

The **Grav**Group at **GSSI**: gravitational waves and stars

Science Fair
GSSI

23/02/2026

G | **S** GRAN SASSO
S | **I** SCIENCE INSTITUTE
SCHOOL OF ADVANCED STUDIES
Scuola Universitaria Superiore

Faculty



Post-docs



2nd year PhD



4th year PhD



4th year PhD



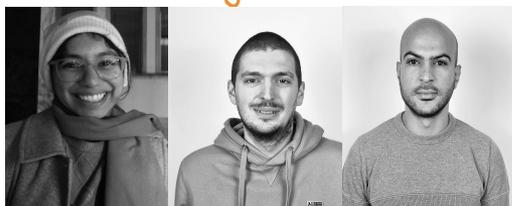
3rd year PhD



3rd year PhD



2nd year PhD



1st year PhD



Faculty



Post-docs



2nd year PhD



4th year PhD



4th year PhD



3rd year PhD



3rd year PhD



2nd year PhD



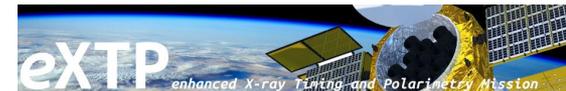
1st year PhD



Collaborating is important

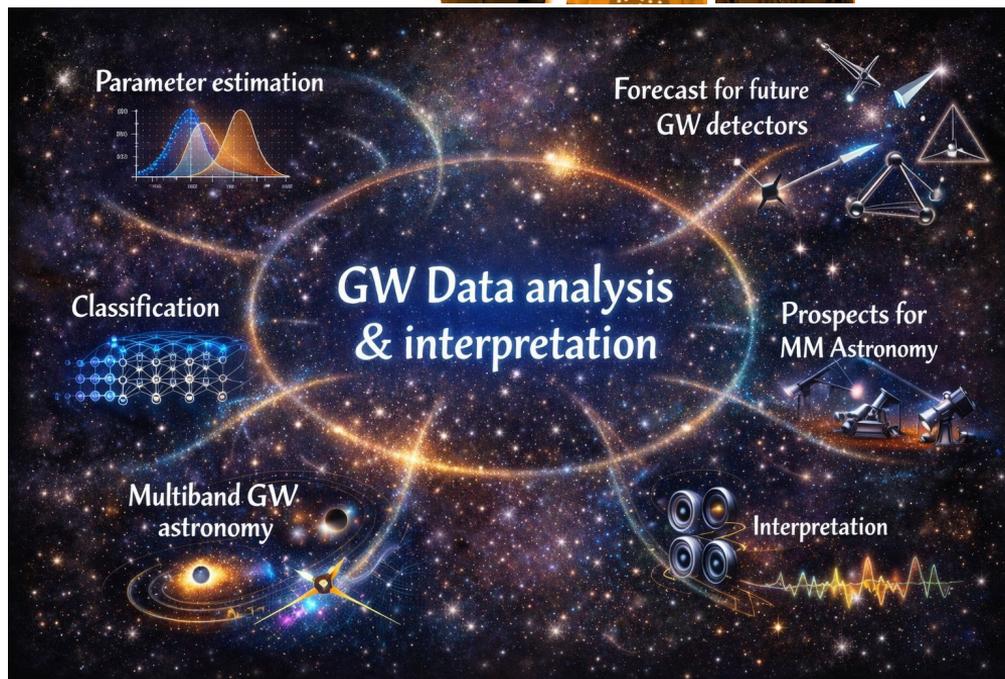


TEONGRAV Teoria delle ONde GRAVitazionali
Gravitational Wave Emission from Astrophysical Sources



