., Pauwels, T., Petit, J. M., Recio-Blanco, A., Richards, P. J., Rimoldini, L., Robin, A. C., Sarro, L. M., Siopis, C., Smith, M., Sozzetti, A., Süveges, M., Torra, J., van Reeven, W., Abbas, U., Abreu Aramburu, A., Accart, S., Aerts, C., Altavilla, G., Álvarez, M. A., Alvarez, R., Alves, J., Anderson, R. I., Andrei, A. H., Anglada Varela, E., Antiche, E., Antoja, T., Arcay, B., Astraatmadja, T. L., Bach, N., Baker, S. G., Balaguer-Núñez, L., Balm, P., Barache, C., Barata, C., Barbato, D., Barblan, F., Barklem, P. S., Barrado, D., Barros, M., Barstow, M. A., Bartholomé Muñoz, S., Bassilana, J. L., Becciani, U., Bellazzini, M., Berihuete, A., Bertone, S., Bianchi, L., Bienaymé, O., Blanco-Cuaresma, S., Boch, T., Boeche, C., Bombrun, A., Borrachero, R., Bossini, D., Bouquillon, S., Bourda, G., Bragaglia, A., Bramante, L., Breddels, M. A., Bressan, A., Brouillet, N., Brüsemeister, T., Brugaletta, E., Bucciarelli, B., Burlacu, A., Busonero, D., Butkevich, A. G., Buzzi, R., Caffau, E., Cancelliere, R., Cannizzaro, G., Cantat-Gaudin, T., Carballo, R., Carlucci, T., Carrasco, J. M., Casamiquela, L., Castellani, M., Castro-Ginard, A., Charlot, P., Chemin, L., Chiavassa, A., Cocozza, G., Costigan, G., Cowell, S., Crifo, F., Crosta, M., Crowley, C., Cuypers, J., Dafonte, C., Damerdji, Y., Dapergolas, A., David, P., David, M., de Laverny, P., De Luise, F., De March, R., de Martino, D., de Souza, R., de Torres, A., Debosscher, J., del Pozo, E., Delbo, M., Delgado, A., Delgado, H. E., Di Matteo, P., Diakite, S., Diener, C., Distefano, E., Dolding, C., Drazinos, P., Durán, J., Edvardsson, B., Enke, H., Eriksson, K., Esquej, P., Eynard Bontemps, G., Fabre, C., Fabrizio, M., Faigler, S., Falcão, A. J., Farràs Casas, M., Federici, L., Fedorets, G., Fernique, P., Figueras, F., Filippi, F., Findeisen, K., Fonti, A., Fraile, E., Fraser, M., Frézouls, B., Gai, M., Galleti, S., Garabato, D., García-Sedano, F., Garofalo, A., Garralda, N., Gavel, A., Gavras, P., Gerssen, J., Geyer, R., Giacobbe, P., Gilmore, G., Girona, S., Giuffrida, G., Glass, F., Gomes, M., Granvik, M., Gueguen, A., Guerrier, A., Guiraud, J., Gutiérrez-Sánchez, R., Haigron, R., Hatzidimitriou, D., Hauser, M., Haywood, M., Heiter, U., Helmi, A., Heu, J., Hilger, T., Hobbs, D., Hofmann, W., Holland, G., Huckle, H. E., Hypki, A., Icardi, V., Janßen, K., Jevardat de Fombelle, G., Jonker, P. G., Juhász, Á. L., Julbe, F., Karampelas, A., Kewley, A., Klar, J., Kochoska, A., Kohley, R., Kolenberg, K., Kontizas, M., Kontizas, E., Koposov, S. E., Kordopatis, G., Kostrzewa-Rutkowska, Z., Koubsky, P., Lambert, S., Lanza, A. F., Lasne, Y., Lavigne, J. B., Le Fustec, Y., Le Poncin-Lafitte, C., Lebreton, Y., Leccia, S., Leclerc, N., Lecoeur-Taibi, I., Lenhardt, H., Leroux, F., Liao, S., Licata, E., Lindstrøm, H. E. P., Lister, T. A., Livanou, E., Lobel, A., López, M., Managau, S., Mann, R. G., Mantelet, G., Marchal, O., Marchant, J. M., Marconi, M., Marinoni, S., Marschalkó, G., Marshall, D. J., Martino, M., Marton, G., Mary, N., Massari, D., Matijevič, G., Mazeh, T., McMillan, P. J., Messina, S., Michalik, D., Millar, N. R., Molina, D., Molinaro, R., Molnár, L., Montegriffo, P., Mor, R., Morbidelli, R., Morel, T., Morris, D., Mulone, A. F., Muraveva, T., Musella, I., Nelemans, G., Nicastro, L., Noval, L., O'Mullane, W., Ordénovic, C., Ordóñez-Blanco, D., Osborne, P., Pagani, C., Pagano, I., Pailler, F., Palacin, H., Palaversa, L., Panahi, A., Pawlak, M., Piersimoni, A. M., Pineau, F. X., Plachy, E., Plum, G., Poggio, E., Poujoulet, E., Prša, A., Pulone, L., Racero, E., Ragaini, S., Rambaux, N., Ramos-Lerate, M., Regibo, S., Reylé, C., Riclet, F., Ripepi, V., Riva, A., Rivard, A., Rixon, G., Roegiers, T., Roelens, M., Romero-Gómez, M., Rowell, N., Royer, F., Ruiz-Dern, L., Sadowski, G., Sagristà Sellés, T., Sahlmann, J., Salgado, J., Salguero, E., Sanna, N., Santana-Ros, T., Sarasso, M., Savietto, H., Schultheis, M., Sciacca, E., Segol, M., Segovia, J. C., Ségransan, D., Shih, I. C., Siltala, L., Silva, A. F., Smart, R. L., Smith, K. W., Solano, E., Solitro, F., Sordo, R., Soria Nieto, S., Souchay, J., Spagna, A., Spoto, F., Stampa, U., Steele, I. A., Steidelmüller, H., Stephenson, C. A., Stoev, H., Suess, F. F., Surdej, J., Szabados, L., Szegedi-Elek, E., Tapiador, D., Taris, F., Tauran, G., Taylor, M. B., Teixeira, R., Terrett, D., Teyssandier, P., Thuillot, W., Titarenko, A., Torra Clotet, F., Turon, C., Ulla, A., Utrilla, E., Uzzi, S., Vaillant, M., Valentini, G., Valette, V., van Elteren, A., Van Hemelryck, E., van Leeuwen, M., Vaschetto, M., Vecchiato, A., Veljanoski, J., Viala, Y., Vicente, D., Vogt, S., von Essen, C., Voss, H., Votruba, V., Voutsinas, S., Walmsley, G., Weiler, M., Wertz, O., Wevers, T., Wyrzykowski, Ł., Yoldas, A., Žerjal, M., Ziaeepour, H., Zorec, J., Zschocke, S., Zucker, S., Zurbach, C. and Zwitter, T. (2018b) *Gaia* Data Release 2. Summary of the contents and survey properties. A&A, 616, A1. https://doi.org/10.1051/0004-6361/201833051.

