GRAVITATIONAL WAVES
Parallel Session Summary

Chair: **Chiara Caprini**
Summary by: **Nicola Tamanini**

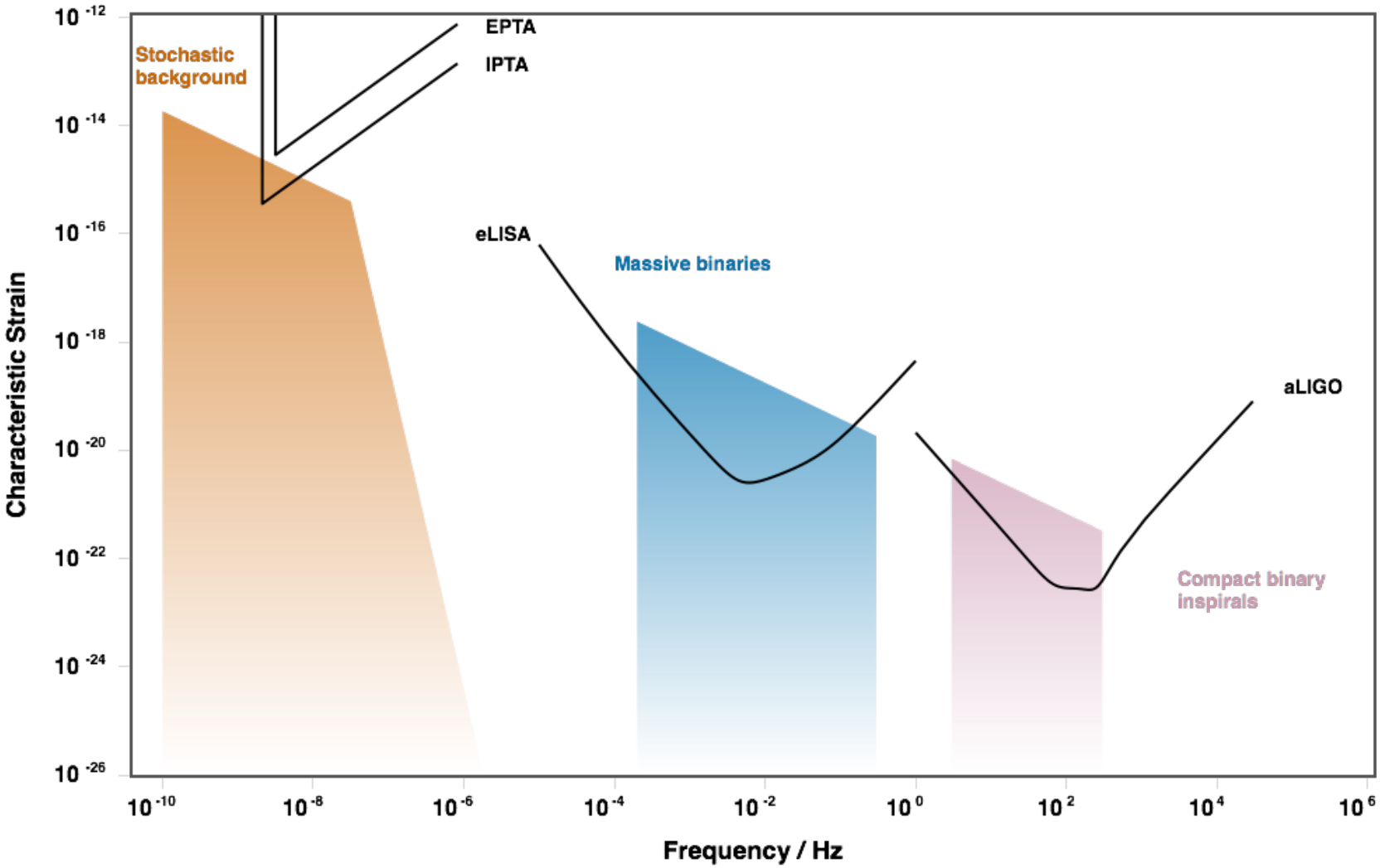
28th Texas Symposium on Relativistic Astrophysics
Geneva, 2015