... and many, many more

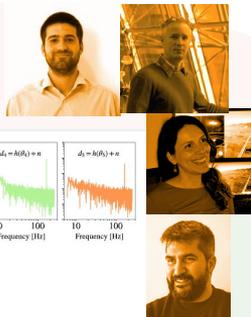
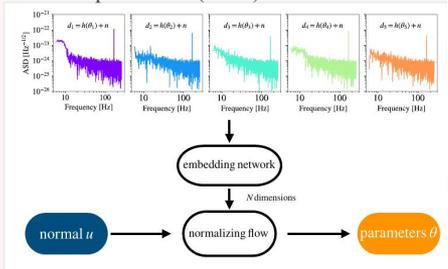
GWs Analysis & Interpretation
(see Filippo's talk)



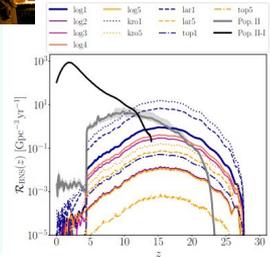
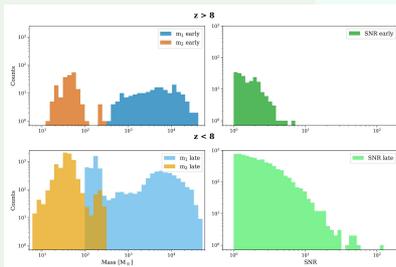
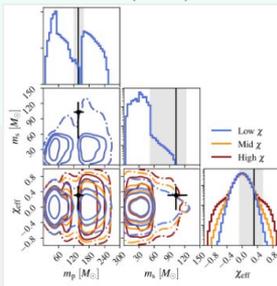
GWs Analysis & Interpretation

GWs Analysis

Santoliquido et al (2025)

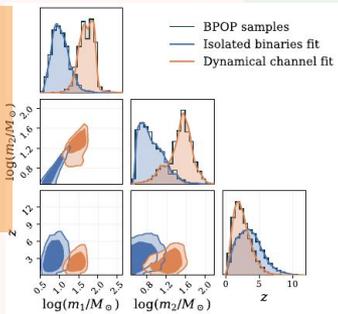


Paiella et al (2025)

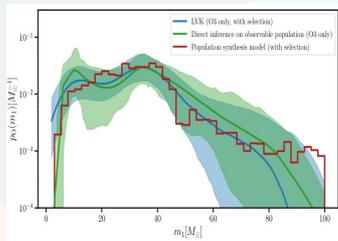


Mestichelli et al (2025)

Scarpa et al (in prep)



Arianna Scarpa
Simone Mastrogiovanni



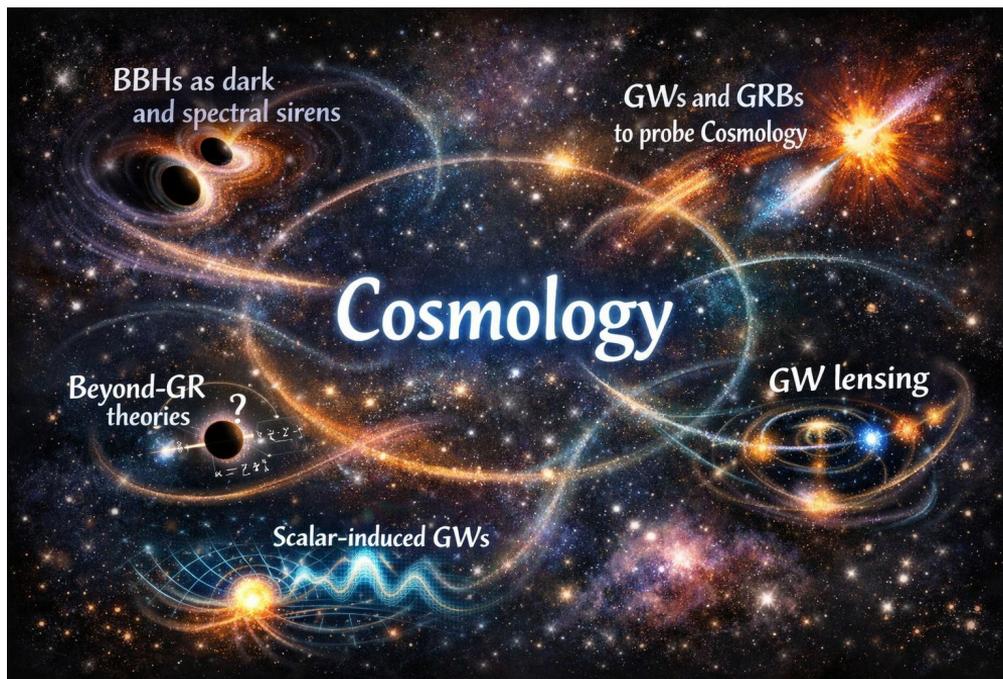
Toubiana et al (2025)

