

Corso Dottorato a.a. 2020/2021 and 2021/2022

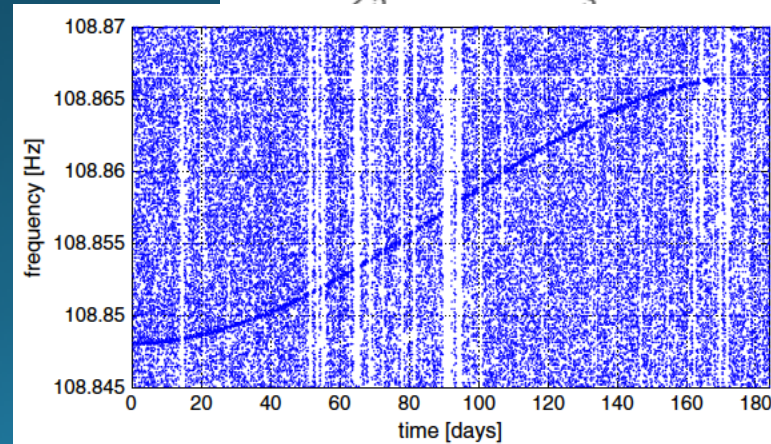
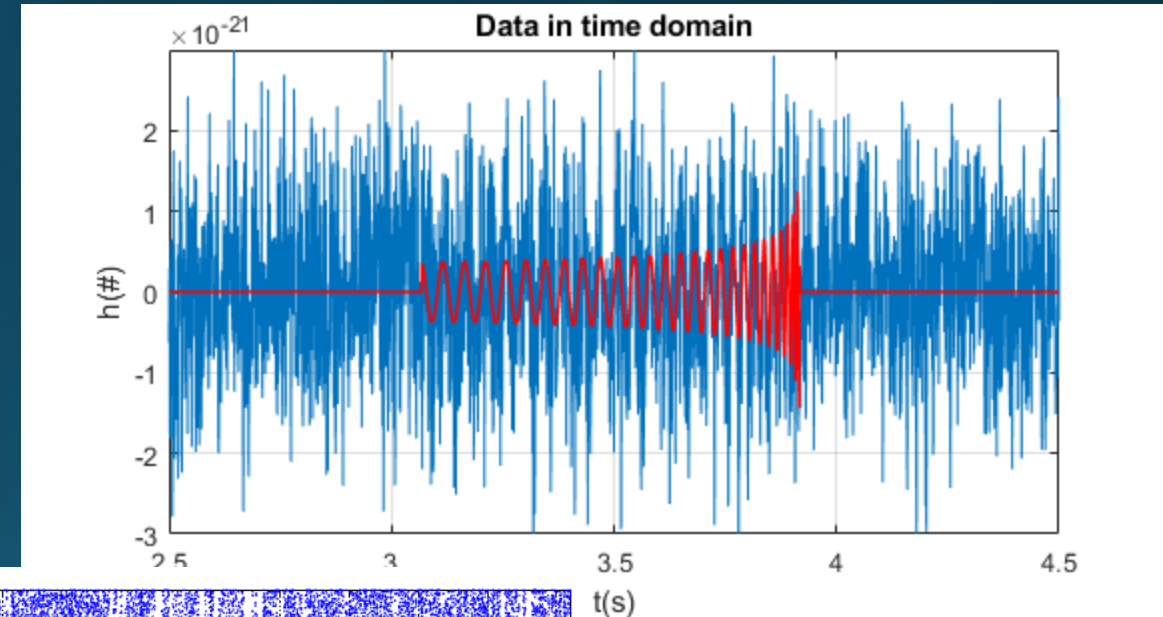
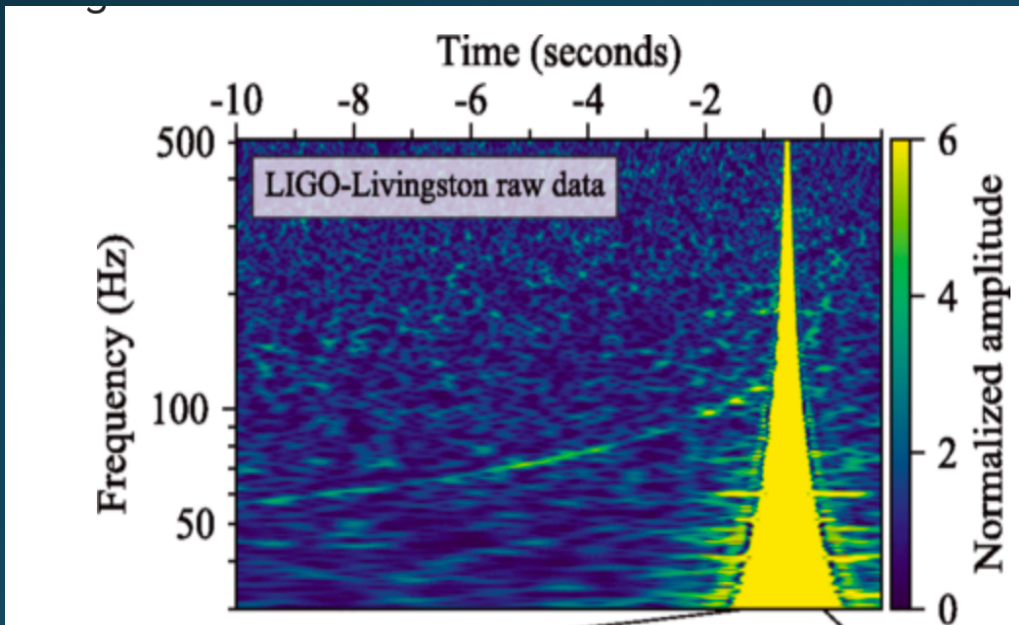
Data analysis advanced techniques: theory and applications