Main topics of the session

GW parallel session mainly divided in 4 topics:

- **Stochastic backgrounds** (astro & cosmo)
  - Tania Regimbau, Elinore Roebber, Pedro Klaus Schwaller, Mark Hindmarsh, David Weir
- **SMBH binaries and standard sirens**
  - Nicola Tamanini, Zoltan Haiman, Andres Escala
- **Waveforms and dynamics of compact binaries**
  - Mark Hannam, Sascha Husa, Laura Bernard, Davide Gerosa
- **Waveforms from neutron stars and SNe**
  - Kenta Hotokezaka, Pantelis Pnigouras, Haakon Andresen

GW landscape

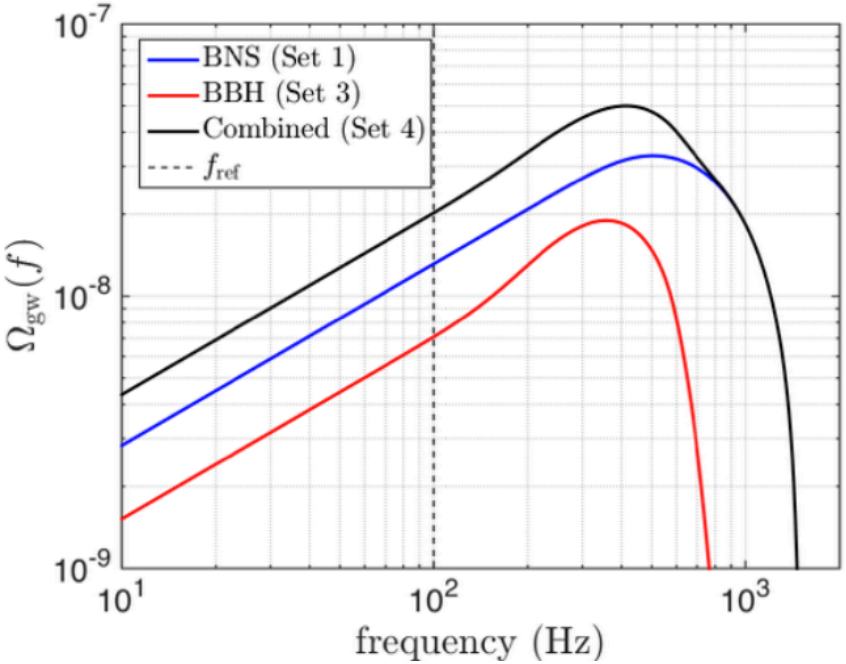


Astrophysical Stochastic Backgrounds

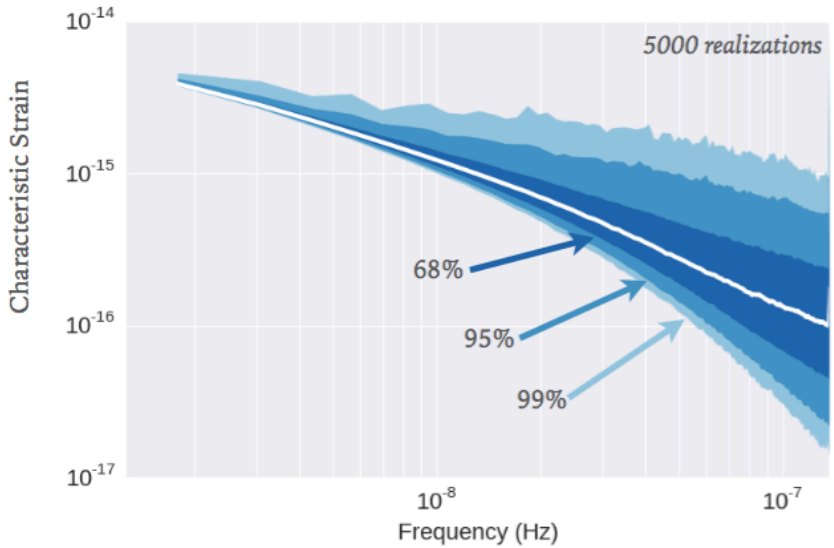
Contributors: **Tania Regimbau, Elinore Roebber**

