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Can we use the NASA Gamma-Ray Burst Satellites, Fermi and Swift, to aid the search for the first Gravitational Wave Detection?

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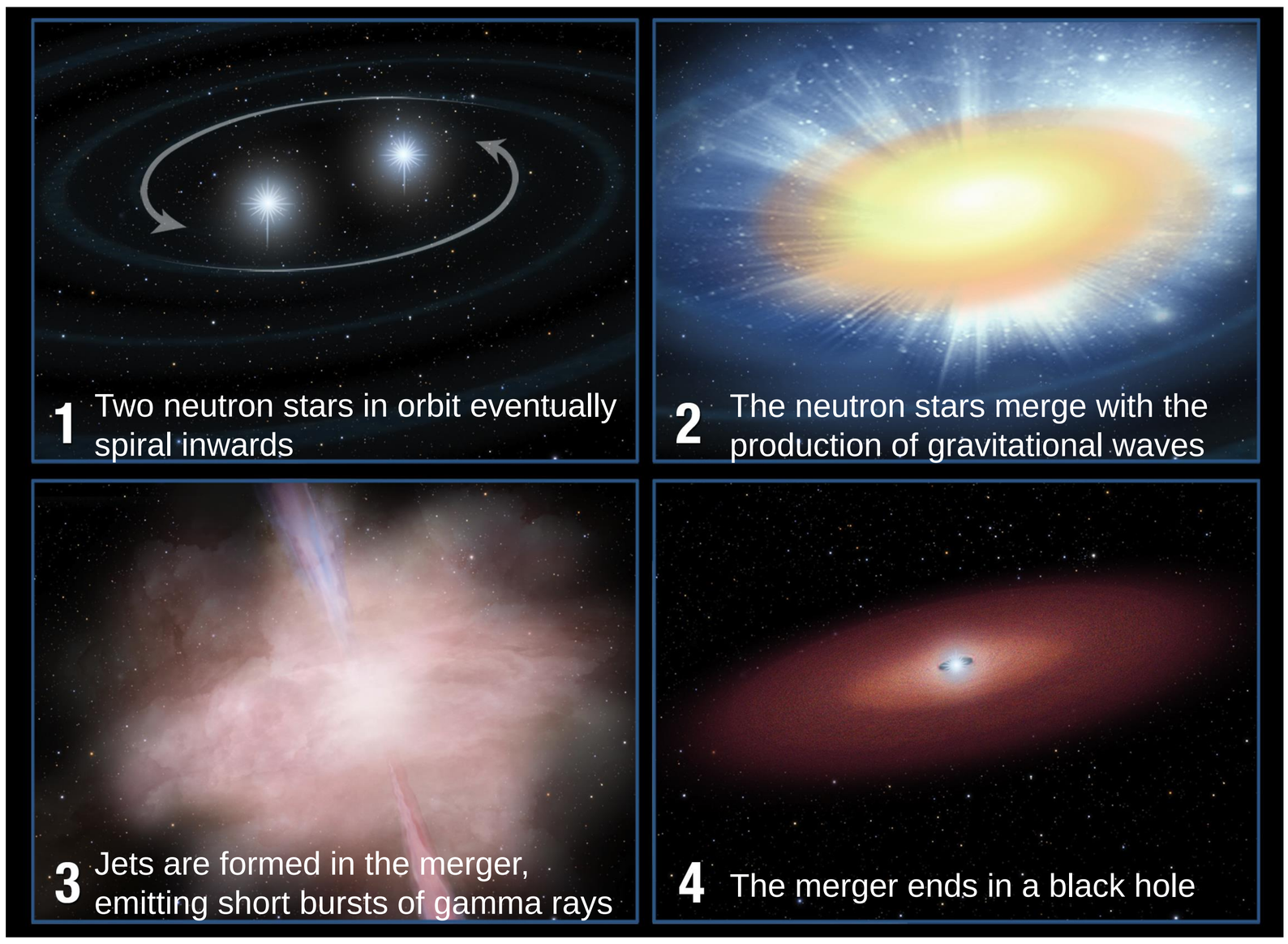
Overview