20 hours, 3 CFU.

March-May 2021

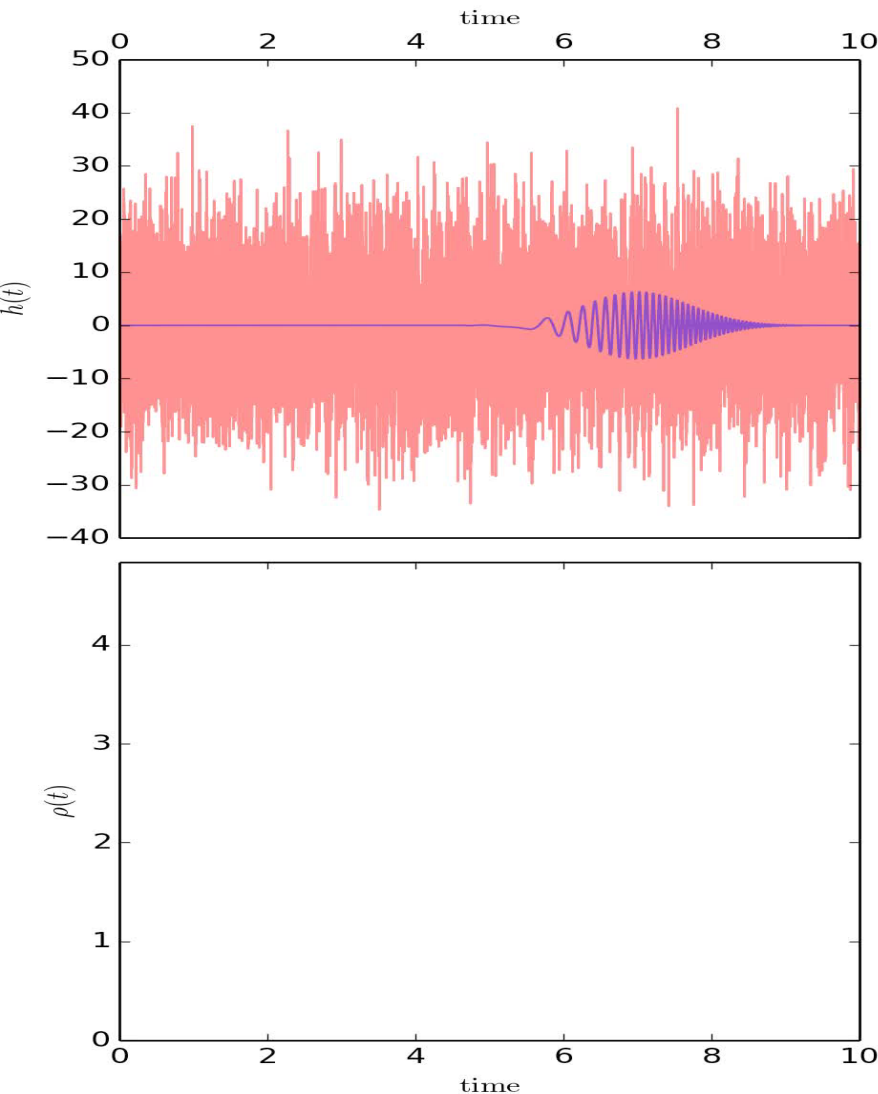
Pia Astone, Paola Leaci, Cristiano Palomba
(LIGO/Virgo/Kagra collaboration)

email for info:
name.surname@roma1.infn.it



General part: 10 hours

All arguments will be presented with examples and applications (using Matlab and Python)



- Signals and noise (continuous and discrete)
- Transformations (Fourier (FFT), Wigner-Ville)
- Spectral estimations (periodogram, auto – regressive estimations, spectrograms)
- Filtering (Wiener, matched, triangular...)
- Procedures in non-stationary noise
- Image analysis (2 dimensional transforms and filtering)
- Parameter estimation
- Introduction to the parallelization algorithms problem (e.g. porting to GPU)

Applications: 10 hours

- 1- data analysis of the LIGO/Virgo open data (<https://www.gw-openscience.org/>);
--extraction of gravitational wave (GW) signals, parameter estimation, spectral estimations.
- 2- Machine learning: introduction and examples of applications to real searches of GW signals (noise identification, removal and signals searches).