Gaia Collaboration, Eyer, L., Rimoldini, L., Audard, M., Anderson, R. I., Nienartowicz, K., Glass, F., Marchal, O., Grenon, M., Mowlavi, N., Holl, B., Clementini, G., Aerts, C., Mazeh, T., Evans, D. W., Szabados, L., Brown, A. G. A., Vallenari, A., Prusti, T., de Bruijne, J. H. J., Babusiaux, C., Bailer-Jones, C. A. L., Biermann, M., Jansen, F., Jordi, C., Klioner, S. A., Lammers, U., Lindegren, L., Luri, X., Mignard, F., Panem, C., Pourbaix, D., Randich, S., Sartoretti, P., Siddiqui, H. I., Soubiran, C., van Leeuwen, F., Walton, N. A., Arenou, F., Bastian, U., Cropper, M., Drimmel, R., Katz, D., Lattanzi, M. G., Bakker, J., Cacciari, C., Castañeda, J., Chaoul, L., Cheek, N., De Angeli, F., Fabricius, C., Guerra, R., Masana, E., Messineo, R., Panuzzo, P., Portell, J., Riello, M., Seabroke, G. M., Tanga, P., Thévenin, F., Gracia-Abril, G., Comoretto, G., Garcia-Reinaldos, M., Teyssier, D., Altmann, M., Andrae, R., Bellas-Velidis, I., Benson, K., Berthier, J., Blomme, R., Burgess, P., Busso, G., Carry, B., Cellino, A., Clotet, M., Creevey, O., Davidson, M., De Ridder, J., Delchambre, L., Dell'Oro, A., Ducourant, C., Fernández-Hernández, J., Fouesneau, M., Frémat, Y., Galluccio, L., García-Torres, M., González-Núñez, J., González-Vidal, J. J., Gosset, E., Guy, L. P., Halbwachs, J. L., Hambly, N. C., Harrison, D. L., Hernández, J., Hestroffer, D., Hodgkin, S. T., Hutton, A., Jasniewicz, G., Jean-Antoine-Piccolo, A., Jordan, S., Korn, A. J., Krone-Martins, A., Lanzafame, A. C., Lebzelter, T., Löffler, W., Manteiga, M., Marrese, P. M., Martín-Fleitas, J. M., Moitinho, A., Mora, A., Muinonen, K., Osinde, J., Pancino, E., Pauwels, T., Petit, J. M., Recio-Blanco, A., Richards, P. J., Robin, A. C., Sarro, L. M., Siopis, C., Smith, M., Sozzetti, A., Süveges, M., Torra, J., van Reeven, W., Abbas, U., Abreu Aramburu, A., Accart, S., Altavilla, G., Álvarez, M. A., Alvarez, R., Alves, J., Andrei, A. H., Anglada Varela, E., Antiche, E., Antoja, T., Arcay, B., Astraatmadja, T. L., Bach, N., Baker, S. G., Balaguer-Núñez, L., Balm, P., Barache, C., Barata, C., Barbato, D., Barblan, F., Barklem, P. S., Barrado, D., Barros, M., Barstow, M. A., Bartholomé Muñoz, S., Bassilana, J. L., Becciani, U., Bellazzini, M., Berihuete, A., Bertone, S., Bianchi, L., Bienaymé, O., Blanco-Cuaresma, S., Boch, T., Boeche, C., Bombrun, A., Borrachero, R., Bossini, D., Bouquillon, S., Bourda, G., Bragaglia, A., Bramante, L., Breddels, M. A., Bressan, A., Brouillet, N., Brüsemeister, T., Brugaletta, E., Bucciarelli, B., Burlacu, A., Busonero, D., Butkevich, A. G., Buzzi, R., Caffau, E., Cancelliere, R., Cannizzaro, G., Cantat-Gaudin, T., Carballo, R., Carlucci, T., Carrasco, J. M., Casamiquela, L., Castellani, M., Castro-Ginard, A., Charlot, P., Chemin, L., Chiavassa, A., Cocozza, G., Costigan, G., Cowell, S., Crifo, F., Crosta, M., Crowley, C., Cuypers, J., Dafonte, C., Damerdji, Y., Dapergolas, A., David, P., David, M., de Laverny, P., De Luise, F., De March, R., de Martino, D., de Souza, R., de Torres, A., Debosscher, J., del Pozo, E., Delbo, M., Delgado, A., Delgado, H. E., Diakite, S., Diener, C., Distefano, E., Dolding, C., Drazinos, P., Durán, J., Edvardsson, B., Enke, H., Eriksson, K., Esquej, P., Eynard Bontemps, G., Fabre, C., Fabrizio, M., Faigler, S., Falcão, A. J., Farràs Casas, M., Federici, L., Fedorets, G., Fernique, P., Figueras, F., Filippi, F., Findeisen, K., Fonti, A., Fraile, E., Fraser, M., Frézouls, B., Gai, M., Galleti, S., Garabato, D., García-Sedano, F., Garofalo, A., Garralda, N., Gavel, A., Gavras, P., Gerssen, J., Geyer, R., Giacobbe, P., Gilmore, G., Girona, S., Giuffrida, G., Gomes, M., Granvik, M., Gueguen, A., Guerrier, A., Guiraud, J., Gutiérrez-Sánchez, R., Haigron, R., Hatzidimitriou, D., Hauser, M., Haywood, M., Heiter, U., Helmi, A., Heu, J., Hilger, T., Hobbs, D., Hofmann, W., Holland, G., Huckle, H. E., Hypki, A., Icardi, V., Janßen, K., Jevardat de Fombelle, G., Jonker, P. G., Juhász, Á. L., Julbe, F., Karampelas, A., Kewley, A., Klar, J., Kochoska, A., Kohley, R., Kolenberg, K., Kontizas, M., Kontizas, E., Koposov, S. E., Kordopatis, G., Kostrzewa-Rutkowska, Z., Koubsky, P., Lambert, S., Lanza, A. F., Lasne, Y., Lavigne, J. B., Le Fustec, Y., Le Poncin-Lafitte, C., Lebreton, Y., Leccia, S., Leclerc, N., Lecoeur-Taibi, I., Lenhardt, H., Leroux, F., Liao, S., Licata, E., Lindstrøm, H. E. P., Lister,

T. A., Livanou, E., Lobel, A., López, M., Lorenz, D., Managau, S., Mann, R. G., Mantelet, G., Marchant, J. M., Marconi, M., Marinoni, S., Marschalkó, G., Marshall, D. J., Martino, M., Marton, G., Mary, N., Massari, D., Matijevič, G., McMillan, P. J., Messina, S., Michalik, D., Millar, N. R., Molina, D., Molinaro, R., Molnár, L., Montegriffo, P., Mor, R., Morbidelli, R., Morel, T., Morgenthaler, S., Morris, D., Mulone, A. F., Muraveva, T., Musella, I., Nelemans, G., Nicastro, L., Noval, L., O'Mullane, W., Ordénovic, C., Ordóñez-Blanco, D., Osborne, P., Pagani, C., Pagano, I., Pailler, F., Palacin, H., Palaversa, L., Panahi, A., Pawlak, M., Piersimoni, A. M., Pineau, F. X., Plachy, E., Plum, G., Poggio, E., Poujoulet, E., Prša, A., Pulone, L., Racero, E., Ragaini, S., Rambaux, N., Ramos-Lerate, M., Regibo, S., Reylé, C., Riclet, F., Ripepi, V., Riva, A., Rivard, A., Rixon, G., Roegiers, T., Roelens, M., Romero-Gómez, M., Rowell, N., Royer, F., Ruiz-Dern, L., Sadowski, G., Sagristà Sellés, T., Sahlmann, J., Salgado, J., Salguero, E., Sanna, N., Santana-Ros, T., Sarasso, M., Savietto, H., Schultheis, M., Sciacca, E., Segol, M., Segovia, J. C., Ségransan, D., Shih, I. C., Siltala, L., Silva, A. F., Smart, R. L., Smith, K. W., Solano, E., Solitro, F., Sordo, R., Soria Nieto, S., Souchay, J., Spagna, A., Spoto, F., Stampa, U., Steele, I. A., Steidelmüller, H., Stephenson, C. A., Stoev, H., Suess, F. F., Surdej, J., Szegedi-Elek, E., Tapiador, D., Taris, F., Tauran, G., Taylor, M. B., Teixeira, R., Terrett, D., Teyssandier, P., Thuillot, W., Titarenko, A., Torra Clotet, F., Turon, C., Ulla, A., Utrilla, E., Uzzi, S., Vaillant, M., Valentini, G., Valette, V., van Elteren, A., Van Hemelryck, E., van Leeuwen, M., Vaschetto, M., Vecchiato, A., Veljanoski, J., Viala, Y., Vicente, D., Vogt, S., von Essen, C., Voss, H., Votruba, V., Voutsinas, S., Walmsley, G., Weiler, M., Wertz, O., Wevers, T., Wyrzykowski, Ł., Yoldas, A., Žerjal, M., Ziaeepour, H., Zorec, J., Zschocke, S., Zucker, S., Zurbach, C. and Zwitter, T. (2019) *Gaia* Data Release 2. Variable stars in the colour–absolute magnitude diagram. A&A, 623, A110. https://doi.org/10.1051/0004-6361/201833304.

