



# LISA Consortium & astroWG

Marta Volonteri

(based on slides created by Jonathan Gair and  
current and former astroWG chairs)

# Reshaping the Consortium

- After adoption of the LISA mission, it was clear the **LISA Consortium needed to evolve** to enable close collaboration with both ESA and NASA moving forward
- **Consortium Constituent Council (CCC)** was formed to develop the charter, bylaws, and organisation of the evolved LISA Consortium
- At <https://directory.lisamission.org/register> you can find links to [Consortium Bylaws](#), [Consortium Policies and Procedures](#), [Consortium Work Plan](#), [Membership Quick Guide](#)

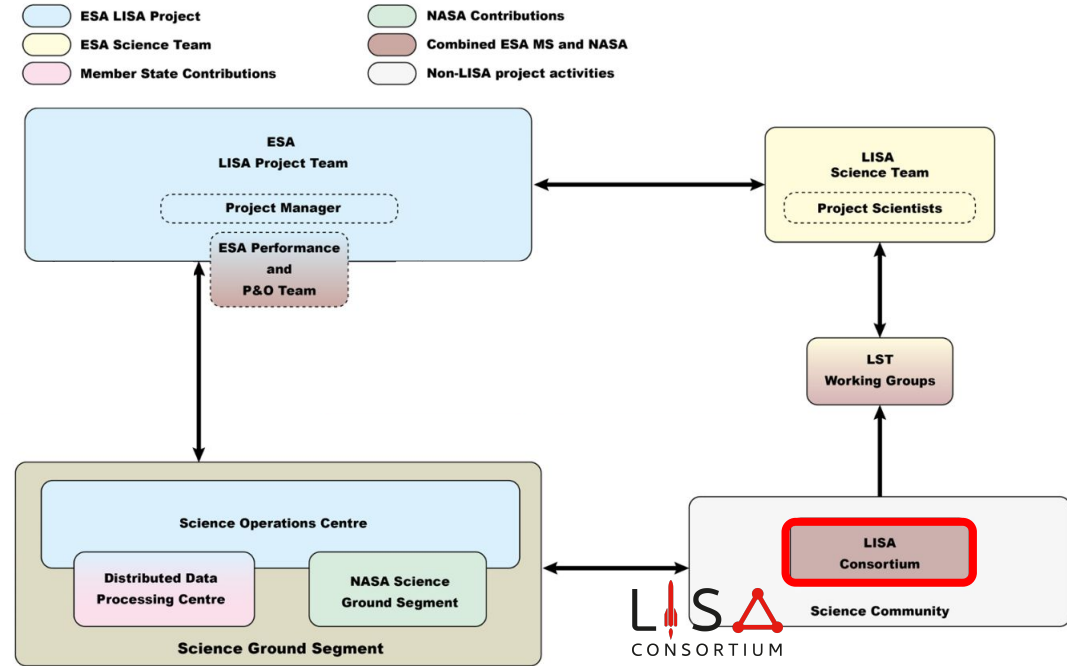


Figure from ESA's Science Management plan for LISA

# New Consortium Vision

*The LISA Consortium is a scientific collaboration working together to maximize the scientific return of LISA, in particular using the LISA data. The Consortium will support all aspects of the LISA mission throughout the mission lifecycle.*

*The LISA Consortium is committed to promoting the long-term growth and development of the LISA scientific Community, by providing a supportive and inclusive environment that offers training, mentoring and opportunities for scientists at all stages of their careers, in particular, early career scientists. The Consortium will also engage with the wider scientific community to foster interest in and support applications of the LISA data.*

Two types of members

- **Core members** [commit to deliverables]
- **Community members** [involved and informed]

# LISA Consortium Members

- Involved and informed
- Directory and email lists
- Workshops and meetings
- Announcements and LISA communications

## Community Members

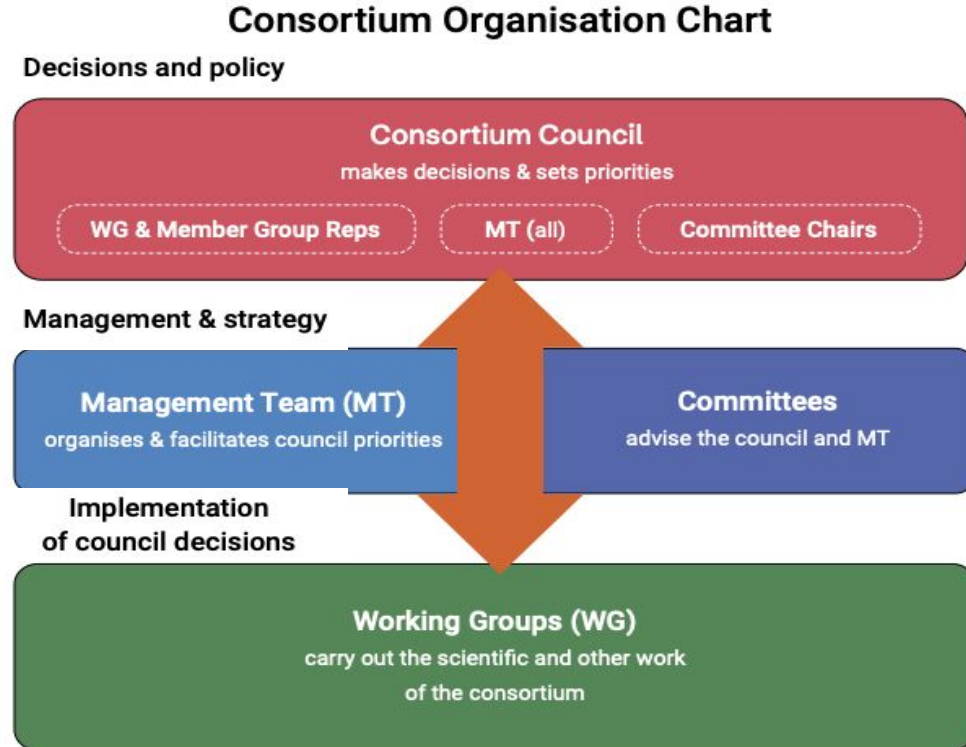
- No deliverables required
- No membership contribution reviews
- No automatic right to opt-in to author list of consortium papers
- Cannot be attached to member groups

