

Einstein Telescope Mock Data & Science Challenge

ET-MDC3 Telecon, 25/03/2015

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ET MS&DSCs : What and Why ?

- Produce realistic simulated data containing instrumental noise + GW signal from population of sources at the output of E1, E2 and E3
- Generation package document at <https://dcc.ligo.org/LIGO-T1400401>
- Test data analysis and parameter estimation methods
- Prepare the interpretation of the results in term of astrophysics, cosmology and fundamental physics

ET MDSCs comparison

MD&SC 1	MD&SC 2
1 month	1 year
Gaussian coloured noise (ET-B)	Gaussian coloured noise (ET-D)
Low frequency at 10 Hz	Low frequency at 5 Hz
E1, E2 and E3 collocated	Relative position of the vorticed accounted *
NS-NS (Gaussian mass distribution)	<ul style="list-style-type: none">• NS-NS, NS-BH, BH-BH (StarTrack)• IMBHs + IMRIs (J. Gair & I. Mandel)• 1 f-modes & 2 supernova (J. Clark)
1 data set: ET MDSC1	3 data sets : <ul style="list-style-type: none">• stellar CBC only ET MDSC2a• undetected stellar CBC ET MDSC2b• all type of sources ET MDSC2c

* D. Meacher DCC: T1408308

First ET MS&DC (arxiv/1201.3563)

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- ✓ Demonstrated null stream
- ✓ Showed source overlap is not a problem
- ✓ Measured chirp mass (<0.5%) and total mass (<a few percent)
- ✓ Measured non Gaussian astrophysical background

Second ET MS&DC

- ✓ Measured residual astrophysical background (bias corrected) * arXiv:1404.1134
- ✓ CBC analysis down to 5 Hz wth GSTLAL (in progress, D. Meacher)
- ✓ PE for IMBHB and IMRIs (in progress, M. Coughlin)
- ✓ Burst analysis (in progress, J. Powell)

* Not isotropic because of a the GW selection effect that favored the detection of the best oriented and located sources, especially at larger redshift

Third ET MS&DC

The goal of the teleconferences will be

- Preparation

- Decide what challenges :