Alexandre Toubiana

GWs Interpretation

GW Cosmology

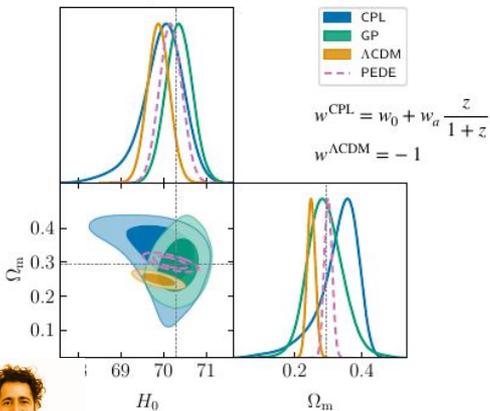
(see Matteo, Andrea, and Izumi's talk)



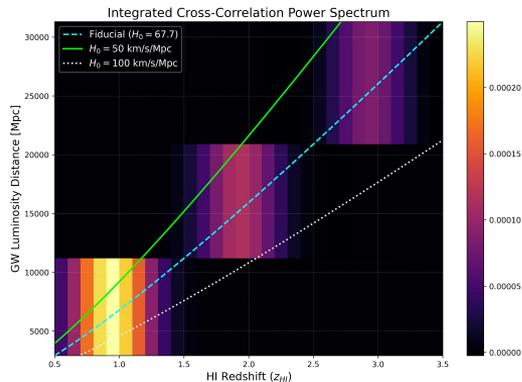
GW Cosmology

Use GWs and GRBs to probe Cosmology

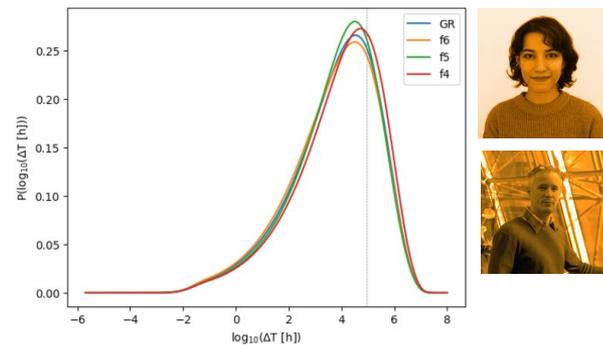
PEDE Universe | Pantheon+ & ET Δ + CE



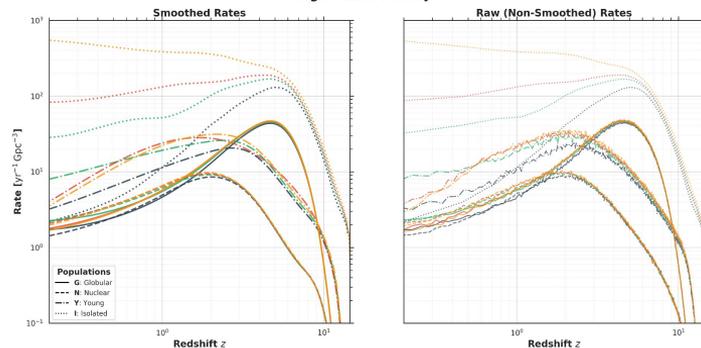
Using GW sources as tracers of the LSS