- Astrophysical SB: composed by the sum of many unresolved sources (e.g. compact binaries in coalescence for Earth-based detectors)
- advLIGO and VIRGO Mock Data Challenge: the astro SB has good chances to be detected after a few years of observation
- SB from SMBH: signal in the nHz band, relevant for PTA
- From DM simulation obtain several realizations of SMBH binary population $\rightarrow$ effect of 'cosmic variance' in the SB frequency dependence

Astrophysical Stochastic Backgrounds



from Regimbau's talk



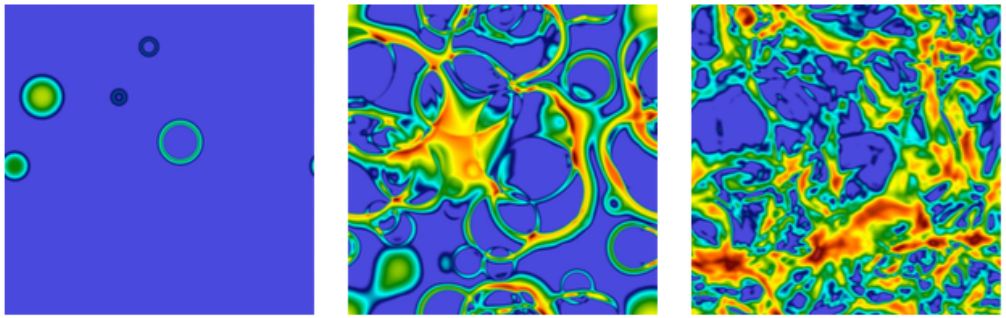
from Roebber's talk

Cosmological Stochastic Backgrounds

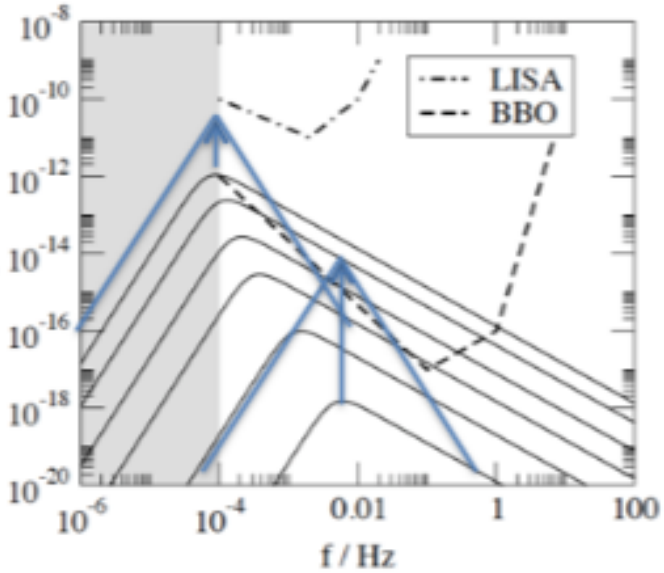
Contributors: **Pedro Klaus Schwaller, Mark Hindmarsh, David Weir**

- Cosmological SB from first order phase transitions in the early universe : EW symmetry breaking in models beyond SM possibly testable by eLISA
- possible GW signal in eLISA by PT occurring in a dark sector, providing also a Dark Matter candidate
- New simulations of the collisions of PT bubbles : sound waves are generated in the surrounding plasma
- Sound waves are a strong source of GW, in many cases stronger than the one from the scalar field and from MHD turbulence