## Core Members

- **Deliverables required**, as a rule of the thumb, about 25% of your research time devoted to Consortium work
- Membership contribution is reviewed
- Opt-in to author list of consortium papers
- Can self-organise into member groups
- **Only core members are part of WGs and can participate in and coordinate WG projects**

# Evolved consortium structure

- **Council + Management Team (MT)**
  - Consortium spokesperson: Niels Warburton
  - Consortium LST representative: Jonathan Gair
  - Council chairs: John Regan & Richard Brito
- **Committees**
  - Permanent (e.g. DEI, communication, membership etc)
  - Temporary (e.g. conference team etc)
- **Working Groups (WGs)**
  - Science WGs (Astrophysics, Cosmology, Data analysis, Fundamental physics, Instrumentation, Instrument Simulation and Processing, Waveforms)
  - Other Core WGs (Early Career Scientists, Communication, etc.)
- **Member groups** (self-organised groups of core members from institution/country/other)



# LISA consortium role and interaction with other entities

Consortium aims to maximise scientific return of LISA, and support the mission throughout its lifecycle

- Core members pledge deliverable(s)
  - Consortium work plan defines consortium work and deliverables
  - Consortium work is done in consortium WGs, including new projects proposed by members
- 
- Note: LISA data will be open, no preferred access for consortium. People that made significant contributions to LISA can become legacy authors on consortium papers.
    - ESA will create Science Topical Panel to work on the scientific results during the proprietary period. There will be an open call for joining the Science Topical Panels and we expect that Consortium members will make a significant part of these panels

# The role of Science WGs

- Core and community member
- Science WGs are in charge of deliverables
- **Core members commit to deliverables** in their main WG
- Deliverables are either work in, e.g., DDPC and LST or active contribution to WG projects or committees
- **Service tracking will be in place:** if minimum deliverable threshold is not met core members will lose their status and revert to community members
- **New core members can apply to join without committing to deliverables.** Such members are provisional core members
- At the end of a provisional period (normally one year), a provisional core member will become a regular core member provided they have identified defined deliverables to which they can contribute; otherwise they will be reclassified as community members

# WG chairs, council and elections

- **WG co-chairs**

- Senior co-chairs serve 3-year terms and early career co-chairs serve 2-year terms
- Elections for the working groups will likely be synchronized at a given time of the year to minimize the flow of information

- **WG council representatives**

- Science WGs will call for a vote to elect representatives to the Council as described in the bylaws
- The number of representatives from a science WG is the number of core members for whom this is their primary WG - who are not members of a MG, or whose MG has fewer members than the representation quota - divided by 10, and rounded down
- Science WG Council representatives are elected for three years terms

# Recap: Consortium basics, members' rights and duties

- Individuals can apply to join either as a **core member** or as a **community member**
- Core members will identify a **primary working group**
- Only core members can join WGs and **participate to projects**
- Core members submit **pledges** on work to be performed and pledges are reviewed yearly. **Service tracking statements are reviewed at end of June/July**
- Core members have the option to form **member groups** by institution, region, etc
- About 25% of core members' research time devoted to Consortium work. **Individual research and work done within member groups, even if relevant to LISA does not count towards the pledge. Only work done within and for the Consortium counts towards the pledge** (WG projects, DDPC, NSGS, Performance and Operations, hardware, LST)
- Core members can choose to be represented **either** via member group (e.g. your university group) **or** via science WG: 1 council rep per ~10 core members, elected by their group
- Core members elect Spokesperson (open call) and LST representative (open call)
- MT (open call) selected by spokesperson and LST rep and approved by council
- WG chairs elected by WG members
- Committee members appointed by council
- The LISA wiki – currently being updated – will contain all information: <https://wiki.lisamission.org/>



## LISA Wiki Home

### LISA Online

- Consortium Website
- ESA LISA Website
- NASA LISA Website
- LISA Mission FAQ
- LISA Science Team

### Consortium Directory

### Management

- LISA Council
- Management Team
- Ombudsperson

### Council Minutes

### Committees

- Appts & Elections
- Bylaws
- Communications
- DEI
- Membership
- Pubs & Presentations

### WGs

#### Science WGs

- Astrophysics
- Cosmology
- Data Analysis R&D
- Fundamental Physics
- Instrumentation
- Instrument Simulation
- Waveforms

#### Other WGs

[Main](#) /

# LISA Consortium Wiki Home

## Wiki homepage of the LISA consortium.

We have archived the [preAdoption Consortium Wiki Homepage](#) (with old pre-Adoption Consortium and CCC Organizational Information).

### Revamp of the Wiki-page

The LISA Communications Implementation Working Group is currently working on revising and restructuring the Wiki page to facilitate project organization and information management in the Consortium -- ***pardon the digital dust and chaos!***

If you would like to help in this effort, please reach out to the CIWG chairs, or join the conversation on the [LISA Mattermost Wiki Channel](#). If you note broken links, or have comments on changes and format, or have suggested changes, please add them to the [Wiki Changes Thread](#) on the [LISA Mattermost](#).

We will try to keep the plan for changes and ToDo list as the wiki-revamp proceeds (in notional priority order) in this [wikiChangeLog](#) during the main part of the restructure. Thank you for your patience!

### Purpose

The purpose of the Wiki is for the various groups to share information, technical and scientific progress with the rest of the consortium. Every working group, or work package group is free to create new pages. A skeleton has already been created as a guiding structure. When reporting on your work in one of the wiki pages, or in a new wiki page, please be sure to include a one-liner explanation in the Edit Summary.

### Navigation and Editing

Please use the right menu to navigate through the wiki, in particular if the **Back** button of your browser shows an expiration error message. For tips on editing or creating pages please read this brief [how-to page](#).