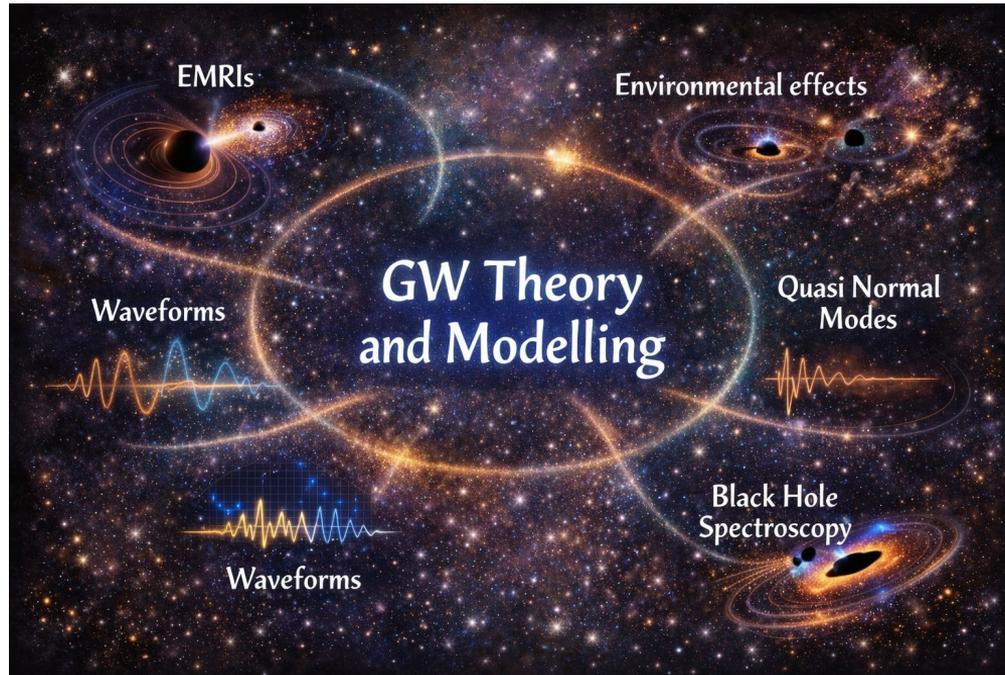
GW lensing to probe cosmology and gravity theories



Merger Rates Density

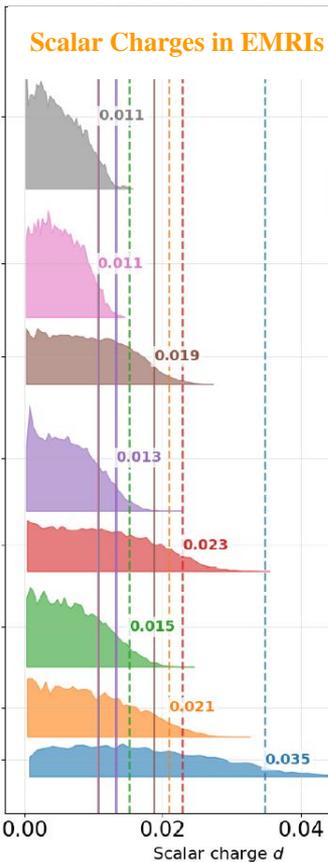


GW Theory
(see Sayak's talk)

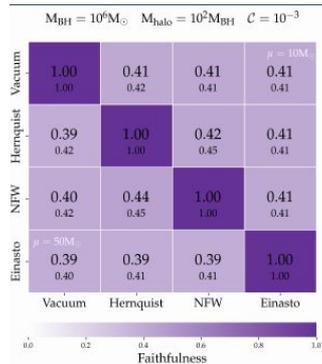


GW Theory

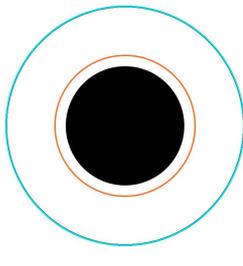
Scalar Charges in EMRIs and IMRIs



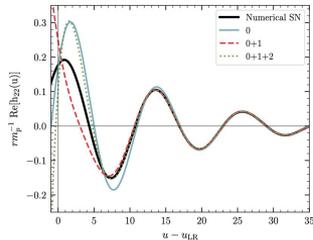
Environmental effects on GW signals in preparation for LISA