- Short Gamma-Ray Bursts (SGRBs) are believed to result from events that should also produce Gravitational Waves (GWs).
- Swift's Burst Alert Telescope (BAT) sees fewer SGRBs than GBM, but due to its better localization has more redshift measurements from followup observations. Due to the higher number of SGRBs, GBM is more likely to see a SGRB coincident with a GW than BAT.
- There is concern that GBM and BAT detect different populations of SGRBs. If this is true than we cannot use BAT's redshift (distance) distribution with GBM's larger SGRB population.

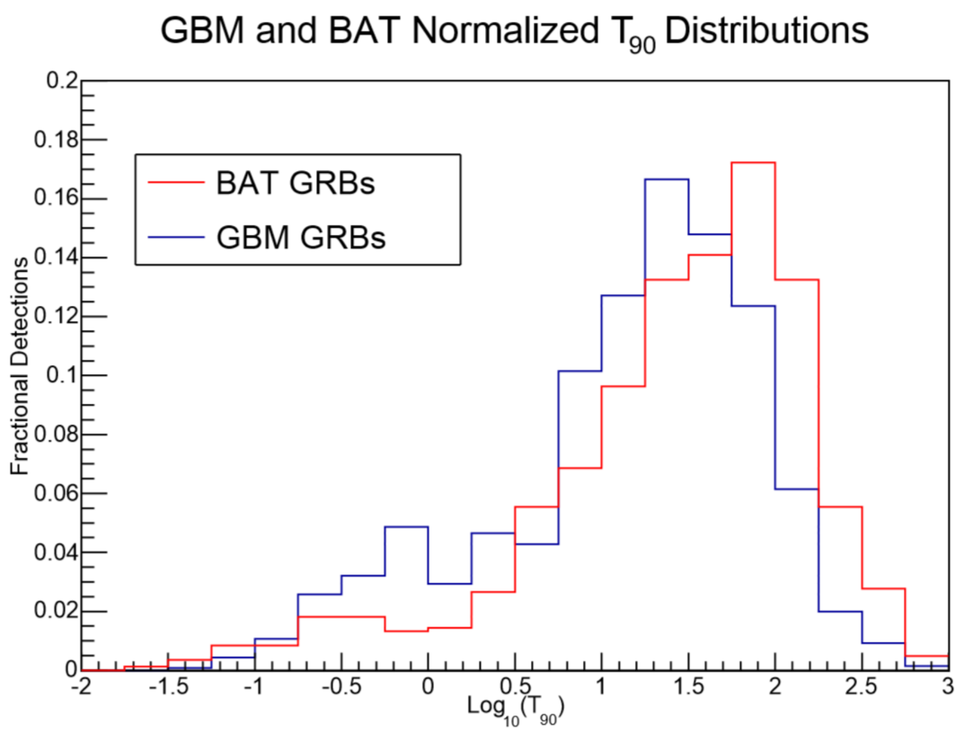


We compare the specific SGRBs detected by both, or just one of these instruments to investigate this possibility.

Key Findings

SGRB Search	Total	Detectable	Triggered	Found	Missed
BAT SGRBs in GBM	48	26	19	4	3
GBM SGRBs in BAT	227	27	22	3	2

BAT and GBM appear to detect the same SGRB population



Impact

- Swift BAT and Fermi GBM are equally likely to detect and classify a given GRB as a short GRB
- We can use the BAT redshift distribution to predict the rates of simultaneous detections with Fermi GBM
- The predicted rates for simultaneous detections are reliable, and we have a decent chance for the first direct observation for GWs in the coming years

Explanation

Every observation of space has been done with only one of the four fundamental forces. Proving the first direct gravitational wave detection will start our capabilities of doing space observations with a second.

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