### Wiki pages

- [LISA Consortium Wide \(Home\)](#)
  - [Pre-Adoption & Restructure Home](#)
  - [Membership Management](#)
  - [Consortium Ombudsperson](#)
  - [DEI Committee](#)
  - [LISA Early Career Scientist Group](#)
  - [P & P Committee](#)
  - [Helpful Information](#)
  - [Chairs & Leads](#)

Join with the same credentials as for the LISA directory email the Membership Management Team, [mmt@lisamission.org](mailto:mmt@lisamission.org), if you have lost or forgotten your credentials

# Consortium projects

- **Any core member can propose a new WG project. New projects must be presented to the relevant WGs and approved by the WG chairs**
- The **coordinators** will be suggested by the project proposer, in consultation with the WG chairs, at the time the project is proposed. When the proposer is not the coordinator, the proposer would normally form part of the project team
- Consortium projects are expected to be **collaborative or focussed on delivering key results or tools** identified by the working groups or Council as required to ensure the success of the mission or to deliver the scientific goals of the consortium
- Projects **should not overlap with work being carried out outside the Consortium** by members of the WG with external collaborators. If proposed projects are identified as such, the WG chairs will work with the interested parties to find a mutually agreeable way to move forward

# Consortium projects

- Newly approved projects must be **advertised** to all core members of the relevant WGs. WG members expressing interest, with valuable expertise and sufficient available time should normally be given the opportunity to contribute to the project
- Reasonable limits on the number of participants in a project can be imposed, with the agreement of the chairs of the relevant WGs
- Projects with broad scope, or generating significant scientific results, or deemed to be of high priority, can be designated as **Consortium Key Projects**. The Council has the right to instigate Key Projects and to designate ongoing WG projects as Key Projects
- A key project is being discussed and advertised as soon as it's been consolidated
- How to find projects: <https://directory.lisamission.org/consortium/project/> (view only)

- MAIN NAVIGATION
- Service Tracking
- Plings (next year)
- Statement
- Statement Confirm List
- Members
- Manage Members
- Member Groups
- Manage Member Groups
- Group Applications
- Create member Group
- Consortium Groups
- Manage Consortium Groups
- Consortium projects (view only)
- SGS projects (view only)
- Waiting Confirm (Reader)
- Support
- Logout

### Consortium projects (view only)

Home Consortium Project List Consortium projects

Search:

Code	Name	Group	Coordinator	Status	Created at	actions
astro-wg-2025-05	Comparing UCB catalogues for LISA with existing observations	Astrophysics WG	Alexey Bobrick, Simone Scaringi, Silvia Toonen	Open	2025-12-01	<a href="#">View</a>
astro-wg-2025-11	Data standard and DDPC-friendly catalogs	Astrophysics WG	Tristan Boual, Laurentiu-Ioan Caramete, David Izquierdo-Villaba, Golan Shalufiah	Open	2025-12-01	<a href="#">View</a>
astro-wg-2025-03	DiscMPL	Astrophysics WG	Andrea Dondozzi, Alessia Franchini, Alexander Dittmann, Alessandro Lupi	Open	2025-03-28	<a href="#">View</a>
astro-wg-2025-13	Dual-binary AGN	Astrophysics WG	Alessandra De Rosa, David Izquierdo-Villaba, Kunyong Li, Leonid Dunais	Open	2025-12-01	<a href="#">View</a>
astro-wg-2025-07	Dynamical binaries in the Galaxy and Local Volume	Astrophysics WG	SARA PASTELLO, Manuel Arca Sedda, Tristan Boual, Cristiano Ugolini	Open	2025-12-01	<a href="#">View</a>
astro-wg-2025-12	EMRI catalogs	Astrophysics WG	Matteo Bonetti, Elisa Bortolas, Luca Broggi, Alessandro Tricca	Open	2025-12-01	<a href="#">View</a>
astro-wg-2025-14	Environment of MBH mergers	Astrophysics WG	John Regan, Sean McGee, Nanyi Chen	Open	2025-12-01	<a href="#">View</a>
astro-wg-2025-06	Extending UCB catalogs to include mass-transferring systems	Astrophysics WG	Thomas Kupfer, Simone Scaringi, Nathan Steinle	Open	2025-12-01	<a href="#">View</a>
astro-wg-2025-08	Extragalactic DWD foreground	Astrophysics WG	Valeriya Korol, Gija Nelmans, Mauro Pieroni	Open	2025-12-01	<a href="#">View</a>
astro-wg-2025-02	LISA Synthetic UCB Catalogs Project	Astrophysics WG	Alexey Bobrick, Katelyn Brevik	Open	2025-03-28	<a href="#">View</a>
astro-wg-2025-15	Lisa Triples and CBPs	Astrophysics WG	Camilla Danielski, Nicola Tammini, Silvia Toonen	Open	2025-12-01	<a href="#">View</a>
astro-wg-2025-01	MBHCatalogs	Astrophysics WG	David Izquierdo-Villaba, Marta Volontieri, Matteo Bonetti, Alessia Gualandri, Melanie Habouzit, Silvia Bonoli	Open	2025-03-28	<a href="#">View</a>
astro-wg-2025-04	Revise AstroWG White Paper CH 1 (UCBs)	Astrophysics WG	Thomas Kupfer, Thomas Tauris, Anastasios Fragkos	Open	2025-03-28	<a href="#">View</a>
astro-wg-2025-17	Revise AstroWG White Paper CH 2 (MBHBs)	Astrophysics WG	Elisa Bortolas, Melanie Habouzit, Pedro Capelo	Open	2025-12-04	<a href="#">View</a>
astro-wg-2025-18	Revise AstroWG White Paper CH 3 (EMRIs)	Astrophysics WG	Lorenz Zwick, Veronica Vazquez Acioves, Pau Amaro Sequeira, J.E. Saavik Ford, Alejandro Torres-Orjales	Open	2025-12-04	<a href="#">View</a>
astro-wg-2025-16	Updatable predictions for sEBH in LISA	Astrophysics WG	Riccardo Busicchio, Alexandre Toubiana	Open	2025-12-02	<a href="#">View</a>
j-2025-02	Waveform parameter space for astrophysical sources	Astrophysics WG, Waveform WG	Luca Broggi, Lucio Mayer, Marta Volontieri, Sean McWilliams	Open	2025-12-01	<a href="#">View</a>
comm-wg-2025-10	Consortium Calls - Internal Communications	Communications Implementation WG	Elias Vagstad, Shane Larson, Andrea Monica Scorta	Open	2025-11-27	<a href="#">View</a>
comm-wg-2025-08	LPF 10th anniversary - Public Engagement & Outreach	Communications Implementation WG	Eleonora Castelli	Open	2025-11-27	<a href="#">View</a>
comm-wg-2025-05	Newsletter - Internal Communications	Communications Implementation WG	Ana Caramete	Open	2025-11-27	<a href="#">View</a>
comm-wg-2025-06	Social Media - Public Engagement & Outreach	Communications Implementation WG	Eleonora Castelli, Alice Paun	Open	2025-11-27	<a href="#">View</a>
comm-wg-2025-11	Sonification - Public Engagement & Outreach	Communications Implementation WG	Nina Kunert	Open	2026-02-19	<a href="#">View</a>
comm-wg-2025-07	Website - Public Engagement & Outreach	Communications Implementation WG	Sascha Rieger	Open	2025-11-27	<a href="#">View</a>
comm-wg-2025-09	Wiki - Internal Communications	Communications Implementation WG	Shane Larson	Open	2025-11-27	<a href="#">View</a>
cos-wg-2025-01	Cosmic strings beyond minimally-coupled models	Cosmology WG	Jeremy Wichter, Lara Souza	Open	2025-04-04	<a href="#">View</a>
cos-wg-2025-06	LISA-ET Synergy project on SGWB	Cosmology WG	Antonio Junior Iovino, Gabriele Perra	Open	2025-12-09	<a href="#">View</a>
cos-wg-2025-03	Primordial Black Hole toolbox PrimBHoles	Cosmology WG	Juan Garcia-Bellido, Sebastian Clesse	Open	2025-04-04	<a href="#">View</a>
cos-wg-2026-08	Rapid testing of cosmological SGWB models against Global FR residuals	Cosmology WG	Mauro Pieroni, Jesús Torrado, Jonas El Gammal	Open	2026-01-27	<a href="#">View</a>