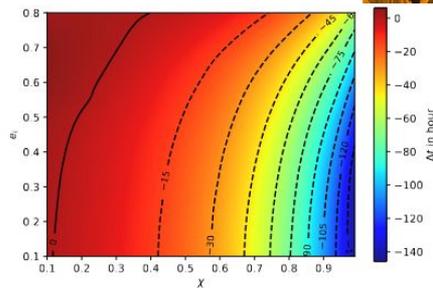
Plunges and QNMs to probe ringdown in asymmetric binaries



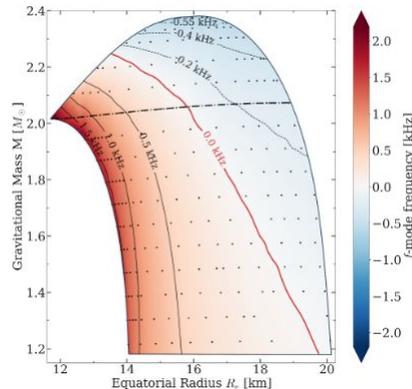
- ISCO
- Analytical Plunge
- Light Ring



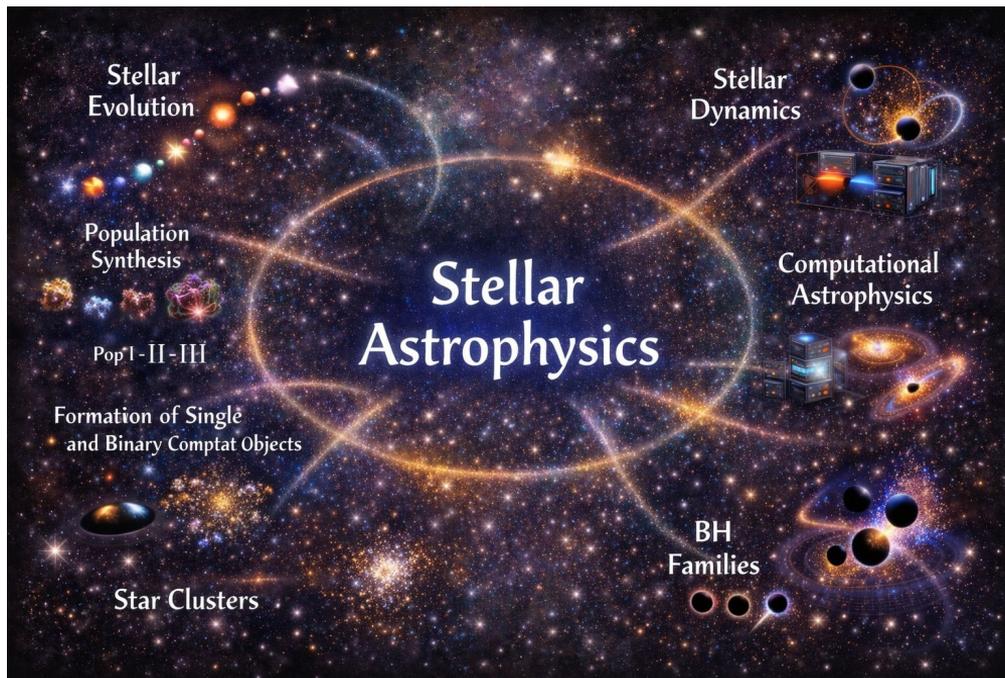
Tidal heating in BBHs



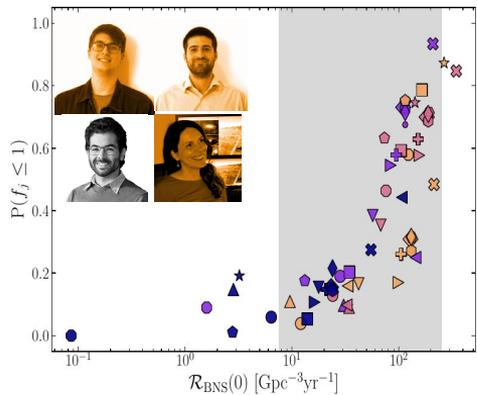
GW asteroseismology with NSs