Gaia Collaboration, Smart, R. L., Sarro, L. M., Rybizki, J., Reylé, C., Robin, A. C., Hambly, N. C., Abbas, U., Barstow, M. A., de Bruijne, J. H. J., Bucciarelli, B., Carrasco, J. M., Cooper, W. J., Hodgkin, S. T., Masana, E., Michalik, D., Sahlmann, J., Sozzetti, A., Brown, A. G. A., Vallenari, A., Prusti, T., Babusiaux, C., Biermann, M., Creevey, O. L., Evans, D. W., Eyer, L., Hutton, A., Jansen, F., Jordi, C., Klioner, S. A., Lammers, U., Lindegren, L., Luri, X., Mignard, F., Panem, C., Pourbaix, D., Randich, S., Sartoretti, P., Soubiran, C., Walton, N. A., Arenou, F., Bailer-Jones, C. A. L., Bastian, U., Cropper, M., Drimmel, R., Katz, D., Lattanzi, M. G., van Leeuwen, F., Bakker, J., Castañeda, J., De Angeli, F., Ducourant, C., Fabricius, C., Fouesneau, M., Frémat, Y., Guerra, R., Guerrier, A., Guiraud, J., Jean-Antoine Piccolo, A., Messineo, R., Mowlavi, N., Nicolas, C., Nienartowicz, K., Pailler, F., Panuzzo, P., Riclet, F., Roux, W., Seabroke, G. M., Sordo, R., Tanga, P., Thévenin, F., Gracia-Abril, G., Portell, J., Teyssier, D., Altmann, M., Andrae, R., Bellas-Velidis, I., Benson, K., Berthier, J., Blomme, R., Brugaletta, E., Burgess, P. W., Busso, G., Carry, B., Cellino, A., Cheek, N., Clementini, G., Damerdji, Y., Davidson, M., Delchambre, L., Dell'Oro, A., Fernández-Hernández, J., Galluccio, L., García-Lario, P., Garcia-Reinaldos, M., González-Núñez, J., Gosset, E., Haigron, R., Halbwachs, J. L., Harrison, D. L., Hatzidimitriou, D., Heiter, U., Hernández, J., Hestroffer, D., Holl, B., Janßen, K., Jevardat de Fombelle, G., Jordan, S., Krone-Martins, A., Lanzafame, A. C., Löffler, W., Lorca, A., Manteiga, M., Marchal, O., Marrese, P. M., Moitinho, A., Mora, A., Muinonen, K., Osborne, P., Pancino, E., Pauwels, T., Recio-Blanco, A., Richards, P. J., Riello, M., Rimoldini, L., Roegiers, T., Siopis, C., Smith, M., Ulla, A., Utrilla, E., van Leeuwen, M., van Reeven, W., Abreu Aramburu, A., Accart, S., Aerts, C., Aguado, J. J., Ajaj, M., Altavilla, G., Álvarez, M. A., Álvarez Cid-Fuentes, J., Alves, J., Anderson, R. I., Anglada Varela, E., Antoja, T., Audard, M., Baines, D., Baker, S. G., Balaguer-Núñez, L., Balbinot, E., Balog, Z., Barache, C., Barbato, D., Barros, M., Bartolomé, S., Bassilana, J. L., Bauchet, N., Baudesson-Stella, A., Becciani, U., Bellazzini, M., Bernet, M., Bertone, S., Bianchi, L., Blanco-Cuaresma, S., Boch, T., Bombrun, A., Bossini, D., Bouquillon, S., Bragaglia, A., Bramante, L., Breedt, E., Bressan, A., Brouillet, N., Burlacu, A., Busonero, D., Butkevich, A. G., Buzzi, R., Caffau, E., Cancelliere, R., Cánovas, H., Cantat-Gaudin, T., Carballo, R., Carlucci, T., Carnerero, M. I., Casamiquela, L., Castellani, M., Castro-Ginard, A., Castro Sampol, P., Chaoul, L., Charlot, P., Chemin, L., Chiavassa, A., Cioni, M. R. L., Comoretto, G., Cornez, T., Cowell, S., Crifo, F., Crosta, M., Crowley, C., Dafonte, C., Dapergolas, A., David, M., David, P., de Laverny, P., De Luise, F., De March, R., De Ridder, J., de Souza, R., de Teodoro, P., de Torres, A., del Peloso, E. F., del Pozo, E., Delgado, A., Delgado, H. E., Delisle, J. B., Di Matteo, P., Diakite, S., Diener, C., Distefano, E., Dolding, C., Eappachen, D., Edvardsson, B., Enke, H., Esquej, P., Fabre, C., Fabrizio, M., Faigler, S., Fedorets, G., Fernique, P., Fienga, A., Figueras, F., Fouron, C., Fragkoudi, F., Fraile, E., Franke, F., Gai, M., Garabato, D., Garcia-Gutierrez, A., García-Torres, M., Garofalo, A., Gavras, P., Gerlach, E., Geyer, R., Giacobbe, P., Gilmore, G., Girona, S., Giuffrida, G., Gomel, R., Gomez, A., Gonzalez-Santamaria, I., González-Vidal, J. J., Granvik, M., Gutiérrez-Sánchez, R., Guy, L. P., Hauser, M., Haywood, M., Helmi, A., Hidalgo, S. L., Hilger, T., Hładczuk, N., Hobbs, D., Holland, G., Huckle, H. E., Jasniewicz, G., Jonker, P. G., Juaristi Campillo, J., Julbe, F., Karbevska, L., Kervella, P., Khanna, S., Kochoska, A., Kontizas, M., Kordopatis, G., Korn, A. J., Kostrzewa-Rutkowska, Z., Kruszyńska, K., Lambert, S., Lanza, A. F., Lasne, Y., Le Campion, J. F., Le Fustec, Y., Lebreton, Y., Lebzelter, T., Leccia, S., Leclerc, N., Lecoeur-Taibi, I., Liao, S., Licata, E., Lindstrøm, H. E. P., Lister, T. A., Livanou, E., Lobel, A., Madrero Pardo, P., Managau, S., Mann, R. G., Marchant, J. M., Marconi, M., Marcos Santos, M. M. S., Marinoni, S., Marocco, F., Marshall, D. J., Martin Polo, L., Martín-Fleitas, J. M., Masip, A., Massari, D., Mastrobuono-Battisti, A., Mazeh, T., McMillan, P. J., Messina, S., Millar, N. R., Mints, A., Molina, D., Molinaro, R., Molnár, L., Montegriffo, P., Mor, R., Morbidelli, R., Morel, T., Morris, D., Mulone, A. F., Munoz, D., Muraveva, T., Murphy, C. P., Musella, I., Noval, L., Ordénovic, C., Orrù, G., Osinde, J., Pagani, C., Pagano, I., Palaversa, L., Palicio, P. A., Panahi, A., Pawlak, M., Peñalosa Esteller, X., Penttilä, A., Piersimoni, A. M., Pineau, F. X., Plachy, E., Plum, G., Poggio, E., Poretti, E., Poujoulet, E., Prša, A., Pulone, L., Racero, E., Ragaini, S., Rainer, M., Raiteri, C. M., Rambaux, N., Ramos, P., Ramos-Lerate, M., Re Fiorentin, P., Regibo, S., Ripepi, V., Riva, A., Rixon, G., Robichon, N., Robin, C., Roelens, M., Rohrbasser, L., Romero-Gómez, M., Rowell, N., Royer, F., Rybicki, K. A., Sadowski, G., Sagristà Sellés, A., Salgado, J., Salguero, E., Samaras, N., Sanchez Gimenez, V., Sanna, N., Santoveña, R., Sarasso, M., Schultheis, M., Sciacca, E., Segol, M., Segovia, J. C., Ségransan, D., Semeux, D., Shahaf, S., Siddiqui, H. I., Siebert, A., Siltala, L., Slezak, E., Solano, E., Solitro, F., Souami, D., Souchay, J., Spagna, A., Spoto, F., Steele, I. A., Steidelmüller, H., Stephenson, C. A., Süveges, M., Szabados, L., Szegedi-Elek, E., Taris, F., Tauran, G., Taylor, M. B., Teixeira, R., Thuillot, W., Tonello, N., Torra, F., Torra, J., Turon, C., Unger, N., Vaillant, M., van Dillen, E., Vanel, O., Vecchiato, A., Viala, Y., Vicente, D., Voutsinas, S., Weiler, M., Wevers, T., Wyrzykowski, Ł., Yoldas, A., Yvard, P., Zhao, H., Zorec, J., Zucker, S., Zurbach, C. and Zwitter, T. (2021) *Gaia* Early Data Release 3. The *Gaia* catalogue of nearby stars. A&A, 649, A6. https://doi.org/10.1051/0004-6361/202039498.

Gaia Collaboration, Vallenari, A., Brown, A. G. A., Prusti, T., de Bruijne, J. H. J., Arenou, F., Babusiaux, C., Biermann, M., Creevey, O. L., Ducourant, C., Evans, D. W., Eyer, L., Guerra, R., Hutton, A., Jordi, C., Klioner, S. A., Lammers, U. L., Lindegren, L., Luri, X., Mignard, F., Panem, C., Pourbaix, D., Randich, S., Sartoretti, P., Soubiran, C., Tanga, P., Walton, N. A., Bailer-Jones, C. A. L., Bastian, U., Drimmel, R., Jansen, F., Katz, D., Lattanzi, M. G., van Leeuwen, F., Bakker, J., Cacciari, C., Castañeda, J., De Angeli, F., Fabricius, C., Fouesneau, M., Frémat, Y., Galluccio, L., Guerrier, A., Heiter, U., Masana, E., Messineo, R., Mowlavi, N., Nicolas, C., Nienartowicz, K., Pailler, F., Panuzzo, P., Riclet, F., Roux, W., Seabroke, G. M., Sordo, R., Thévenin, F., Gracia-Abril, G., Portell, J., Teyssier, D., Altmann, M., Andrae, R., Audard, M., Bellas-Velidis, I., Benson, K., Berthier, J., Blomme, R., Burgess, P. W., Busonero, D., Busso, G., Cánovas, H., Carry, B., Cellino, A., Cheek, N., Clementini, G., Damerdji, Y., Davidson, M., de Teodoro, P., Nuñez Campos, M., Delchambre, L., Dell'Oro, A., Esquej, P., Fernández-Hernández, J., Fraile, E., Garabato, D., García-Lario, P., Gosset, E., Haigron, R., Halbwachs, J. L., Hambly, N. C., Harrison, D. L., Hernández, J., Hestroffer, D., Hodgkin, S. T., Holl, B., Janßen, K., Jevardat de Fombelle, G., Jordan, S., Krone-Martins, A., Lanzafame, A. C., Löffler, W., Marchal, O., Marrese, P. M., Moitinho, A., Muinonen, K., Osborne, P., Pancino, E., Pauwels, T., Recio-Blanco, A., Reylé, C., Riello, M., Rimoldini, L., Roegiers, T., Rybizki, J., Sarro, L. M., Siopis, C., Smith, M., Sozzetti, A., Utrilla, E., van Leeuwen, M., Abbas, U., Ábrahám, P., Abreu Aramburu, A., Aerts, C., Aguado, J. J., Ajaj, M., Aldea-Montero, F., Altavilla, G., Álvarez, M. A., Alves, J., Anders, F., Anderson, R. I., Anglada Varela, E., Antoja, T., Baines, D., Baker, S. G., Balaguer-Núñez, L., Balbinot, E., Balog, Z., Barache, C., Barbato, D., Barros, M., Barstow, M. A., Bartolomé, S., Bassilana, J. L., Bauchet, N., Becciani, U., Bellazzini, M., Berihuete, A., Bernet, M., Bertone, S., Bianchi, L., Binnenfeld, A., Blanco-Cuaresma, S., Blazere, A., Boch, T., Bombrun, A., Bossini, D., Bouquillon, S., Bragaglia, A., Bramante, L., Breedt, E., Bressan, A., Brouillet, N., Brugaletta, E., Bucciarelli, B., Burlacu, A., Butkevich, A. G., Buzzi, R., Caffau, E., Cancelliere, R., Cantat-Gaudin, T., Carballo, R., Carlucci, T., Carnerero, M. I., Carrasco, J. M., Casamiquela, L., Castellani, M., Castro-Ginard, A., Chaoul, L., Charlot, P., Chemin, L., Chiaramida, V., Chiavassa, A., Chornay, N., Comoretto, G., Contursi, G., Cooper, W. J., Cornez, T., Cowell, S., Crifo, F., Cropper, M., Crosta, M., Crowley, C., Dafonte, C., Dapergolas, A., David, M., David, P., de Laverny, P., De Luise, F., De March, R., De Ridder, J., de Souza, R., de Torres, A., del Peloso, E. F., del Pozo, E., Delbo, M., Delgado, A., Delisle, J. B., Demouchy, C., Dharmawardena, T. E., Di Matteo, P., Diakite, S., Diener, C., Distefano, E., Dolding, C., Edvardsson, B., Enke, H., Fabre, C., Fabrizio, M., Faigler, S., Fedorets, G., Fernique, P., Fienga, A., Figueras, F., Fournier, Y., Fouron, C., Fragkoudi, F., Gai, M., Garcia-Gutierrez, A., Garcia-Reinaldos, M., García-Torres, M., Garofalo, A., Gavel, A., Gavras, P., Gerlach, E., Geyer, R., Giacobbe, P., Gilmore, G., Girona, S., Giuffrida, G., Gomel, R., Gomez, A., González-Núñez, J., González-Santamaría, I., González-Vidal, J. J., Granvik, M., Guillout, P., Guiraud, J., Gutiérrez-Sánchez, R., Guy, L. P., Hatzidimitriou, D., Hauser, M., Haywood, M., Helmer, A., Helmi, A., Sarmiento, M. H., Hidalgo, S. L., Hilger, T., Hładczuk, N., Hobbs, D., Holland, G., Huckle, H. E., Jardine, K., Jasniewicz, G., Jean-Antoine Piccolo, A., Jiménez-Arranz, Ó., Jorissen, A., Juaristi Campillo, J., Julbe, F., Karbevska, L., Kervella, P., Khanna, S., Kontizas, M., Kordopatis, G., Korn, A. J., Kóspál, Á., Kostrzewa-Rutkowska, Z., Kruszyńska, K., Kun, M., Laizeau, P., Lambert, S., Lanza, A. F., Lasne, Y., Le Campion, J. F., Lebreton, Y., Lebzelter, T., Leccia, S., Leclerc, N., Lecoeur-Taibi, I., Liao, S., Licata, E. L., Lindstrøm, H. E. P., Lister, T. A., Livanou, E., Lobel, A., Lorca, A., Loup, C., Madrero Pardo, P., Magdaleno Romeo, A., Managau, S., Mann, R. G., Manteiga, M., Marchant, J. M., Marconi, M., Marcos, J., Marcos Santos, M. M. S., Marín Pina, D., Marinoni, S., Marocco, F., Marshall, D. J., Martin Polo, L., Martín-Fleitas, J. M., Marton, G., Mary, N., Masip, A., Massari, D., Mastrobuono-Battisti, A., Mazeh, T., McMillan, P. J., Messina, S., Michalik, D., Millar, N. R., Mints, A., Molina, D., Molinaro, R., Molnár, L., Monari, G., Monguió, M., Montegriffo, P., Montero, A., Mor, R., Mora, A., Morbidelli, R., Morel, T., Morris, D., Muraveva, T., Murphy, C. P., Musella, I., Nagy, Z., Noval, L., Ocaña, F., Ogden, A., Ordenovic, C., Osinde, J. O., Pagani, C., Pagano, I., Palaversa, L., Palicio, P. A., Pallas-Quintela, L., Panahi, A., Payne-Wardenaar, S., Peñalosa Esteller, X., Penttilä, A., Pichon, B., Piersimoni, A. M., Pineau, F. X., Plachy, E., Plum, G., Poggio, E., Prša, A., Pulone, L., Racero, E., Ragaini, S., Rainer, M., Raiteri, C. M., Rambaux, N., Ramos, P., Ramos-Lerate, M., Re Fiorentin, P., Regibo, S., Richards, P. J., Rios Diaz, C., Ripepi, V., Riva, A., Rix, H. W., Rixon, G., Robichon, N., Robin, A. C., Robin, C., Roelens, M., Rogues, H. R. O., Rohrbasser, L., Romero-Gómez, M., Rowell, N., Royer, F., Ruz Mieres, D., Rybicki, K. A., Sadowski, G., Sáez Núñez, A., Sagristà Sellés, A., Sahlmann, J., Salguero, E., Samaras, N., Sanchez Gimenez, V., Sanna, N., Santoveña, R., Sarasso, M., Schultheis, M., Sciacca, E., Segol, M., Segovia, J. C., Ségransan, D., Semeux, D., Shahaf, S., Siddiqui, H. I., Siebert, A., Siltala, L., Silvelo, A., Slezak, E., Slezak, I., Smart, R. L., Snaith, O. N., Solano, E., Solitro, F., Souami, D., Souchay, J., Spagna, A., Spina, L., Spoto, F., Steele, I. A., Steidelmüller, H., Stephenson, C. A., Süveges, M., Surdej, J., Szabados, L., Szegedi-Elek, E., Taris, F., Taylor, M. B., Teixeira, R., Tolomei, L., Tonello, N., Torra, F., Torra, J., Torralba Elipe, G., Trabucchi, M., Tsounis, A. T., Turon, C., Ulla, A., Unger, N., Vaillant, M. V., van Dillen, E., van Reeven, W., Vanel, O., Vecchiato, A., Viala, Y., Vicente, D., Voutsinas, S., Weiler, M., Wevers, T., Wyrzykowski, Ł., Yoldas, A., Yvard, P., Zhao, H., Zorec, J., Zucker, S. and Zwitter, T. (2023b) *Gaia* Data Release 3. Summary of the content and survey properties. A&A, 674, A1. https://doi.org/10.1051/0004-6361/202243940.