cos-wg-2026-07	Reinterpreting GW Signals from PTs in Particle Physics Model Parameter Space	Cosmology WG	Eric Madge, Germano Nardini, Marek Lewicki	Open	2026-01-09	<a href="#">View</a>
cos-wg-2025-04	Standard siren cosmology with LISA: a Bayesian hierarchical inference approach	Cosmology WG	Danny Lighi	Open	2025-04-04	<a href="#">View</a>
cos-wg-2025-05	Strong Lensing with LISA	Cosmology WG	Jose Maria Esculaga, Alice Garofolo	Open	2025-11-14	<a href="#">View</a>
cos-wg-2025-02	Testing gravitational wave polarization with LISA	Cosmology WG	Alberto Mangiari, Macarena Lagos	Open	2025-04-04	<a href="#">View</a>
datard-wg-2025-02	Community/DDPC/CS interface	Data Analysis Research and Development WG		Open	2025-05-09	<a href="#">View</a>
datard-wg-2025-04	Education of LISA and broader community about LISA data analysis	Data Analysis Research and Development WG		Open	2025-05-09	<a href="#">View</a>
datard-wg-2025-01	Figures of Merit	Data Analysis Research and Development WG	Maude Le Jeune	Open	2025-05-07	<a href="#">View</a>
datard-wg-2025-03	Novel methods for LISA data analysis	Data Analysis Research and Development WG		Open	2025-05-09	<a href="#">View</a>
datard-wg-2025-05	Support/contribute to data analysis aspects of other WGs	Data Analysis Research and Development WG		Open	2025-05-09	<a href="#">View</a>
fp-wg-2025-02	Effect of systematics on parametrized inspiral-merger-ringdown tests	Fundamental Physics WG	Elisa Maggio, Manuel Piruli	Open	2025-04-08	<a href="#">View</a>
fp-wg-2025-01	Ringdown tests of the no-hair theorem with LISA	Fundamental Physics WG	Marc Besancon, Lorena Magaña Zertuche	Open	2025-04-08	<a href="#">View</a>
j-2025-01	EMRI models in EFT extensions of GR	Fundamental Physics WG, Waveform WG	Susanna Barsanti, Andrew Spiers	Open	2025-04-08	<a href="#">View</a>
j-2026-2	EMRI models with accretion discs	Fundamental Physics WG, Waveform WG	Francisco Duque	Open	2026-03-05	<a href="#">View</a>
j-2026-3	EMRI models with axion clouds	Fundamental Physics WG, Waveform WG	Conor Dyson	Open	2026-03-05	<a href="#">View</a>
j-2026-1	EMRI models with tidal resonances	Fundamental Physics WG, Waveform WG	Beatrice Bonga	Open	2026-03-05	<a href="#">View</a>
isp-wg-2025-01	Alternative approaches to LISA data processing	Instrument Simulation and Processing WG		Open	2025-12-03	<a href="#">View</a>
isp-wg-2025-02	Study of next-gen GW missions and LISA follow-ups	Instrument Simulation and Processing WG		Open	2025-12-03	<a href="#">View</a>
wav-wg-2026-12	Common data sets: EMRI dataset: OPA data for generic orbits and primary spins.	Waveform WG	Niels Warburton	Open	2026-03-06	<a href="#">View</a>
wav-wg-2026-13	Common data sets: EMRI dataset: 1PA conservative 15F data	Waveform WG	Zachary Naepeck	Open	2026-03-06	<a href="#">View</a>
wav-wg-2026-15	Common data sets: EMRI dataset: 1PA dissipative 25F data	Waveform WG	Barry Wardell	Open	2026-03-06	<a href="#">View</a>
wav-wg-2026-14	Common data sets: EMRI dataset: 1PA secondary spin data	Waveform WG	Viktor Skoupny	Open	2026-03-06	<a href="#">View</a>
wav-wg-2025-02	Common data sets: PPheda	Waveform WG	David Testini	Open	2025-04-04	<a href="#">View</a>
j-2026-4	EMRI models with dark matter spikes and halos	Waveform WG	Rodrigo Vicente, Kyriakos Destounis	Open	2026-03-05	<a href="#">View</a>
wav-wg-2025-01	Waveform conventions: Bondi-Metzner-Sachs frames	Waveform WG	Keefe Mtnan	Open	2025-04-04	<a href="#">View</a>
wav-wg-2026-10	Waveform conventions: eccentricity definitions	Waveform WG	Philip Lynch, Moj Af Shakh	Open	2026-03-06	<a href="#">View</a>
wav-wg-2026-11	Waveform conventions: frames for processing binaries	Waveform WG	Sarp Akay, Josh Mathews	Open	2026-03-06	<a href="#">View</a>
wav-wg-2025-03	Waveform systematics: common tools	Waveform WG	Héctor Estellés Estrella, Amab Dhani	Open	2025-04-09	<a href="#">View</a>
wav-wg-2026-20	Waveform systematics: Systematics for EMRIs: impact of post-adiabatic terms	Waveform WG	Josh Matthews, Jonathan Thompson	Open	2026-03-06	<a href="#">View</a>
wav-wg-2026-19	Waveform systematics: Systematics for high mass ratio MBHBs & IMRIs	Waveform WG	Angelica Albertini, Eleanor Hamilton	Open	2026-03-06	<a href="#">View</a>
wav-wg-2026-17	Waveform systematics: Systematics for massive BBHs: impact of GW memory	Waveform WG	Maria Roselló-Sastre	Open	2026-03-06	<a href="#">View</a>
wav-wg-2026-18	Waveform systematics: Systematics for massive BBHs: impact of higher harmonics	Waveform WG	Sophia Yi, Chantal Pitte	Open	2026-03-06	<a href="#">View</a>
wav-wg-2026-16	Waveform systematics: Systematics for massive BBHs: NR accuracy requirements	Waveform WG	Keefe Mtnan, Asim Jan, Deborah Ferguson	Open	2026-03-06	<a href="#">View</a>

