

Offline searches for short GRBs using GBM CTTE

Michael S. Briggs
University of Alabama in Huntsville



Continuous Time-Tagged Events (CTTE) – individual photons with full time coverage – have been available since 2012 November 26. With this new datatype we can search for short transients that are below the in-flight detection (trigger) threshold.

Three types of searches:

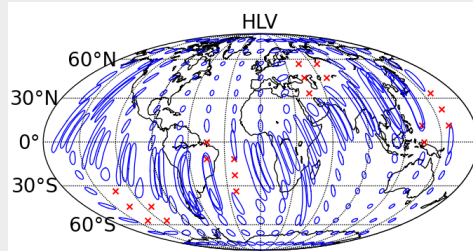
- Blind – search GBM data without a prior in order to provide candidates to aLIGO/VIRGO.
- Targeted by aLIGO/VIRGO.
- Targeted from more accurate localizations.



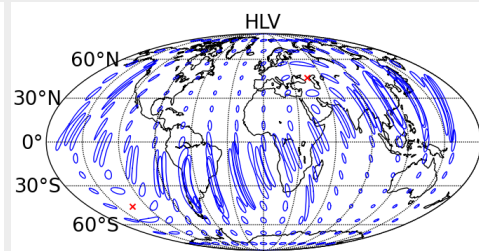
GW-targeted search

Caption definition → Observation dates
Values and figure from fraction < 5 square degrees
Aasi et al., arxiv:1304.0670 number of detected binary neutron star mergers

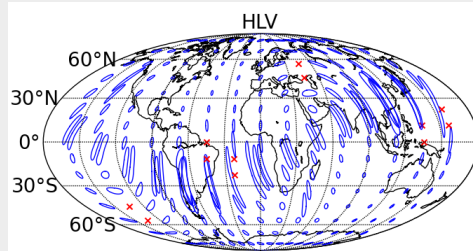
2016/2017
~2%
6E-3 – 20



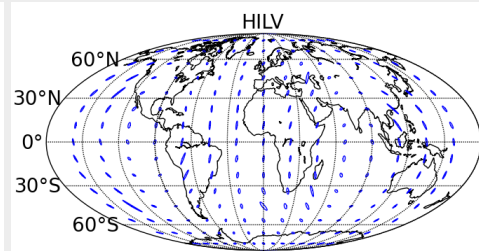
2017/2018
~2%
0.04 – 100



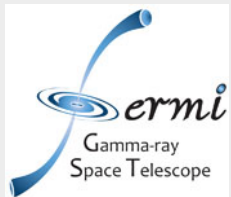
2019+
~5%
0.2 – 200



2022+
~20%
0.4 – 400

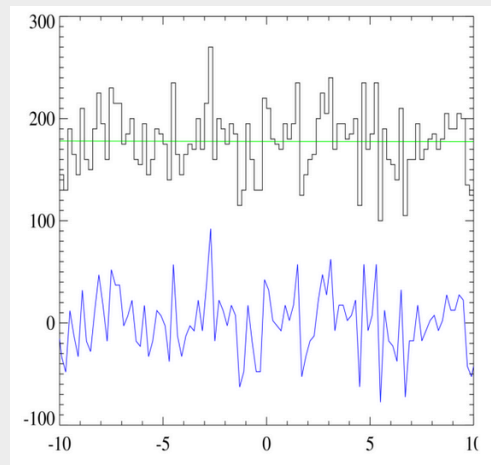


Blackburn et al., arxiv:1410.0929
aLIGO / VIRGO-targeted search of GBM data for SGRBs
– Bayesian technique that uses the GW time/location
constraint in searching for a GBM signal.
This week: meetings in Huntsville to implement.

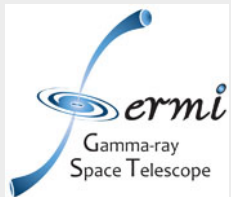


Blind offline search

- Bayesian Matched Pattern technique, developed by Binbin Zhang (UAH)
- Finding >100 additional SGRB per year. cf. 45 GBM triggered SGRBs,
- Need to improve speed and candidate down-select,
- Confirmation: Finds 3 of 4 Swift SGRBs that didn't trigger GBM, for which CTTE is available. The 4th is only well-placed to one GBM detector.



Weakest Swift SGRB that did not trigger GBM and that was found by the offline search: GRB 140516A.
At 30% of Swift fluence distribution.



Second joint LIGO-Fermi-Swift workshop:
Pasadena, CA, 2015 March 14-15
<http://www.ligo.caltech.edu/~jkanner/ligo-fermi/>



FUG: 2/17/2015