DA, cosmology, astrophysics, fundamental physics

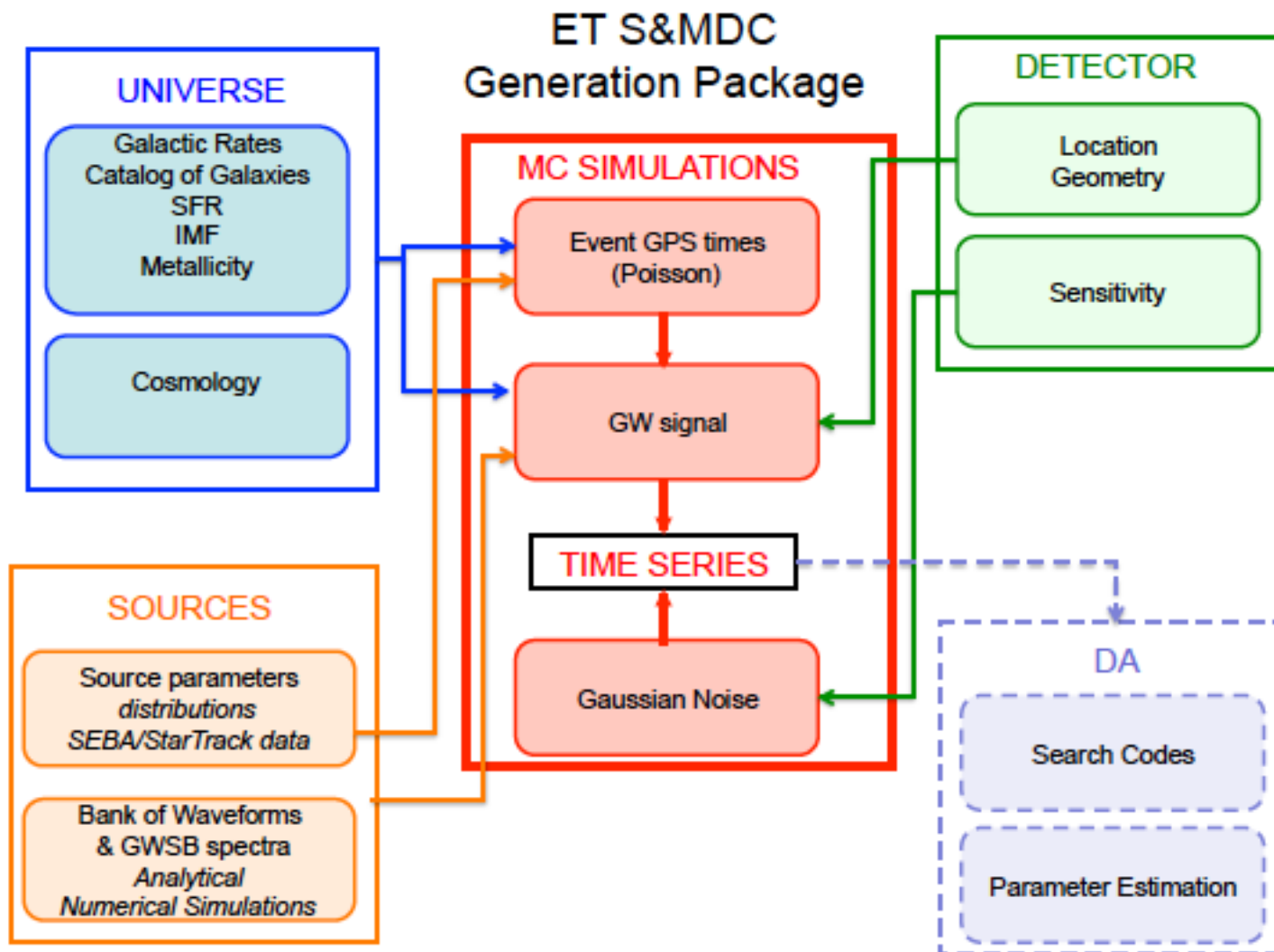
Groups ? i.e cosmography

- Choose models, waveforms

- Implementation

Computing team ?