# AstroWG projects

- **Call for proposing new projects every ~3-4 months**
- The **coordinators** will be suggested by the project proposer, in consultation with the WG chairs, at the time the project is proposed. When the proposer is not the coordinator, the proposer would normally form part of the project team
- An astroWG project should not be a student's main PhD project, as progress depends too much on other people's contribution
- **Signing up for projects** is first opened through online forms up to a given date (e.g., 1-2 months) then joining remains possible by emailing the coordinators. Coordinators can judge if new contributors are allowed to join, based on project needs and the Policies and Procedures
- **One doesn't need to be an expert (yet!) on a topic to join a project:** help is possible also by working on the bibliography, making plots, etc.
- Project **guidelines** can be found at <https://tinyurl.com/4rxnwadb>

# Astro WG projects

- Updating the astroWG LRR (2025)
  - Stellar compact binaries and multiples
  - Massive black hole binaries
  - Extreme and intermediate mass-ratio inspirals.
- EMRI catalogs
- Dual/binary AGN
- Environment of MBH mergers
- Waveform parameter space (with wavWG)
- Data standard for catalogs
- DDPC-friendly catalogs
- Comparing UCB catalogues for LISA with existing observations
- Extending UCB catalogs to include mass-transferring systems (e.g. AM CVns, CVs, etc.)
- UCB catalogs from dynamical channels
- Estimating uncertainty in the extragalactic DWD foreground
- Lisa triples and Circumbinary Planets
- Updatable predictions for stellar binary BHs in LISA

# Results from the first astroWG projects

Marta Volonteri on behalf of the astroWG chairs and the project coordinators

astroWG chairs: Matteo Bonetti, Taeho Ryu, Silvia Toonen, Marta Volonteri (Valeriya Korol, Shane Larson)

UCBcatalogs: Katie Breivik, Alexey Bobrick

MBHcatalogs: Melanie Habouzit, Luke Kelley, Alessia Gualandris, Silvia Bonoli, David Izquierdo, Matteo Bonetti, Marta Volonteri

DisclMRIs: Andrea Derdzinski, Alessandro Lupi, Alessia Franchini, Alex Dittman, Lucio Mayer

# Overview and goals

Target is creation of WG “flagship” projects that foster the community building approach and address key aspects of the LISA science goals:

- **Provide basis for the Consortium’s science exploitation of LISA data**
- **Catalogs to build your next Data Challenge**
- **Assess astrophysical uncertainties, e.g., for figures of merit etc**

These projects were open to all astroWG members, with a sign-up procedure: ~100 people have signed up for the proposed projects

Experts who are not part of the astroWG/Consortium were also invited to join

**MBHCatalogs:** Creation and comparison of MBH binary catalogues

**UCBCatalogs:** Expected number of Galactic binaries

**DiscIMRIs:** Numerical hydrodynamics code comparison on sinking MBHs and IMRIs

# Creation and comparison of MBH binary catalogs (MBHCatalogs)

## Project

Exhaustive comparison of **20 existing models** predicting MBH merger rates and LISA event rates.

Models span different techniques, resolution, physical assumptions on MBH seeding, growth, dynamics, galaxy formation models.

## Goals

- i) Evaluating the global astrophysical uncertainties on the LISA event rate.
- ii) Identifying robust model-independent predictions.

## In practice

- About 100 participants with diverse expertise / skills and at different stages of career.
- 7 coordinators.
- Project divided in many tasks.
- Each participant expected to complete several tasks.
- Close monitoring of who is doing what.

