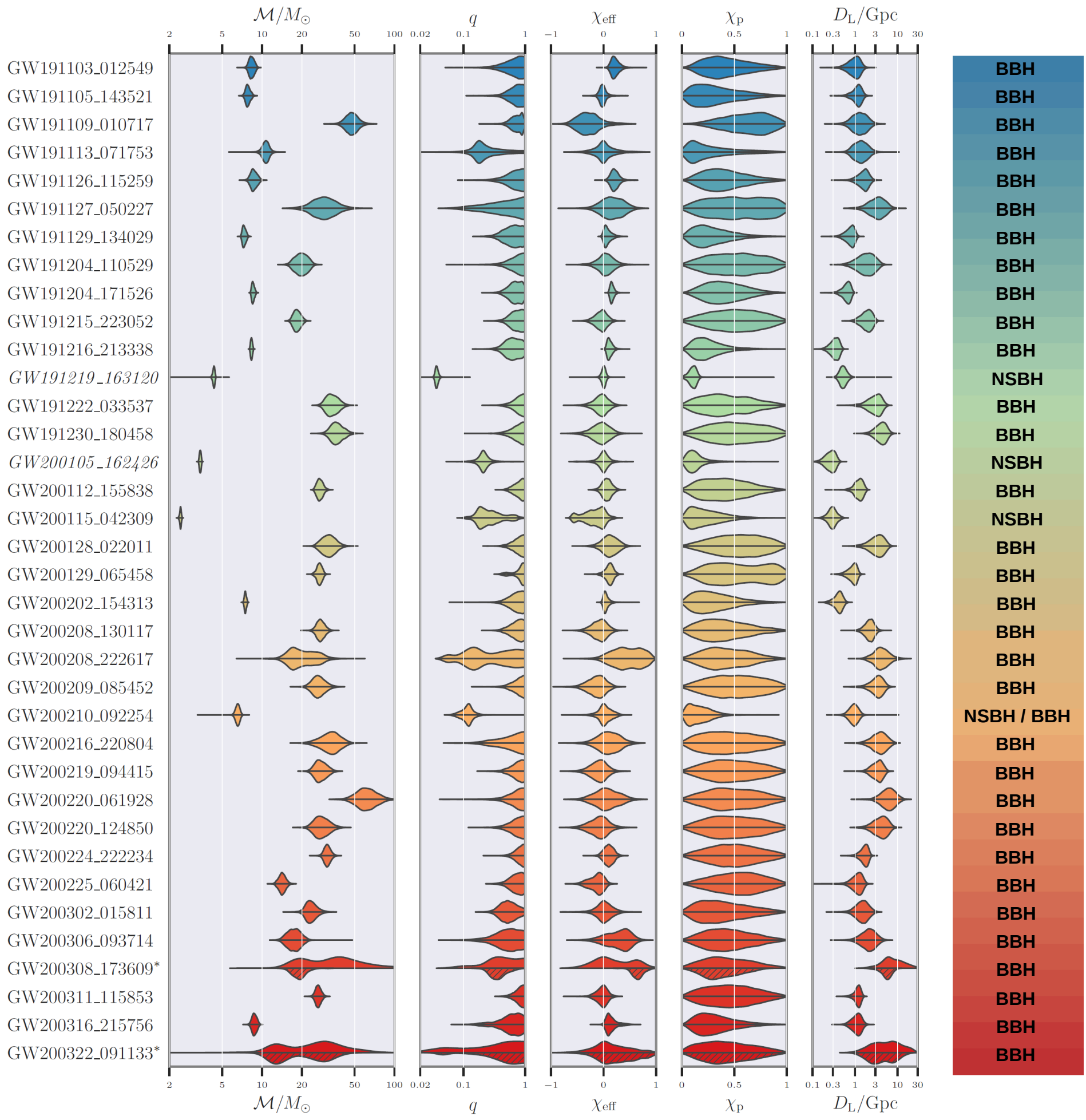
Gravitational-Wave Transient Catalog 3

compact binary coalescences from the second part of the third observing run (O3b)



Properties of the events reported in the O3b catalog are listed above: chirp mass $\mathcal{M}$, in solar masses, mass ratio q, effective inspiral spin $\chi_{\rm eff}$, effective precession spin $\chi_{\rm p}$, and distance $D_{\rm L}$, in Gigaparsecs.

Also listed for each event is the most likely source classification. Events labelled BBH are those that we are confident are binary black hole coalescences. Events labelled NSBH are those that are possible neutron star and black hole coalescences. (We consider compact objects that are likely to have masses less than 3 times the mass of our sun to be possible neutron star candidates).