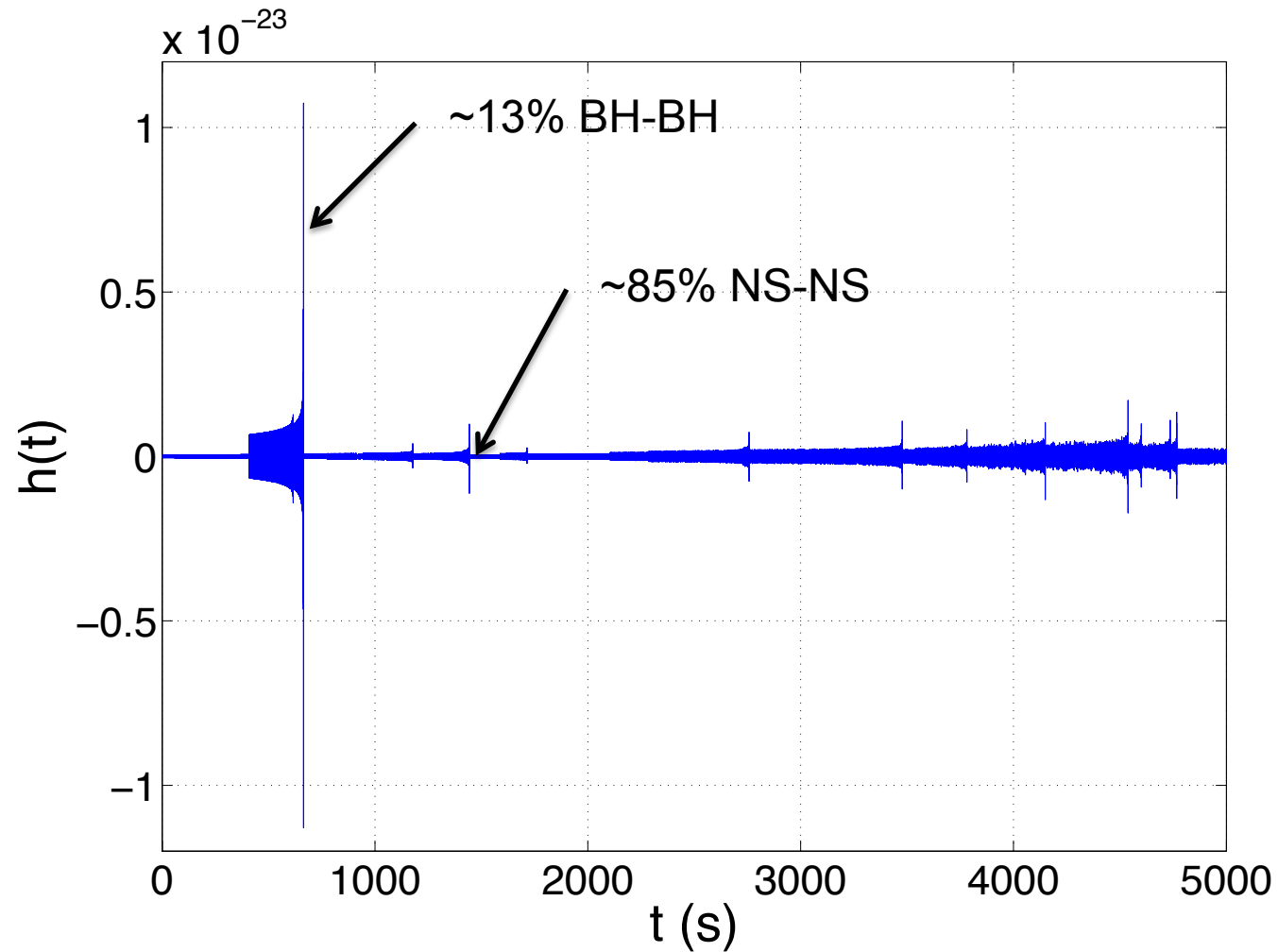
- Report results



<https://dcc.ligo.org/LIGO-T1400401>

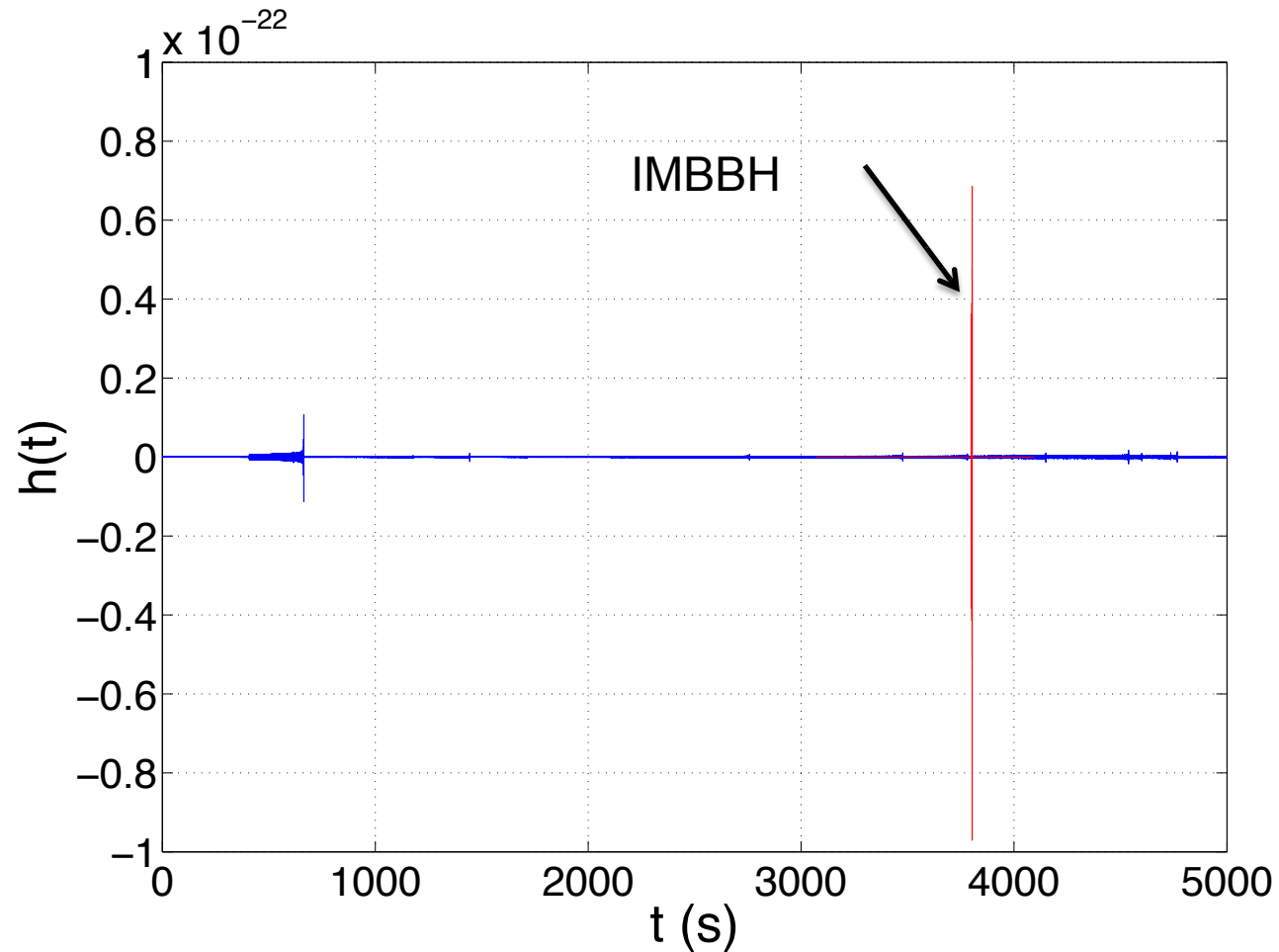
GW Signal ET MDSC2a

$\sim 1.6 \cdot 10^5$ stellar CBC up to $z=20$



GW Signal ET MDSC2c

$\sim 1.6 \cdot 10^5$ stellar CBCs up to $z=20$ + ~ 800 IMBHs & IMRIs up to $z=4$



GW Signal ET MDSC2c