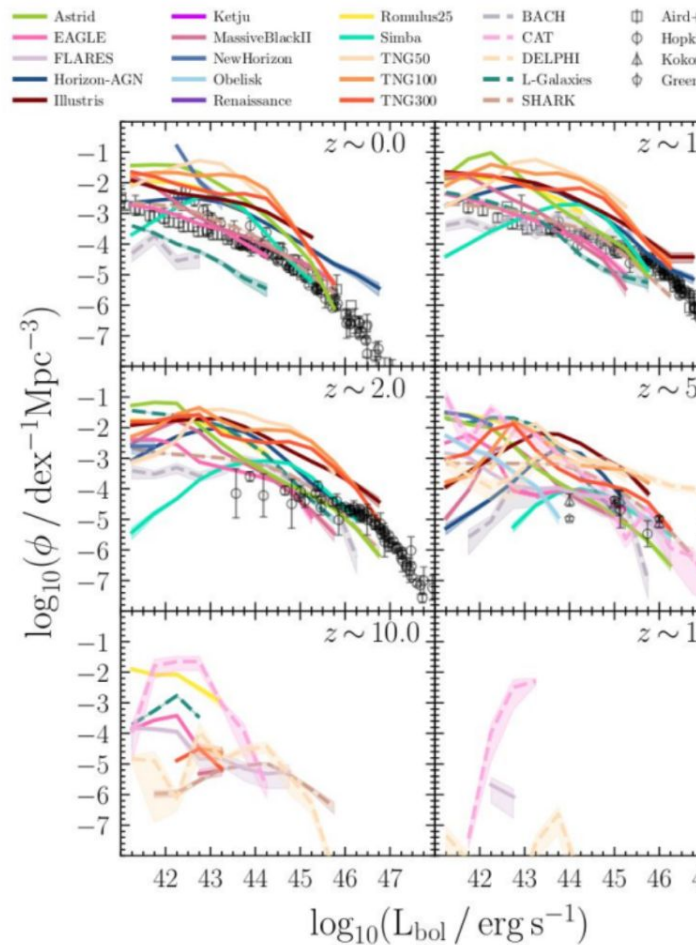
# General checks

The density of active MBHs at different times – Luminosity function

1 - It seems to be a convergence in the bright end ( $L_{\text{bol}} > 10^{45}$  erg/s)

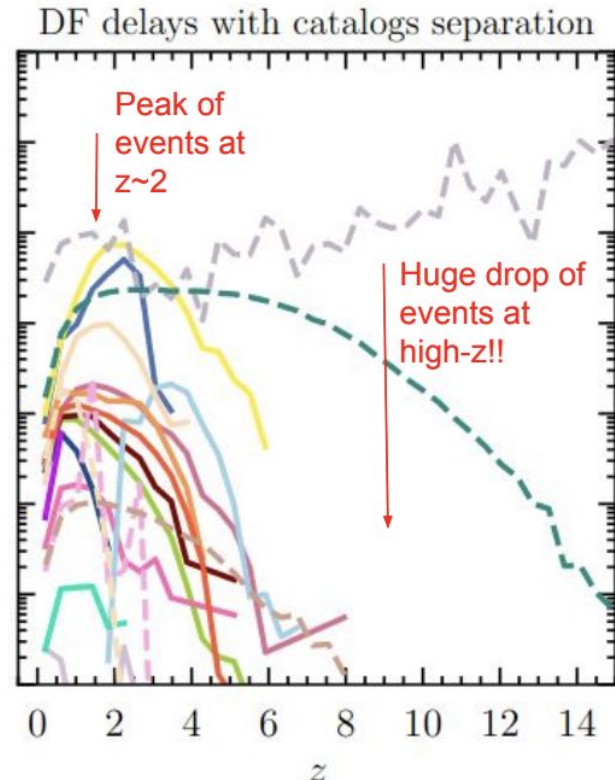
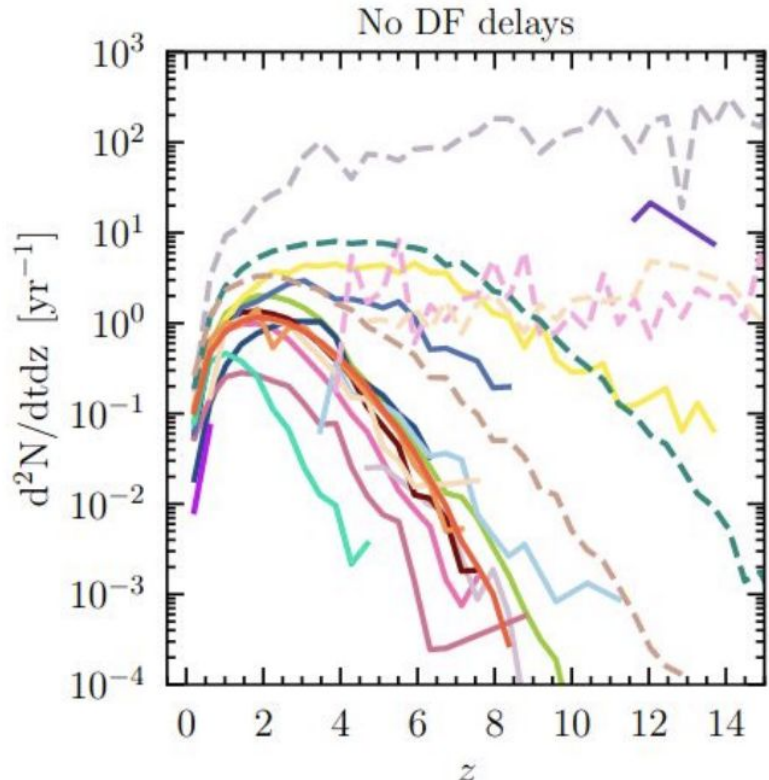
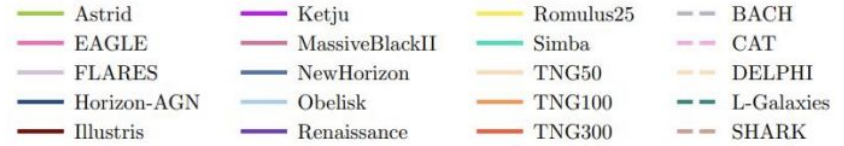
2 - Huge spread in the faint end ( $L_{\text{bol}} < 10^{44}$  erg/s)  
→ Large uncertainties in the multimessenger astronomy

Lower redshift  
Higher redshift



# Massive black hole binaries

Merger rates – Numerical mergers vs Delayed mergers –



# LISA Synthetic UCB Catalogs Project

What is the Galactic Population of LISA DWD Sources to the Best of Our Knowledge?