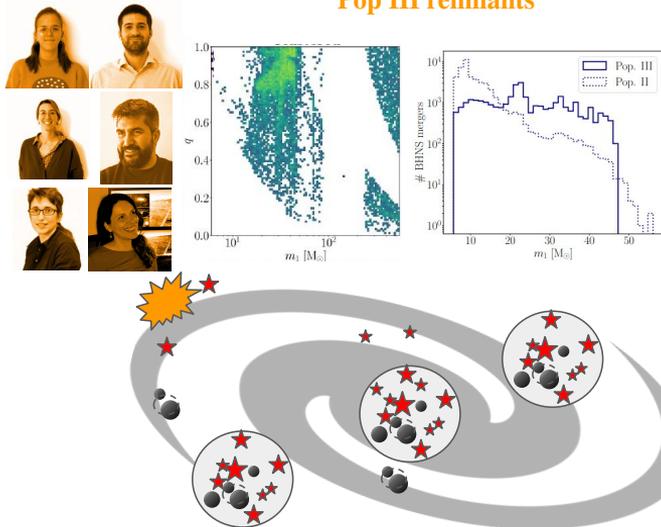
Stellar Astrophysics
(see *Benedetta, Lavinia*
and *Cristiano's* talk)



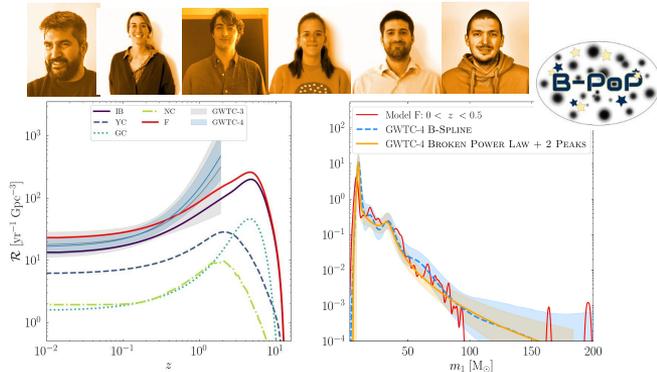
GRBs and BNSs rates



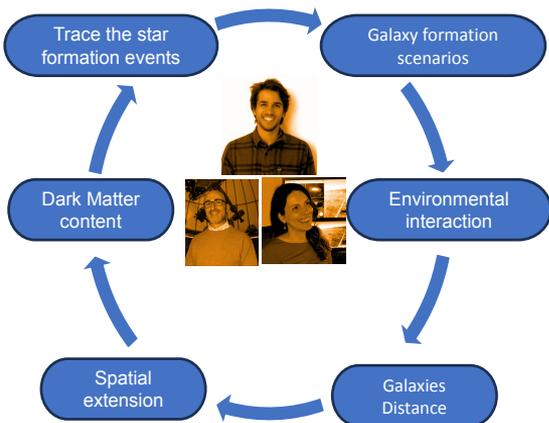
Pop III remnants



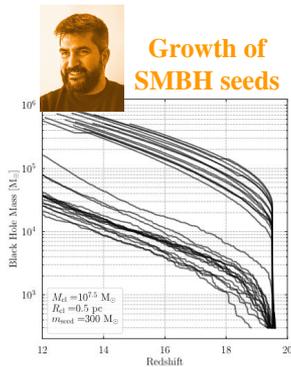
Population synthesis of GW source progenitors