Cosmological Stochastic Backgrounds



from Weir's talk



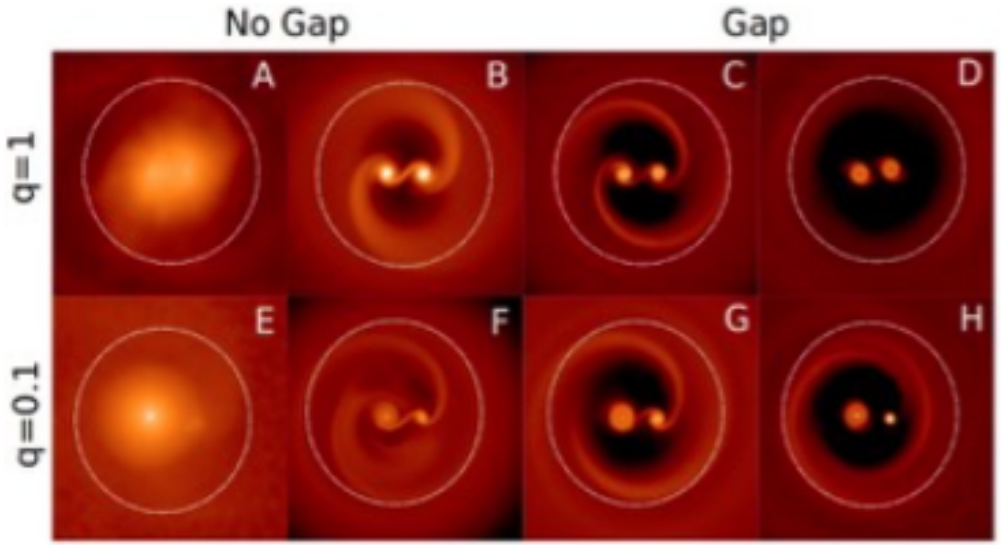
from Hindmarsh's talk

SMBH binaries and Standard Sirens

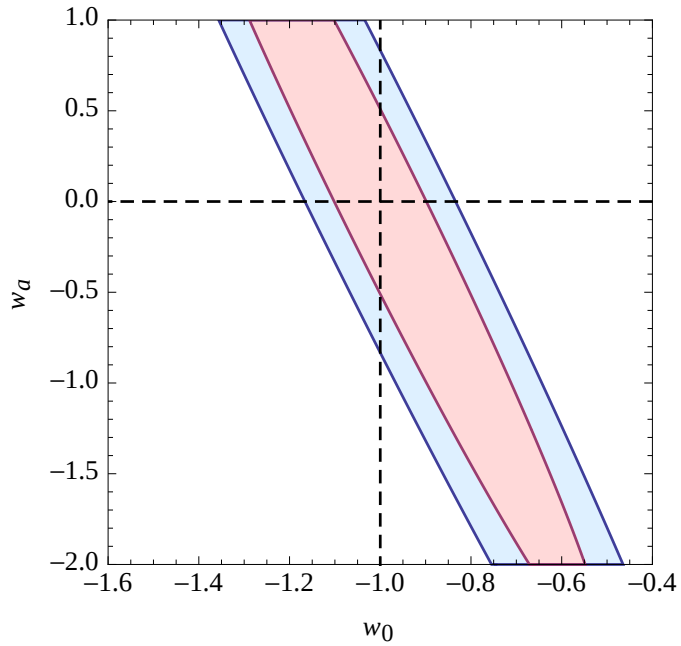
Contributors: **Nicola Tamanini, Zoltan Haiman, Andres Escala**

- Study of EM emissions connected with BH inspiral and merger
- Numerical simulations to analyse the accretion of the disk into the binary
- Open issue: formation of gaps and disk instabilities in relation with the formation stage of the binary
- Possible use of SMBHBs as standard sirens: cosmological constraints from eLISA

