

MDC ET Next What next for the Mock Data Challenge?

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Outline

✤ What was the first ET MDC?

- Gaussian background noise with ET-B sensitivity curve
- Data from 3 detectors, ET1, ET2, ET3, located at the same site as Virgo
- A cosmological population of binary neutron stars
- ✤ A year's worth of data
- What did we do?
 - First ever detection of such systems a new population of astronomical sources

Verify GRB-GW Association

- Check if compact binaries in which at least one of the companions is a neutron star are progenitors of short gamma-ray bursts
- Measure the Hubble parameter to within 5%
 - Compact binary inspirals are self-calibrating standard sirens
 - To be useful as standard candles it is necessary to identify the host and measure its redshift and so sky localization is a key science objective
 - If we binary black holes occur in sufficient numbers then EM identification may not be necessary but it would still be necessary to have a good resolution
- Carry out strong field tests of general relativity

What was First ET MDC?

What was the data?

- Gaussian background noise with ET-B sensitivity curve
 - Data from 3 detectors, ET I, ET2, ET3, located at the same site as Virgo
- A cosmological population of binary neutron stars
- ✤ A year's worth of data

What was the challenge?

- How good are current detection pipelines in disentangling overlapping signals and can we reach theoretical detection efficiency?
- Does a cosmological population create a confusion background and if so that level?
 - Can we detect the confusion background and learn about the underlying pop?

What did we do?

- Estimation of PSD using the null stream
- Recovery of BNS background from residuals
- Search for BNS using iHOPE pipeline
- Search for stochastic background

What did we Find?

Null stream is a very powerful data stream in ET



Residuals

All quantities have been scaled by 10⁴⁹ and a constant value of 0.01 added



Detection Efficiency for BNS





background in the three detectors

For each of the pairs E1-E2, E2-E3 and E1-E3, we found a point estimate of 1.02×10^{-9} with error $\sigma_{\Omega} = 2.6 \times 10^{-11}$ at 100 Hz.