Gao, Y., Toonen, S. and Leigh, N. (2023) Stellar triples as a source for Ba stars. MNRAS, 518(1), 526–538. https://doi.org/10.1093/mnras/stac3068.

Geller, A. M., Hurley, J. R. and Mathieu, R. D. (2013) Direct *N*-body modeling of the old open cluster NGC 188: A detailed comparison of theoretical and observed binary star and blue straggler populations. AJ, 145(1), 8. https://doi.org/10.1088/0004-6256/145/1/8.

Gilmore, G., Randich, S., Worley, C. C., Hourihane, A., Gonneau, A., Sacco, G. G., Lewis, J. R., Magrini, L., François, P., Jeffries, R. D., Koposov, S. E., Bragaglia, A., Alfaro, E. J., Allende Prieto, C., Blomme, R., Korn, A. J., Lanzafame, A. C., Pancino, E., Recio-Blanco, A., Smiljanic, R., Van Eck, S., Zwitter, T., Bensby, T., Flaccomio, E., Irwin, M. J., Franciosini, E., Morbidelli, L., Damiani, F., Bonito, R., Friel, E. D., Vink, J. S., Prisinzano, L., Abbas, U., Hatzidimitriou, D., Held, E. V., Jordi, C., Paunzen, E., Spagna, A., Jackson, R. J., Maíz Apellániz, J., Asplund, M., Bonifacio, P., Feltzing, S., Binney, J., Drew, J., Ferguson, A. M. N., Micela, G., Negueruela, I., Prusti, T., Rix, H. W., Vallenari, A., Bergemann, M., Casey, A. R., de Laverny, P., Frasca, A., Hill, V., Lind, K., Sbordone, L., Sousa, S. G., Adibekyan, V., Caffau, E., Daflon, S., Feuillet, D. K., Gebran, M., Gonzalez Hernandez, J. I., Guiglion, G., Herrero, A., Lobel, A., Merle, T., Mikolaitis, Š., Montes, D., Morel, T., Ruchti, G., Soubiran, C., Tabernero, H. M., Tautvaišienė, G., Traven, G., Valentini, M., Van der Swaelmen, M., Villanova, S., Viscasillas Vázquez, C., Bayo, A., Biazzo, K., Carraro, G., Edvardsson, B., Heiter, U., Jofré, P., Marconi, G., Martayan, C., Masseron, T., Monaco, L., Walton, N. A., Zaggia, S., Aguirre Børsen-Koch, V., Alves, J., Balaguer-Nunez, L., Barklem, P. S., Barrado, D., Bellazzini, M., Berlanas, S. R., Binks, A. S., Bressan, A., Capuzzo-Dolcetta, R., Casagrande, L., Casamiquela, L., Collins, R. S., D'Orazi, V., Dantas, M. L. L., Debattista, V. P., Delgado-Mena, E., Di Marcantonio, P., Drazdauskas, A., Evans, N. W., Famaey, B., Franchini, M., Frémat, Y., Fu, X., Geisler, D., Gerhard, O., González Solares, E. A., Grebel, E. K., Gutiérrez Albarrán, M. L., Jiménez-Esteban, F., Jönsson, H., Khachaturyants, T., Kordopatis, G., Kos, J., Lagarde, N., Ludwig, H. G., Mahy, L., Mapelli, M., Marfil, E., Martell, S. L., Messina, S., Miglio, A., Minchev, I., Moitinho, A., Montalban, J., Monteiro, M. J. P. F. G., Morossi, C., Mowlavi, N., Mucciarelli, A., Murphy, D. N. A., Nardetto, N., Ortolani, S., Paletou, F., Palouš, J., Pickering, J. C., Quirrenbach, A., Re Fiorentin, P., Read, J. I., Romano, D., Ryde, N., Sanna, N., Santos, W., Seabroke, G. M., Spina, L., Steinmetz, M., Stonkuté, E., Sutorius, E., Thévenin, F., Tosi, M., Tsantaki, M., Wright, N., Wyse, R. F. G., Zoccali, M., Zorec, J. and Zucker, D. B. (2022) The *Gaia*-ESO public spectroscopic survey: Motivation, implementation, GIRAFFE data processing, analysis, and final data products. A&A, 666, A120. https://doi.org/10.1051/0004-6361/202243134.

Graczyk, D., Soszyński, I., Poleski, R., Pietrzyński, G., Udalski, A., Szymański, M. K., Kubiak, M., Wyrzykowski, Ł. and Ulaczyk, K. (2011) The optical gravitational lensing experiment. The OGLE-III catalog of variable stars. XII. Eclipsing binary stars in the Large Magellanic Cloud. AcA, 61(2), 103–122. https://doi.org/10.48550/arXiv.1108.0446.

Green, M. J., Maoz, D., Mazeh, T., Faigler, S., Shahaf, S., Gomel, R., El-Badry, K. and Rix, H.-W. (2023) 15 000 ellipsoidal binary candidates in TESS: Orbital periods, binary fraction, and tertiary companions. MNRAS, 522(1), 29–55. https://doi.org/10.1093/mnras/stad915.

Han, Z.-W., Ge, H.-W., Chen, X.-F. and Chen, H.-L. (2020) Binary population synthesis. RAA, 20(10), 161. https://doi.org/10.1088/1674-4527/20/10/161.

Herschel, W. (1803) Account of the changes that have happened, during the last twenty-five years, in the relative situation of double-stars; with an investigation of the cause to which they are owing. RSPT, 93, 339–382.

Howard, E. L., Davenport, J. R. A. and Covey, K. R. (2022) 370 new eclipsing binary candidates from TESS Sectors 1–26. RNAAS, 6(5), 96. https://doi.org/10.3847/2515-5172/ac6e42.

Iben, I. and Renzini, A. (1984) Single star evolution I. Massive stars and early evolution of low and intermediate mass stars. PhR, 105(6), 329–406. https://doi.org/10.1016/0370-1573(84)90142-X.