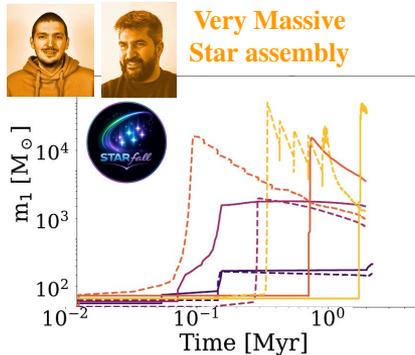
GCs as tracers of galaxy evolution



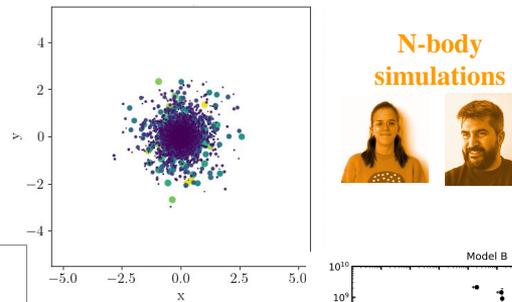
Growth of SMBH seeds



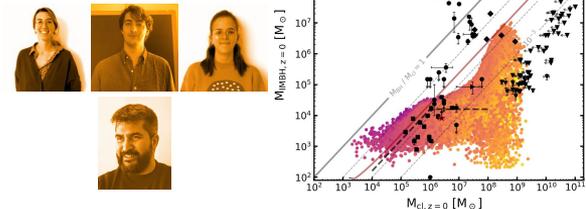
Very Massive Star assembly



N-body simulations



IMBH growth



Collaborative projects

ETO
task force





High-redshift
task force



IMBH
task force







Host&Pop



The origin of
dynamical UCB



GWSPACE2050

CBC
IMBH



GR &
Fundamental
physics



Collateral Activities



outreach

Public lectures

Meet students and kids



Join us!
our science is fun,
our food is great!



Short Course 2025-2026

Code	Title	Lecturer(s)	Description
GC1	The Luna Gravitational-wave Antenna	J. Harms (GSSI)	Introduction to the instrumentation, operational challenges, and science case of the LGWA, which is poised to become the first gravitational-wave observatory in the decihertz band.
GC2	Multi-messenger transient	G. Oganessian (GSSI), G. Pagliaroli (INFN LNGS)	First part of the course will be focused on the physics of gamma-ray bursts (GRBs). The second part of the course focuses on neutrino astronomy: from MeV to PeV astrophysical neutrinos.
GC3	Nucleosynthesis	S. Cristallo (INAF Abruzzo)	Introduction to nuclear burnings in quiescent hydrostatic phases and basics of stellar evolution. Theory of kilonova lightcurves.
GC4	Astrophysics of Neutron Stars	S. Ascenzi (GSSI)	The course focuses on the different classes of NSs, internal structure, cooling, and key techniques to measure their properties
GC5	The equilibrium configuration and tidal perturbation of NS	S. Datta (GSSI)	Review the structure of NSs, both in equilibrium or perturbed, focusing on tidal perturbations and their impact on GWs.
GC6	The dynamics of asymmetric binaries	A. Maselli (GSSI)	This course focuses on asymmetric binaries (like EMRIs), and observation prospects with ET, LISA, and other detectors
GC7	Multi-probe Cosmology	R. Murgia (University of Cagliari)	We will focus on: i) cmb and lss, ii) synergies among cosmological probes, iii) cosmic tensions and anomalies, iv) GW+cosmology.
GC8	Compact objects formation and evolution	M. Arca Sedda & C. Ugolini (GSSI)	The lectures focus on the processes driving the formation and evolution of compact objects in isolated galactic fields and dense stellar clusters, placing them in the context of current and future GW detectors.
GC9	Foundations of GW and MM data analysis	F. Santoliquido & B. Banerjee (GSSI)	This course provides an introduction to gravitational wave data analysis, explores analysis methods for next-generation observatories, and examines the multi-messenger opportunities for GRB physics.