SMBH binaries and Standard Sirens



from Escala's talk



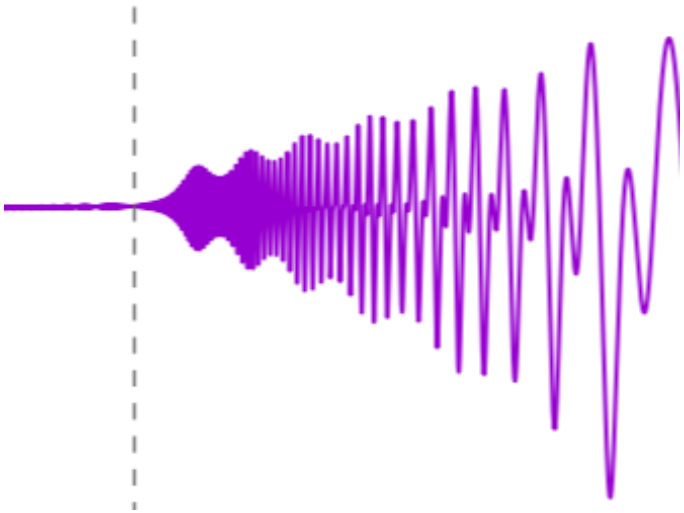
from Tamanini's talk

Waveforms and dynamics of compact binaries

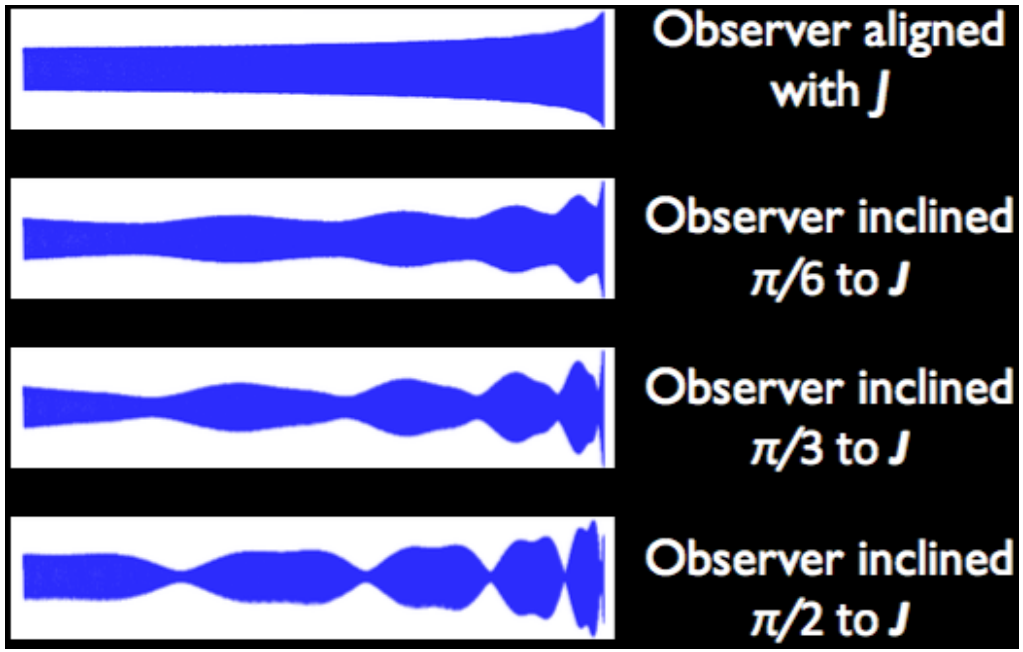
Contributors: **Mark Hannam, Sascha Husa, Laura Bernard, Davide Gerosa**

- Modelling of precessing waveforms using the properties of precession: well parametrized by a single effective spin
- Progress in the phenomenological waveform construction for BH coalescence
- Calculation of the inspiral Lagrangian up to 4th PN order: useful for parameter estimations
- Instabilities of align BH binaries to spin precession: the binary might start precessing during the inspiral