Izzard, R. G., Jeffery, C. S. and Lattanzio, J. (2007) Origin of the early-type R stars: a binary-merger solution to a century-old problem? A&A, 470(2), 661–673. https://doi.org/10.1051/0004-6361:20077457.

Jorissen, A., Boffin, H. M. J., Karinkuzhi, D., Van Eck, S., Escorza, A., Shetye, S. and Van Winckel, H. (2019) Barium and related stars, and their white-dwarf companions. I. Giant stars. A&A, 626, A127. https://doi.org/10.1051/0004-6361/201834630.

Kamiński, T., Tylenda, R., Kiljan, A., Schmidt, M., Lisiecki, K., Melis, C., Frankowski, A., Joshi, V. and Menten, K. M. (2021) V838 Monocerotis as seen by ALMA: A remnant of a binary merger in a triple system. A&A, 655, A32. https://doi.org/10.1051/0004-6361/202141526.

Karinkuzhi, D., Van Eck, S., Goriely, S., Siess, L., Jorissen, A., Merle, T., Escorza, A. and Masseron, T. (2021) Low-mass low-metallicity AGB stars as an efficient *i*-process site explaining CEMP-rs stars. A&A, 645, A61. https://doi.org/10.1051/0004-6361/202038891.

Kippenhahn, R., Weigert, A. and Weiss, A. (2013) Stellar Structure and Evolution. Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-30304-3.

Kirk, B., Conroy, K., Prša, A., Abdul-Masih, M., Kochoska, A., Matijevič, G., Hambleton, K., Barclay, T., Bloemen, S., Boyajian, T., Doyle, L. R., Fulton, B. J., Hoekstra, A. J., Jek, K., Kane, S. R., Kostov, V., Latham, D., Mazeh, T., Orosz, J. A., Pepper, J., Quarles, B., Ragozzine, D., Shporer, A., Southworth, J., Stassun, K., Thompson, S. E., Welsh, W. F., Agol, E., Derekas, A., Devor, J., Fischer, D., Green, G., Gropp, J., Jacobs, T., Johnston, C., LaCourse, D. M., Saetre, K., Schwengeler, H., Toczyski, J., Werner, G., Garrett, M., Gore, J., Martinez, A. O., Spitzer, I., Stevick, J., Thomadis, P. C., Vrijmoet, E. H., Yenawine, M., Batalha, N. and Borucki, W. (2016) *Kepler* eclipsing binary stars. VII. The catalog of eclipsing binaries found in the entire *Kepler* data set. AJ, 151(3), 68. https://doi.org/10.3847/0004-6256/151/3/68.

Kobulnicky, H. A., Molnar, L. A., Cook, E. M. and Henderson, L. E. (2022) A Bayesian analysis of physical parameters for 783 Kepler close binaries: Extreme-mass-ratio systems and a new mass ratio versus period lower limit. ApJS, 262(1), 12. https://doi.org/10.3847/1538-4365/ac75bd.

Koch, D. G., Borucki, W. J., Basri, G., Batalha, N. M., Brown, T. M., Caldwell, D., Christensen-Dalsgaard, J., Cochran, W. D., DeVore, E., Dunham, E. W., Gautier, I., Thomas N., Geary, J. C., Gilliland, R. L., Gould, A., Jenkins, J., Kondo, Y., Latham, D. W., Lissauer, J. J., Marcy, G., Monet, D., Sasselov, D., Boss, A., Brownlee, D., Caldwell, J., Dupree, A. K., Howell, S. B., Kjeldsen, H., Meibom, S., Morrison, D., Owen, T., Reitsema, H., Tarter, J., Bryson, S. T., Dotson, J. L., Gazis, P., Haas, M. R., Kolodziejczak, J., Rowe, J. F., Van Cleve, J. E., Allen, C., Chandrasekaran, H., Clarke, B. D., Li, J., Quintana, E. V., Tenenbaum, P., Twicken, J. D. and Wu, H. (2010) *Kepler Mission* design, realized photometric performance, and early science. ApJ, 713(2), L79–L86. https://doi.org/10.1088/2041-8205/713/2/L79.

Kochanek, C. S., Shappee, B. J., Stanek, K. Z., Holoien, T. W. S., Thompson, T. A., Prieto, J. L., Dong, S., Shields, J. V., Will, D., Britt, C., Perzanowski, D. and Pojmański, G. (2017) The All-Sky Automated Survey for Supernovae (ASAS-SN) light curve server v1.0. PASP, 129(980), 104502. https://doi.org/10.1088/1538-3873/aa80d9.

Kostov, V. B., Powell, B. P., Rappaport, S. A., Borkovits, T., Gagliano, R., Jacobs, T. L., Kristiansen, M. H., LaCourse, D. M., Omohundro, M., Orosz, J., Schmitt, A. R., Schwengeler, H. M., Terentev, I. A., Torres, G., Barclay, T., Friedman, A. H., Kruse, E., Olmschenk, G., Vanderburg, A. and Welsh, W. (2022) Ninety-seven eclipsing quadruple star candidates discovered in TESS full-frame images. ApJS, 259(2), 66. https://doi.org/10.3847/1538-4365/ac5458.

Kounkel, M., Covey, K. R., Stassun, K. G., Price-Whelan, A. M., Holtzman, J., Chojnowski, D., Longa-Peña, P., Román-Zúñiga, C. G., Hernandez, J., Serna, J., Badenes, C., De Lee, N., Majewski, S., Stringfellow, G. S., Kratter, K. M., Moe, M., Frinchaboy, P. M., Beaton, R. L., Fernández-Trincado, J. G., Mahadevan, S., Minniti, D., Beers, T. C., Schneider, D. P., Barba, R., Brownstein, J. R., García-Hernández, D. A., Pan, K. and Bizyaev, D. (2021) Double-lined spectroscopic binaries in the APOGEE DR16 and DR17 data. AJ, 162(5), 184. https://doi.org/10.3847/1538-3881/ac1798.

Kovalev, M., Chen, X. and Han, Z. (2022) Detection of 2460 double-lined spectroscopic binary candidates in the LAMOST-MRS using projected rotational velocities and a binary spectral model. MNRAS, 517(1), 356–373. https://doi.org/10.1093/mnras/stac2513.

Kovaleva, D., Kaygorodov, P., Malkov, O., Debray, B. and Oblak, E. (2015) Binary star DataBase BDB development: Structure, algorithms, and VO standards implementation. A&C, 11, 119–125. https://doi.org/10.1016/j.ascom.2015.02.007.

Kurtz, D. W. (2022) Asteroseismology across the Hertzsprung–Russell diagram. ARA&A, 60, 31–71. https://doi.org/10.1146/annurev-astro-052920-094232.

Ledrew, G. (2001) The real starry sky. JRASC, 95, 32.

Li, C.-q., Shi, J.-r., Yan, H.-l., Fu, J.-N., Li, J.-d. and Hou, Y.-H. (2021) Double- and triple-line spectroscopic candidates in the LAMOST medium-resolution spectroscopic survey. ApJS, 256(2), 31. https://doi.org/10.3847/1538-4365/ac22a8.

Mahy, L., Sana, H., Shenar, T., Sen, K., Langer, N., Marchant, P., Abdul-Masih, M., Banyard, G., Bodensteiner, J., Bowman, D. M., Dsilva, K., Fabry, M., Hawcroft, C., Janssens, S., Van Reeth, T. and Eldridge, C. (2022) Identifying quiescent compact objects in massive Galactic single-lined spectroscopic binaries. A&A, 664, A159. https://doi.org/10.1051/0004-6361/202243147.

Majewski, S. R., Schiavon, R. P., Frinchaboy, P. M., Allende Prieto, C., Barkhouser, R., Bizyaev, D., Blank, B., Brunner, S., Burton, A., Carrera, R., Chojnowski, S. D., Cunha, K., Epstein, C., Fitzgerald, G., García Pérez, A. E., Hearty, F. R., Henderson, C., Holtzman, J. A., Johnson, J. A., Lam, C. R., Lawler, J. E., Maseman, P., Mészáros, S., Nelson, M., Nguyen, D. C., Nidever, D. L., Pinsonneault, M., Shetrone, M., Smee, S., Smith, V. V., Stolberg, T., Skrutskie, M. F., Walker, E., Wilson, J. C., Zasowski, G., Anders, F., Basu, S., Beland, S., Blanton, M. R., Bovy, J., Brownstein, J. R., Carlberg, J., Chaplin, W., Chiappini, C., Eisenstein, D. J., Elsworth, Y., Feuillet, D., Fleming, S. W., Galbraith-Frew, J., García, R. A., García-Hernández, D. A., Gillespie, B. A., Girardi, L., Gunn, J. E., Hasselquist, S., Hayden, M. R., Hekker, S., Ivans, I., Kinemuchi, K., Klaene, M., Mahadevan, S., Mathur, S., Mosser, B., Muna, D., Munn, J. A., Nichol, R. C., O'Connell, R. W., Parejko, J. K., Robin, A. C., Rocha-Pinto, H., Schultheis, M., Serenelli, A. M., Shane, N., Silva Aguirre, V., Sobeck, J. S., Thompson, B., Troup, N. W., Weinberg, D. H. and Zamora, O. (2017) The Apache Point Observatory Galactic Evolution Experiment (APOGEE). AJ, 154(3), 94. https://doi.org/10.3847/1538-3881/aa784d.

Mason, B. D., Wycoff, G. L., Hartkopf, W. I., Douglass, G. G. and Worley, C. E. (2001) The 2001 US Naval Observatory double star CD-ROM. I. The Washington Double Star Catalog. AJ, 122(6), 3466–3471. https://doi.org/10.1086/323920.

Matijevič, G., Zwitter, T., Munari, U., Bienaymé, O., Binney, J., Bland-Hawthorn, J., Boeche, C., Campbell, R., Freeman, K. C., Gibson, B., Gilmore, G., Grebel, E. K., Helmi, A., Navarro, J. F., Parker, Q. A., Seabroke, G. M., Siebert, A., Siviero, A., Steinmetz, M., Watson, F. G., Williams, M. and Wyse, R. F. G. (2010) Double-lined spectroscopic binary stars in the Radial Velocity Experiment survey. AJ, 140(1), 184–195. https://doi.org/10.1088/0004-6256/140/1/184.