## Two Types of Uncertainty

### #1 - Astro Uncertainties:

#### Examples:

- Stellar winds
- Mass transfer
- Galaxy models
- Real Astro processes

Astro Uncertainty Paper  
AB++26

Main Outcome: Variance Assuming  
Perfect Implementation



## Two Types of Uncertainty

### #2 - Code Uncertainty:

#### Examples:

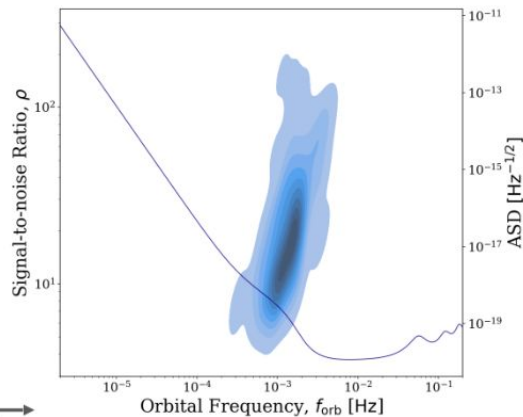
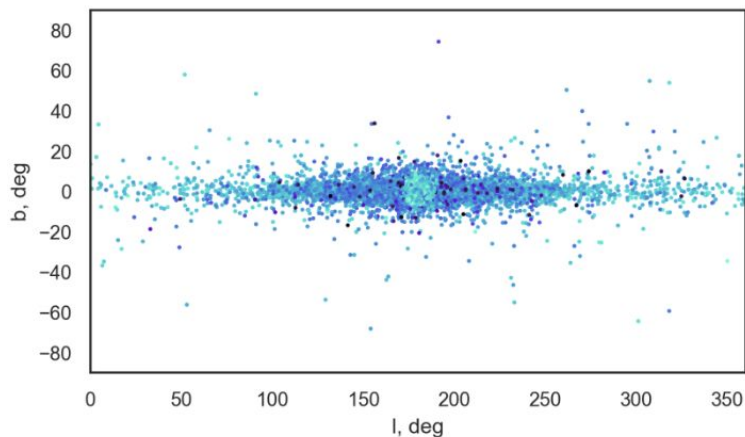
- Timestepping
- Event handling
- Numerical implementation
- Understanding of the processes

Code Uncertainty Paper  
KB++26

Main Outcome: Variance Assuming  
Perfect Astrophysics Knowledge



# End-to-End Pipeline



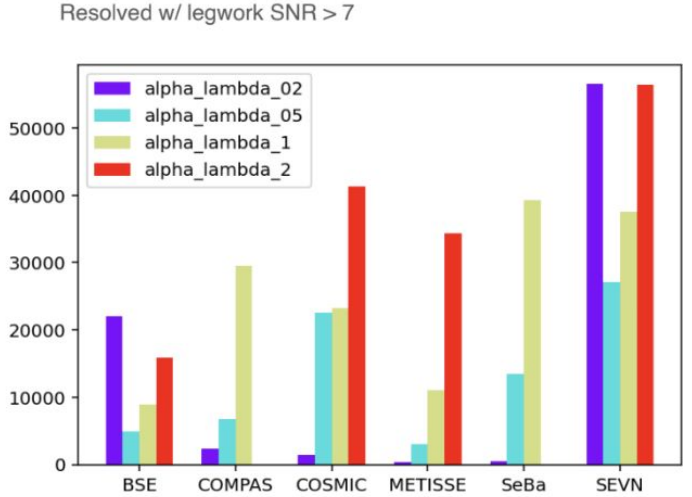
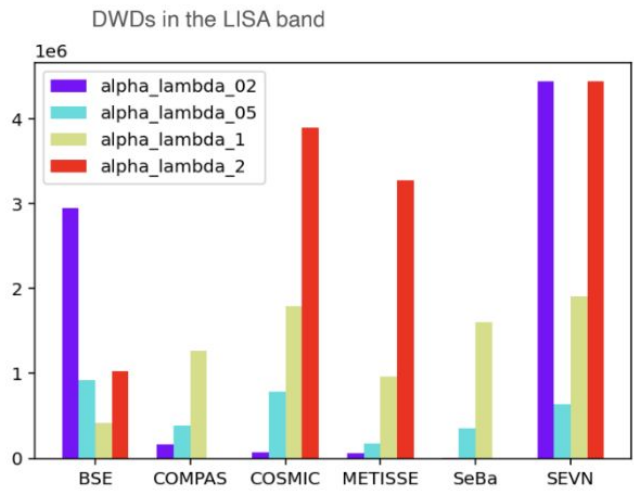
- Detailed Galaxy models
- Convolution step
- Detection pipeline

Robin+03

Credit: AB,  
R.Willcox,  
V.Strokov, KB



# DWD Population Comparison



Credit: [W. van Zeist](#)

- CE and MT - dominant unknowns
- Code-to-code variations



- How does gas impede or drive the binary inspiral?
- Are there characteristic EM counterparts?
- Implications for binary formation and merger rates
- How will gas interactions manifest in gravitational waves?

# Disk IMRI Code Comparison

LISA Astro Working Group Project  
Alessia Franchini (University of Milan)  
on behalf of the entire DiskIMRI team

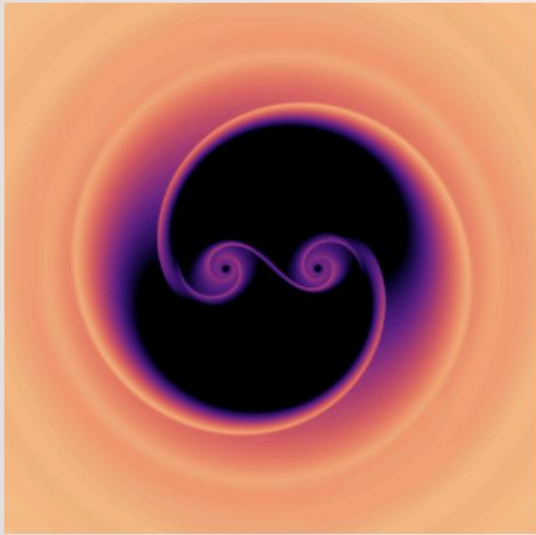
Derdzinski, Dittmann, Franchini, Lupi et al. (sub.)  
<https://arxiv.org/pdf/2512.10893>