Waveforms and dynamics of compact binaries



from Gerosa's talk



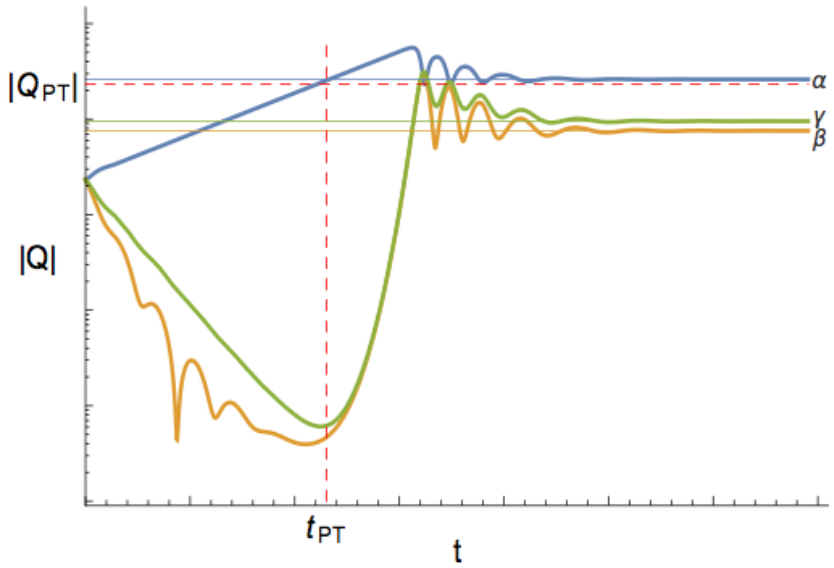
from Hannam's talk

Waveforms from neutron stars and SNe

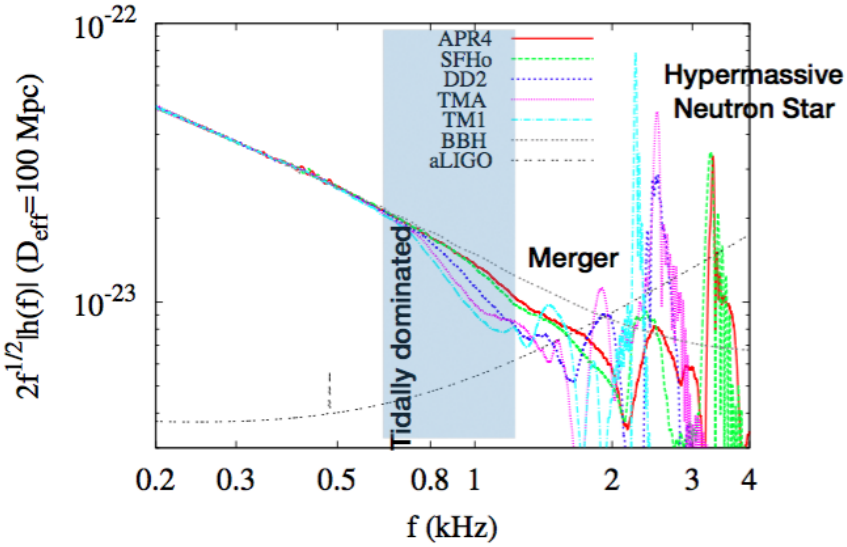
Contributors: **Kenta Hotokezaka, Pantelis Pnigouras, Haakon Andresen**

- GW waveform including tidal deformability of NS: possible way to distinguish between NS or BH binaries
- GWs from development and saturation of f instability of NS: possible information on physics of NS
- GW emission from core collapse SNe can provide insight for SNe processes: strong emission below 250 Hz from large scale shock deformations and high frequency excitations from convection

Waveforms from neutron stars and SNe



from Pnigouras's talk



from Hotokezaka's talk

Posters

- **On the possibility of attenuation of GWs in the early universe**
  - Joseph Avenoso
- **Search of primordial gravitational waves with Very Long Baseline Interferometry**
  - Oleg Titov