Mazeh, T., Faigler, S., Bashi, D., Shahaf, S., Davidson, N., Green, M., Gomel, R., Maoz, D., Sussholz, A., Dong, S., Zhang, H., Liu, J., Wang, S., Luo, A., Zheng, Z., Hallakoun, N., Perdelwitz, V., Latham, D. W., Ribas, I., Baroch, D., Morales, J. C., Nagel, E., Santos, N. C., Ciardi, D. R., Christiansen, J. L., Lund, M. B. and Winn, J. N. (2022) Probable dormant neutron star in a short-period binary system. MNRAS, 517(3), 4005–4021. https://doi.org/10.1093/mnras/stac2853.

McClure, R. D. (1997) The R stars: Carbon stars of a different kind. PASP, 109, 256–263. https://doi.org/10.1086/133882.

Merle, T., Hamers, A. S., Van Eck, S., Jorissen, A., Van der Swaelmen, M., Pollard, K., Smiljanic, R., Pourbaix, D., Zwitter, T., Traven, G., Gilmore, G., Randich, S., Gonneau, A., Hourihane, A., Sacco, G. and Worley, C. C. (2022) A spectroscopic quadruple as a possible progenitor of sub-Chandrasekhar type Ia supernovae. NatAs, 6, 681–688. https://doi.org/10.1038/s41550-022-01664-5.

Merle, T., Thévenin, F., Pichon, B. and Bigot, L. (2011) A grid of non-local thermodynamic equilibrium corrections for magnesium and calcium in late-type giant and supergiant stars: application to *Gaia*. MNRAS, 418(2), 863–887. https://doi.org/10.1111/j.1365-2966.2011.19540.x.

Merle, T., Van der Swaelmen, M., Van Eck, S., Jorissen, A., Jackson, R. J., Traven, G., Zwitter, T., Pourbaix, D., Klutsch, A., Sacco, G., Blomme, R., Masseron, T., Gilmore, G., Randich, S., Badenes, C., Bayo, A., Bensby, T., Bergemann, M., Biazzo, K., Damiani, F., Feuillet, D., Frasca, A., Gonneau, A., Jeffries, R. D., Jofré, P., Morbidelli, L., Mowlavi, N., Pancino, E. and Prisinzano, L. (2020) The *Gaia*-ESO survey: detection and characterisation of single-line spectroscopic binaries. A&A, 635, A155. https://doi.org/10.1051/0004-6361/201935819.

Merle, T., Van Eck, S., Jorissen, A., Van der Swaelmen, M., Masseron, T., Zwitter, T., Hatzidimitriou, D., Klutsch, A., Pourbaix, D., Blomme, R., Worley, C. C., Sacco, G., Lewis, J., Abia, C., Traven, G., Sordo, R., Bragaglia, A., Smiljanic, R., Pancino, E., Damiani, F., Hourihane, A., Gilmore, G., Randich, S., Koposov, S., Casey, A., Morbidelli, L., Franciosini, E., Magrini, L., Jofre, P., Costado, M. T., Jeffries, R. D., Bergemann, M., Lanzafame, A. C., Bayo, A., Carraro, G., Flaccomio, E., Monaco, L. and Zaggia, S. (2017) The *Gaia*-ESO survey: double-, triple-, and quadruple-line spectroscopic binary candidates. A&A, 608, A95. https://doi.org/10.1051/0004-6361/201730442.

Miller-Jones, J. C. A., Bahramian, A., Orosz, J. A., Mandel, I., Gou, L., Maccarone, T. J., Neijssel, C. J., Zhao, X., Ziółkowski, J., Reid, M. J., Uttley, P., Zheng, X., Byun, D.-Y., Dodson, R., Grinberg, V., Jung, T., Kim, J.-S., Marcote, B., Markoff, S., Rioja, M. J., Rushton, A. P., Russell, D. M., Sivakoff, G. R., Tetarenko, A. J., Tudose, V. and Wilms, J. (2021) Cygnus X-1 contains a 21–solar mass black hole—Implications for massive star winds. Sci, 371(6533), 1046–1049. https://doi.org/10.1126/science.abb3363.

Minniti, D., Lucas, P. W., Emerson, J. P., Saito, R. K., Hempel, M., Pietrukowicz, P., Ahumada, A. V., Alonso, M. V., Alonso-Garcia, J., Arias, J. I., Bandyopadhyay, R. M., Barbá, R. H., Barbuy, B., Bedin, L. R., Bica, E., Borissova, J., Bronfman, L., Carraro, G., Catelan, M., Clariá, J. J., Cross, N., de Grijs, R., Dékány, I., Drew, J. E., Fariña, C., Feinstein, C., Fernández Lajús, E., Gamen, R. C., Geisler, D., Gieren, W., Goldman, B., Gonzalez, O. A., Gunthardt, G., Gurovich, S., Hambly, N. C., Irwin, M. J., Ivanov, V. D., Jordán, A., Kerins, E., Kinemuchi, K., Kurtev, R., López-Corredoira, M., Maccarone, T., Masetti, N., Merlo, D., Messineo, M., Mirabel, I. F., Monaco, L., Morelli, L., Padilla, N., Palma, T., Parisi, M. C., Pignata, G., Rejkuba, M., Roman-Lopes, A., Sale, S. E., Schreiber, M. R., Schröder, A. C., Smith, M., , J., L. Sodré, Soto, M., Tamura, M., Tappert, C., Thompson, M. A., Toledo, I., Zoccali, M. and Pietrzynski, G. (2010) VISTA Variables in the Via Lactea (VVV): The public ESO near-IR variability survey of the Milky Way. NewA, 15(5), 433–443. https://doi.org/10.1016/j.newast.2009.12.002.

Moe, M. and Di Stefano, R. (2017) Mind your Ps and Qs: The interrelation between period (P) and mass-ratio (Q) distributions of binary stars. ApJS, 230(2), 15. https://doi.org/10.3847/1538-4365/aa6fb6.

Molnar, T. A., Sanders, J. L., Smith, L. C., Belokurov, V., Lucas, P. and Minniti, D. (2022) Variable star classification across the Galactic bulge and disc with the VISTA Variables in the Vía Láctea survey. MNRAS, 509(2), 2566–2592. https://doi.org/10.1093/mnras/stab3116.

Moya, A., Zuccarino, F., Chaplin, W. J. and Davies, G. R. (2018) Empirical relations for the accurate estimation of stellar masses and radii. ApJS, 237(2), 21. https://doi.org/10.3847/1538-4365/aacdae.

Ochsenbein, F., Bauer, P. and Marcout, J. (2000) The VizieR database of astronomical catalogues. A&AS, 143, 23–32. https://doi.org/10.1051/aas:2000169.

Offner, S. S. R., Moe, M., Kratter, K. M., Sadavoy, S. I., Jensen, E. L. N. and Tobin, J. J. (2023) The origin and evolution of multiple star systems. ASPC, 534, 275. https://doi.org/10.48550/arXiv.2203.10066.

Paczyński, B. (1970) Evolution of single stars. I. stellar evolution from main sequence to white dwarf or carbon ignition. AcA, 20, 47.

Parsons, S. G., Brown, A. J., Littlefair, S. P., Dhillon, V. S., Marsh, T. R., Hermes, J. J., Istrate, A. G., Breedt, E., Dyer, M. J., Green, M. J. and Sahman, D. I. (2020) A pulsating white dwarf in an eclipsing binary. NatAs, 4, 690–696. https://doi.org/10.1038/s41550-020-1037-z.

Perryman, M. A. C., de Boer, K. S., Gilmore, G., Høg, E., Lattanzi, M. G., Lindegren, L., Luri, X., Mignard, F., Pace, O. and de Zeeuw, P. T. (2001) GAIA: Composition, formation and evolution of the Galaxy. A&A, 369, 339–363. https://doi.org/10.1051/0004-6361:20010085.

Podsiadlowski, P. (2014) The evolution of binary systems. Canary Islands Winter School of Astrophysics. Cambridge University Press. https://doi.org/10.1017/CBO9781139343268.003.

Portegies Zwart, S. F. and van den Heuvel, E. P. J. (2016) Was the nineteenth century giant eruption of Eta Carinae a merger event in a triple system? MNRAS, 456(4), 3401–3412. https://doi.org/10.1093/mnras/stv2787.

Pourbaix, D., Tokovinin, A. A., Batten, A. H., Fekel, F. C., Hartkopf, W. I., Levato, H., Morrell, N. I., Torres, G. and Udry, S. (2004) S_{B^9}: The ninth catalogue of spectroscopic binary orbits. A&A, 424, 727–732. https://doi.org/10.1051/0004-6361:20041213.

Price-Whelan, A. M., Hogg, D. W., Rix, H.-W., Beaton, R. L., Lewis, H. M., Nidever, D. L., Almeida, A., Badenes, C., Barba, R., Beers, T. C., Carlberg, J. K., De Lee, N., Fernández-Trincado, J. G., Frinchaboy, P. M., García-Hernández, D. A., Green, P. J., Hasselquist, S., Longa-Peña, P., Majewski, S. R., Nitschelm, C., Sobeck, J., Stassun, K. G., Stringfellow, G. S. and Troup, N. W. (2020) Close binary companions to APOGEE DR16 stars: 20,000 binary-star systems across the color-magnitude diagram. ApJ, 895(1), 2. https://doi.org/10.3847/1538-4357/ab8acc.