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Observing period: **1st Nov 2019 15:00 UTC** to **27th Mar 2020 17:00 UTC**

125.5 days with 2 or more detectors observing

2 O3b exceptional events previously published

35 O3b CBC candidates identified with inferred probability of astrophysical origin, p_{astro} **> 0.5**

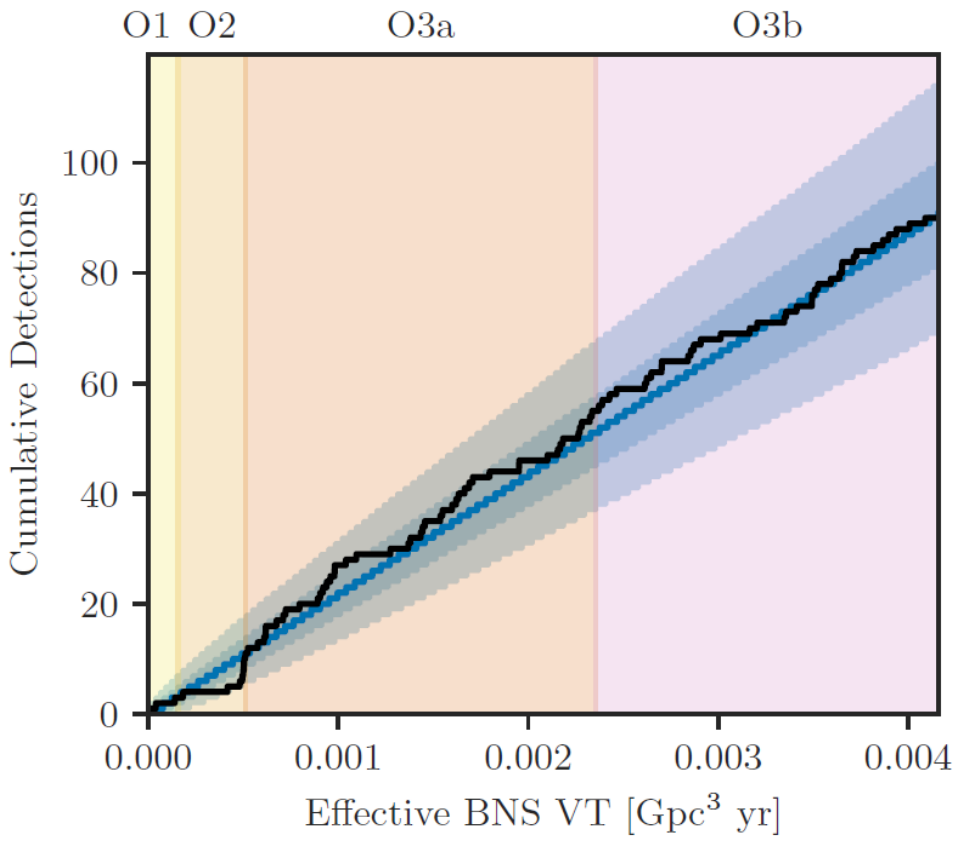
GW candidates identified by **4 search pipelines**

Total of **90 events in GWTC-3** with $p_{astro} > 0.5$

18 of our 35 candidates were previously reported during O3b as **low-latency public alerts**. GWTC-3 also includes **17 O3b candidates** that are being reported for the first time.

Events of Note

GW200220_061928	**Most massive** binary system in O3b with total mass = 148 $M_\odot$
GW191219_163120	**NSBH merger** between a 1.17 $M_\odot$ NS and 31.1 $M_\odot$ BH, with the most extreme mass ratio (q = 0.038) measured to date
GW200115_042309	**NSBH merger** between a 1.44 $M_\odot$ NS and 5.9 $M_\odot$ BH
GW200210_092254	**NSBH or BBH merger:** less massive object has a mass of 2.83 $M_\odot$
GW191109_010717	**BBH merger** which is very likely to have negative spin
GW191129_134029	**Least massive definite BBH merger** in O3b, with total mass = 17.6 $M_\odot$



Growth in the number of LVK catalog candidates across observing runs. This figure shows the number of compact binary coalescence candidates with a probability of astrophysical origin $p_{astro} > 0.5$ versus the detector network's effective surveyed time-volume for BNS coalescences, which should be approximately proportional to the number of detections.

The colored bands indicate the different observing runs: O1, O2, O3a and O3b. The cumulative number of probable candidates is indicated by the solid black line.

Data for all GWTC-3 events are available from the **Gravitational-Wave Open Science Center**: https://www.gw-openscience.org/