# Science Target

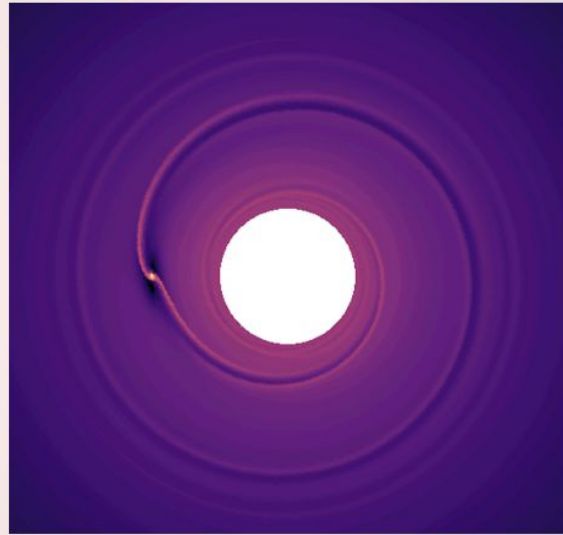
Study the convergence of torques and flow of gas around highly unequal mass binary system.

$$q = M_2/M_1 = 1$$



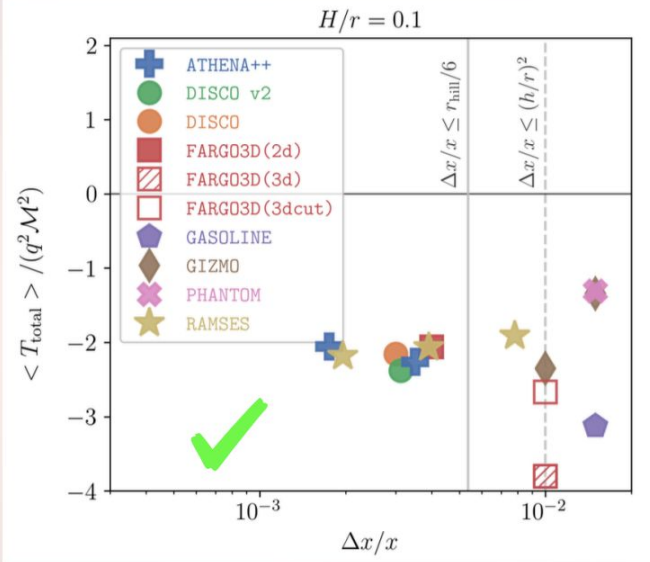
Duffell et al. 2024

$$q \ll 1$$

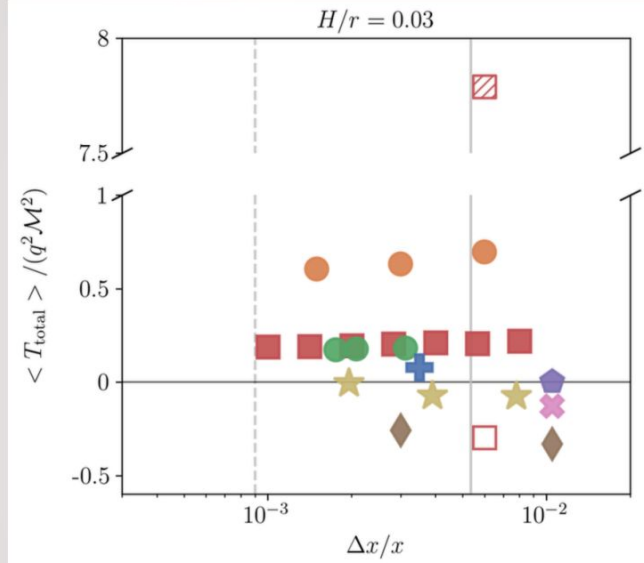


This work

## Total torque vs resolution



Total torque on binary



Spatial resolution

- Good agreement between all codes for the alignment run: thick disks drive the IMRI to inspiral
- Sensitivity to gas morphology in the co-orbital region leads to the strongest differences amongst codes (determines torque sign)
- No general agreement nor convergence on the sign of the torque in the thin disk case
- 3D simulations are necessary in order to properly model the flow around the secondary as this is essentially the region that governs the outcome in terms of IMRI migration direction

# Community Member Q&A

- If I am not a current consortium member, what are my options?
  - If you would like to join the consortium, you can join as a community member or core member
  - Membership is individual, you do not need to be part of a group.
  - Please keep checking the [consortium website](#) for updates on how to join.
- Can I contribute to the consortium?
  - Community members will be informed and connected but do not need to sign up for consortium deliverables
  - Core members will contribute to consortium projects
- How do consortium community members fit in the consortium structure?
  - Community members have access to consortium communication, workshops, etc
  - Will not be part of member groups or have representation on the council
- What do I need to do?
  - Consortium signup will open in March or April and will remain open to apply at any time
  - If you join as a core member, you will need to select a primary working group and have the option to form or join a member group affiliated with an institution, region, or research team

## Q&A: I'm a lead of an existing member group within the Consortium, how do these changes affect me?

- All membership applications will be carried out on an individual basis.
- Members that belong to your research group (e.g. maybe it's a university basis, UAB) can choose to be represented on the council via your group (referred to as a UAB member group) or via a scientific working group to which they belong (but not both).
- How your member group is made up is completely your decision, internal group, institute, university, nation, etc. All members choose to opt in.
- Your member group will be represented on the council; the number of representatives will be dependent on the size of your member group.
- Your representatives do not need to be the member group lead and will be rotated every 3 years.

# Q&A: I am a PhD student how do these changes affect me?

- As all membership applications will be on an individual basis you will need to apply for membership of the new consortium.
- Core or Community consortium membership -
  - PhD students can join as individual Community members and do not need to be part of a group.
  - PhD students working on LISA research will start as provisional Core members and become Core members after the successful conclusion of the probationary period. This should be discussed with your PhD supervisor.
- Note that nothing is set in stone - and things can be changed.