Prša, A., Kochoska, A., Conroy, K. E., Eisner, N., Hey, D. R., IJspeert, L., Kruse, E., Fleming, S. W., Johnston, C., Kristiansen, M. H., LaCourse, D., Mortensen, D., Pepper, J., Stassun, K. G., Torres, G., Abdul-Masih, M., Chakraborty, J., Gagliano, R., Guo, Z., Hambleton, K., Hong, K., Jacobs, T., Jones, D., Kostov, V., Lee, J. W., Omohundro, M., Orosz, J. A., Page, E. J., Powell, B. P., Rappaport, S., Reed, P., Schnittman, J., Schwengeler, H. M., Shporer, A., Terentev, I. A., Vanderburg, A., Welsh, W. F., Caldwell, D. A., Doty, J. P., Jenkins, J. M., Latham, D. W., Ricker, G. R., Seager, S., Schlieder, J. E., Shiao, B., Vanderspek, R. and Winn, J. N. (2022) TESS eclipsing binary stars. I. Short-cadence observations of 4584 eclipsing binaries in Sectors 1–26. ApJS, 258(1), 16. https://doi.org/10.3847/1538-4365/ac324a.

Qian, S.-B., Shi, X.-D., Zhu, L.-Y., Li, L.-J., Zhang, J., Zhao, E.-G., Han, Z.-T., Zhou, X., Fang, X.-H. and Liao, W.-P. (2019) More than two hundred and fifty thousand spectroscopic binary or variable star candidates discovered by LAMOST. RAA, 19(5), 064. https://doi.org/10.1088/1674-4527/19/5/64.

Raghavan, D., McAlister, H. A., Henry, T. J., Latham, D. W., Marcy, G. W., Mason, B. D., Gies, D. R., White, R. J. and ten Brummelaar, T. A. (2010) A survey of stellar families: Multiplicity of solar-type stars. ApJS, 190(1), 1–42. https://doi.org/10.1088/0067-0049/190/1/1.

Randich, S., Gilmore, G., Magrini, L., Sacco, G. G., Jackson, R. J., Jeffries, R. D., Worley, C. C., Hourihane, A., Gonneau, A., Viscasillas Vazquez, C., Franciosini, E., Lewis, J. R., Alfaro, E. J., Allende Prieto, C., Bensby, T., Blomme, R., Bragaglia, A., Flaccomio, E., François, P., Irwin, M. J., Koposov, S. E., Korn, A. J., Lanzafame, A. C., Pancino, E., Recio-Blanco, A., Smiljanic, R., Van Eck, S., Zwitter, T., Asplund, M., Bonifacio, P., Feltzing, S., Binney, J., Drew, J., Ferguson, A. M. N., Micela, G., Negueruela, I., Prusti, T., Rix, H. W., Vallenari, A., Bayo, A., Bergemann, M., Biazzo, K., Carraro, G., Casey, A. R., Damiani, F., Frasca, A., Heiter, U., Hill, V., Jofré, P., de Laverny, P., Lind, K., Marconi, G., Martayan, C., Masseron, T., Monaco, L., Morbidelli, L., Prisinzano, L., Sbordone, L., Sousa, S. G., Zaggia, S., Adibekyan, V., Bonito, R., Caffau, E., Daflon, S., Feuillet, D. K., Gebran, M., Gonzalez Hernandez, J. I., Guiglion, G., Herrero, A., Lobel, A., Maiz Apellaniz, J., Merle, T., Mikolaitis, Š., Montes, D., Morel, T., Soubiran, C., Spina, L., Tabernero, H. M., Tautvaišiene, G., Traven, G., Valentini, M., Van der Swaelmen, M., Villanova, S., Wright, N. J., Abbas, U., Aguirre Børsen-Koch, V., Alves, J., Balaguer-Nunez, L., Barklem, P. S., Barrado, D., Berlanas, S. R., Binks, A. S., Bressan, A., Capuzzo-Dolcetta, R., Casagrande, L., Casamiquela, L., Collins, R. S., D'Orazi, V., Dantas, M. L. L., Debattista, V. P., Delgado-Mena, E., Di Marcantonio, P., Drazdauskas, A., Evans, N. W., Famaey, B., Franchini, M., Frémat, Y., Friel, E. D., Fu, X., Geisler, D., Gerhard, O., Gonzalez Solares, E. A., Grebel, E. K., Gutierrez Albarran, M. L., Hatzidimitriou, D., Held, E. V., Jiménez-Esteban, F., Jönsson, H., Jordi, C., Khachaturyants, T., Kordopatis, G., Kos, J., Lagarde, N., Mahy, L., Mapelli, M., Marfil, E., Martell, S. L., Messina, S., Miglio, A., Minchev, I., Moitinho, A., Montalban, J., Monteiro, M. J. P. F. G., Morossi, C., Mowlavi, N., Mucciarelli, A., Murphy, D. N. A., Nardetto, N., Ortolani, S., Paletou, F., Palouš, J., Paunzen, E., Pickering, J. C., Quirrenbach, A., Re Fiorentin, P., Read, J. I., Romano, D., Ryde, N., Sanna, N., Santos, W., Seabroke, G. M., Spagna, A., Steinmetz, M., Stonkuté, E., Sutorius, E., Thévenin, F., Tosi, M., Tsantaki, M., Vink, J. S., Wright, N., Wyse, R. F. G., Zoccali, M., Zorec, J., Zucker, D. B. and Walton, N. A. (2022) The *Gaia*-ESO public spectroscopic survey: Implementation, data products, open cluster survey, science, and legacy. A&A, 666, A121. https://doi.org/10.1051/0004-6361/202243141.

Rebassa-Mansergas, A., Solano, E., Jiménez-Esteban, F. M., Torres, S., Rodrigo, C., Ferrer-Burjachs, A., Calcaferro, L. M., Althaus, L. G. and Córsico, A. H. (2021) White dwarf-main-sequence binaries from *Gaia* EDR3: the unresolved 100 pc volume-limited sample. MNRAS, 506(4), 5201–5211. https://doi.org/10.1093/mnras/stab2039.

Ren, L., Li, C., Ma, B., Cheng, S., Huang, S.-J., Tang, B. and Hu, Y.-m. (2023) A systematic search for short-period close white dwarf binary candidates based on gaia EDR3 catalog and Zwicky Transient Facility data. ApJS, 264(2), 39. https://doi.org/10.3847/1538-4365/aca09e.

Reylé, C., Jardine, K., Fouqué, P., Caballero, J. A., Smart, R. L. and Sozzetti, A. (2021) The 10 parsec sample in the *Gaia* era. A&A, 650, A201. https://doi.org/10.1051/0004-6361/202140985.

Ricker, G. R., Winn, J. N., Vanderspek, R., Latham, D. W., Bakos, G. Á., Bean, J. L., Berta-Thompson, Z. K., Brown, T. M., Buchhave, L., Butler, N. R., Butler, R. P., Chaplin, W. J., Charbonneau, D., Christensen-Dalsgaard, J., Clampin, M., Deming, D., Doty, J., De Lee, N., Dressing, C., Dunham, E. W., Endl, M., Fressin, F., Ge, J., Henning, T., Holman, M. J., Howard, A. W., Ida, S., Jenkins, J. M., Jernigan, G., Johnson, J. A., Kaltenegger, L., Kawai, N., Kjeldsen, H., Laughlin, G., Levine, A. M., Lin, D., Lissauer, J. J., MacQueen, P., Marcy, G., McCullough, P. R., Morton, T. D., Narita, N., Paegert, M., Palle, E., Pepe, F., Pepper, J., Quirrenbach, A., Rinehart, S. A., Sasselov, D., Sato, B., Seager, S., Sozzetti, A., Stassun, K. G., Sullivan, P., Szentgyorgyi, A., Torres, G., Udry, S. and Villasenor, J. (2015) Transiting Exoplanet Survey Satellite (TESS). JATIS, 1, 014003. https://doi.org/10.1117/1.JATIS.1.1.014003.

Rowan, D. M., Jayasinghe, T., Stanek, K. Z., Kochanek, C. S., Thompson, T. A., Shappee, B. J., Holoien, T. W. S., Prieto, J. L. and Giles, W. (2023) The value-added catalogue of ASAS-SN eclipsing binaries – II. Properties of extra-physics systems. MNRAS, 520(2), 2386–2404. https://doi.org/10.1093/mnras/stad021.

Samus', N. N., Kazarovets, E. V., Durlevich, O. V., Kireeva, N. N. and Pastukhova, E. N. (2017) General catalogue of variable stars: Version GCVS 5.1. ARep, 61(1), 80–88. https://doi.org/10.1134/S1063772917010085.

Sana, H., de Mink, S. E., de Koter, A., Langer, N., Evans, C. J., Gieles, M., Gosset, E., Izzard, R. G., Le Bouquin, J. B. and Schneider, F. R. N. (2012) Binary interaction dominates the evolution of massive stars. Sci, 337(6093), 444. https://doi.org/10.1126/science.1223344.

Sandage, A., Osmer, P., Giacconi, R., Gorenstein, P., Gursky, H., Waters, J., Bradt, H., Garmire, G., Sreekantan, B. V., Oda, M., Osawa, K. and Jugaku, J. (1966) On the optical identification of SCO X-1. ApJ, 146, 316. https://doi.org/10.1086/148892.

Santerne, A., Fressin, F., Díaz, R. F., Figueira, P., Almenara, J. M. and Santos, N. C. (2013) The contribution of secondary eclipses as astrophysical false positives to exoplanet transit surveys. A&A, 557, A139. https://doi.org/10.1051/0004-6361/201321475.

Serenelli, A., Weiss, A., Aerts, C., Angelou, G. C., Baroch, D., Bastian, N., Beck, P. G., Bergemann, M., Bestenlehner, J. M., Czekala, I., Elias-Rosa, N., Escorza, A., Van Eylen, V., Feuillet, D. K., Gandolfi, D., Gieles, M., Girardi, L., Lebreton, Y., Lodieu, N., Martig, M., Miller Bertolami, M. M., Mombarg, J. S. G., Morales, J. C., Moya, A., Nsamba, B., Pavlovski, K., Pedersen, M. G., Ribas, I., Schneider, F. R. N., Silva Aguirre, V., Stassun, K. G., Tolstoy, E., Tremblay, P.-E. and Zwintz, K. (2021) Weighing stars from birth to death: mass determination methods across the HRD. A&ARv, 29(1), 4. https://doi.org/10.1007/s00159-021-00132-9.

Shahaf, S., Bashi, D., Mazeh, T., Faigler, S., Arenou, F., El-Badry, K. and Rix, H. W. (2023) Triage of the *Gaia* DR3 astrometric orbits – I. A sample of binaries with probable compact companions. MNRAS, 518(2), 2991–3003. https://doi.org/10.1093/mnras/stac3290.

Shenar, T., Sana, H., Mahy, L., El-Badry, K., Marchant, P., Langer, N., Hawcroft, C., Fabry, M., Sen, K., Almeida, L. A., Abdul-Masih, M., Bodensteiner, J., Crowther, P. A., Gieles, M., Gromadzki, M., Hénault-Brunet, V., Herrero, A., de Koter, A., Iwanek, P., Kozłowski, S., Lennon, D. J., Maíz Apellániz, J., Mróz, P., Moffat, A. F. J., Picco, A., Pietrukowicz, P., Poleski, R., Rybicki, K., Schneider, F. R. N., Skowron, D. M., Skowron, J., Soszyński, I., Szymański, M. K., Toonen, S., Udalski, A., Ulaczyk, K., Vink, J. S. and Wrona, M. (2022) An X-ray-quiet black hole born with a negligible kick in a massive binary within the Large Magellanic Cloud. NatAs, 6, 1085–1092. https://doi.org/10.1038/s41550-022-01730-y.

Soszyński, I., Pawlak, M., Pietrukowicz, P., Udalski, A., Szymański, M. K., Wyrzykowski, Ł., Ulaczyk, K., Poleski, R., Kozłowski, S., Skowron, D. M., Skowron, J., Mróz, P. and Hamanowicz, A. (2016) The OGLE collection of variable stars. Over 450 000 eclipsing and ellipsoidal binary systems toward the Galactic bulge. AcA, 66(4), 405–420. https://doi.org/10.48550/arXiv.1701.03105.

Southworth, J. (2015) DEBCat: A catalog of detached eclipsing binary stars. ASPC, 496, 164. https://doi.org/10.48550/arXiv.1411.1219.

Steinmetz, M., Zwitter, T., Siebert, A., Watson, F. G., Freeman, K. C., Munari, U., Campbell, R., Williams, M., Seabroke, G. M., Wyse, R. F. G., Parker, Q. A., Bienaymé, O., Roeser, S., Gibson, B. K., Gilmore, G., Grebel, E. K., Helmi, A., Navarro, J. F., Burton, D., Cass, C. J. P., Dawe, J. A., Fiegert, K., Hartley, M., Russell, K. S., Saunders, W., Enke, H., Bailin, J., Binney, J., Bland-Hawthorn, J., Boeche, C., Dehnen, W., Eisenstein, D. J., Evans, N. W., Fiorucci, M., Fulbright, J. P., Gerhard, O., Jauregi, U., Kelz, A., Mijović, L., Minchev, I., Parmentier, G., Peñarrubia, J., Quillen, A. C., Read, M. A., Ruchti, G., Scholz, R. D., Siviero, A., Smith, M. C., Sordo, R., Veltz, L., Vidrih, S., von Berlepsch, R., Boyle, B. J. and Schilbach, E. (2006) The Radial Velocity Experiment (RAVE): First data release. AJ, 132(4), 1645–1668. https://doi.org/10.1086/506564.

Thévenin, F., Provost, J., Morel, P., Berthomieu, G., Bouchy, F. and Carrier, F. (2002) Asteroseismology and calibration of alpha Cen binary system. A&A, 392, L9–L12. https://doi.org/10.1051/0004-6361:20021074.

Ting, Y.-S., Conroy, C., Rix, H.-W. and Cargile, P. (2019) The Payne: Self-consistent ab initio fitting of stellar spectra. ApJ, 879(2), 69. https://doi.org/10.3847/1538-4357/ab2331.

Tokovinin, A. (2014) From binaries to multiples. I. Data on F and G dwarfs within 67 pc of the Sun. AJ, 147(4), 86. https://doi.org/10.1088/0004-6256/147/4/86.

Tokovinin, A. (2018) The updated Multiple Star Catalog. ApJS, 235(1), 6. https://doi.org/10.3847/1538-4365/aaa1a5.

Tokovinin, A. (2021) Architecture of hierarchical stellar systems and their formation. Univ, 7(9), 352. https://doi.org/10.3390/universe7090352.

Tokovinin, A. and Moe, M. (2020) Formation of close binaries by disc fragmentation and migration, and its statistical modelling. MNRAS, 491(4), 5158–5171. https://doi.org/10.1093/mnras/stz3299.

Toonen, S., Portegies Zwart, S., Hamers, A. S. and Bandopadhyay, D. (2020) The evolution of stellar triples. The most common evolutionary pathways. A&A, 640, A16. https://doi.org/10.1051/0004-6361/201936835.

Torres, G., Schaefer, G. H., Monnier, J. D., Anugu, N., Davies, C. L., Ennis, J., Farrington, C. D., Gardner, T., Klement, R., Kraus, S., Labdon, A., Lanthermann, C., Le Bouquin, J.-B., Setterholm, B. R. and ten Brummelaar, T. (2022) The orbits and dynamical masses of the Castor system. ApJ, 941(1), 8. https://doi.org/10.3847/1538-4357/ac9d8d.

Traven, G., Feltzing, S., Merle, T., Van der Swaelmen, M., Čotar, K., Church, R., Zwitter, T., Ting, Y. S., Sahlholdt, C., Asplund, M., Bland-Hawthorn, J., De Silva, G., Freeman, K., Martell, S., Sharma, S., Zucker, D., Buder, S., Casey, A., D'Orazi, V., Kos, J., Lewis, G., Lin, J., Lind, K., Simpson, J., Stello, D., Munari, U. and Wittenmyer, R. A. (2020) The GALAH survey: multiple stars and our galaxy. I. a comprehensive method for deriving properties of FGK binary stars. A&A, 638, A145. https://doi.org/10.1051/0004-6361/202037484.

Tsantaki, M., Pancino, E., Marrese, P., Marinoni, S., Rainer, M., Sanna, N., Turchi, A., Randich, S., Gallart, C., Battaglia, G. and Masseron, T. (2022) Survey of surveys. I. The largest compilation of radial velocities for the Galaxy. A&A, 659, A95. https://doi.org/10.1051/0004-6361/202141702.

Udalski, A., Szymanski, M., Kaluzny, J., Kubiak, M. and Mateo, M. (1992) The optical gravitational lensing experiment. AcA, 42, 253–284.

Vázquez-Semadeni, E., Palau, A., Ballesteros-Paredes, J., Gómez, G. C. and Zamora-Avilés, M. (2019) Global hierarchical collapse in molecular clouds. towards a comprehensive scenario. MNRAS, 490(3), 3061–3097. https://doi.org/10.1093/mnras/stz2736.

Welsh, W. F., Orosz, J. A., Aerts, C., Brown, T. M., Brugamyer, E., Cochran, W. D., Gilliland, R. L., Guzik, J. A., Kurtz, D. W., Latham, D. W., Marcy, G. W., Quinn, S. N., Zima, W., Allen, C., Batalha, N. M., Bryson, S., Buchhave, L. A., Caldwell, D. A., Gautier, I., Thomas N., Howell, S. B., Kinemuchi, K., Ibrahim, K. A., Isaacson, H., Jenkins, J. M., Prsa, A., Still, M., Street, R., Wohler, B., Koch, D. G. and Borucki, W. J. (2011) KOI-54: The *Kepler* discovery of tidally excited pulsations and brightenings in a highly eccentric binary. ApJS, 197(1), 4. https://doi.org/10.1088/0067-0049/197/1/4.

Winters, J. G., Henry, T. J., Jao, W.-C., Subasavage, J. P., Chatelain, J. P., Slatten, K., Riedel, A. R., Silverstein, M. L. and Payne, M. J. (2019) The solar neighborhood. XLV. The stellar multiplicity rate of M dwarfs within 25 pc. AJ, 157(6), 216. https://doi.org/10.3847/1538-3881/ab05dc.

Witte, M. G. and Savonije, G. J. (2002) Orbital evolution by dynamical tides in solar type stars. Application to binary stars and planetary orbits. A&A, 386, 222–236. https://doi.org/10.1051/0004-6361:20020155.

Wyrzykowski, L., Udalski, A., Kubiak, M., Szymanski, M., Zebrun, K., Soszynski, I., Wozniak, P. R., Pietrzynski, G. and Szewczyk, O. (2003) The optical gravitational lensing experiment. Eclipsing binary stars in the Large Magellanic Cloud. AcA, 53, 1–25. https://doi.org/10.48550/arXiv.astro-ph/0304458.

Yücel, G. and Bakış, V. (2022) A list of 49 new stellar twins from the *Kepler* catalogue of eclipsing binary stars. MNRAS, 514(1), 34–42. https://doi.org/10.1093/mnras/stac1361.

Zasche, P., Henzl, Z. and Kára, J. (2022) The first study of four doubly eclipsing systems. A&A, 659, A8. https://doi.org/10.1051/0004-6361/202142771.

Zasche, P., Vokrouhlický, D., Wolf, M., Kučáková, H., Kára, J., Uhlař, R., Mašek, M., Henzl, Z. and Cagaš, P. (2019) Doubly eclipsing systems. A&A, 630, A128. https://doi.org/10.1051/0004-6361/201936328.

Zhang, B., Jing, Y.-J., Yang, F., Wan, J.-C., Ji, X., Fu, J.-N., Liu, C., Zhang, X.-B., Luo, F., Tian, H., Zhou, Y.-T., Wang, J.-X., Guo, Y.-J., Zong, W., Xiong, J.-P. and Li, J. (2022) The spectroscopic binaries from the LAMOST medium-resolution survey. I. Searching for double-lined spectroscopic binaries with a convolutional neural network. ApJS, 258(2), 26. https://doi.org/10.3847/1538-4365/ac42d1.

Zhao, G., Zhao, Y.-H., Chu, Y.-Q., Jing, Y.-P. and Deng, L.-C. (2012) LAMOST spectral survey — An overview. RAA, 12(7), 723–734. https://doi.org/10.1088/1674-4527/12/7/002.