



Fundamental Physics WG

Chairs: Enrico Barausse, Richard Brito, Elisa
Maggio, Philippe Jetzer

e-mail: fp-wg-chairs@lisamission.org



The Galileo Galilei Institute for Theoretical Physics
Arcetri, Florence

Fundamental Physics with LISA
Nov 12-14 2018

Observations of astrophysical systems where gravity is extreme —highly-dynamical and/or non-linearly strong — have the potential to shed light on some of the most profound questions in physics today: from the nature of compact objects to whether Einstein's theory accurately describes the merger of black holes. The first space-based detector, LISA, a joint ESA-NASA mission is currently planned to be deployed in 2034, allowing for the first observation of the merger of supermassive black holes and of extreme mass-ratio inspirals. These observations will enable new accessible tests of general relativity, in particular in the strong regime.

We announce the Fundamental Physics with LISA workshop which will take place on November 12-14, 2018 at the Galileo Galilei Institute (Arcetri, Florence, IT). Its goal will be to discuss ways in which we can test General Relativity and learn about fundamental theoretical physics with future LISA observations.

In order to encourage interaction and discussion, the workshop will bring together experts in theory, phenomenology, modeling and data analysis, and will have an unusual format. Each day will be centered around one of these facets, and consist of three topical lectures in which discussions will be moderated by a panel of three or four experts. The goal of the workshop is to foster fruitful interactions between different dimensions of LISA science.

Invited speakers: S. Bahcall, E. Bertl, D. Blair, Richard Brito, C. Burrage, C. Caserio, V. Cardoso, K. Chatzigeorgidis, N. Cornish, J. de Bruijn, M. Maggiore, H. M. Kim, S. Goldberg, T. Hinderer, S. Hughes, L. Hu, A. Healy, R. Laanoy, C. Matarrese, M. Pardo, A. Racanelli, C. Sopuerta, T. Sotiriou, A. Talley, M. Trodden, M. Van de Meent, C. Moore, F. Venizis, F. Vaiana, H. Witek, K. Yagi.

Organizing Committee:
Enrico Barausse (Institut d'Astrophysique de Paris),
Thomas Hertog (KU Leuven),
Philippe Jetzer (University of Zurich),
Paolo Pani (Sapienza University of Rome),
Nicolas Yunes (Montana State University).

Support:
European Research Council Starting Grant 757480 "DaGRA"
COST Action CA16104 "GWverse"
European Union's Horizon 2020 - Marie Skłodowska-Curie 690904

GGI: <http://www.ggi.infn.it/showevent.pl?id=305> **Deadline for the applications - September 1, 2018**

GGI, Florence,
2018

Brussels, 26 - 28 April 2022
ULB - Campus Plaine | Solvay Room

“Fundamental Physics with LISA”
Cosmological Frontiers in Fundamental Physics 2022
Solvay Institutes | APC | Perimeter Institute

Invited Speakers

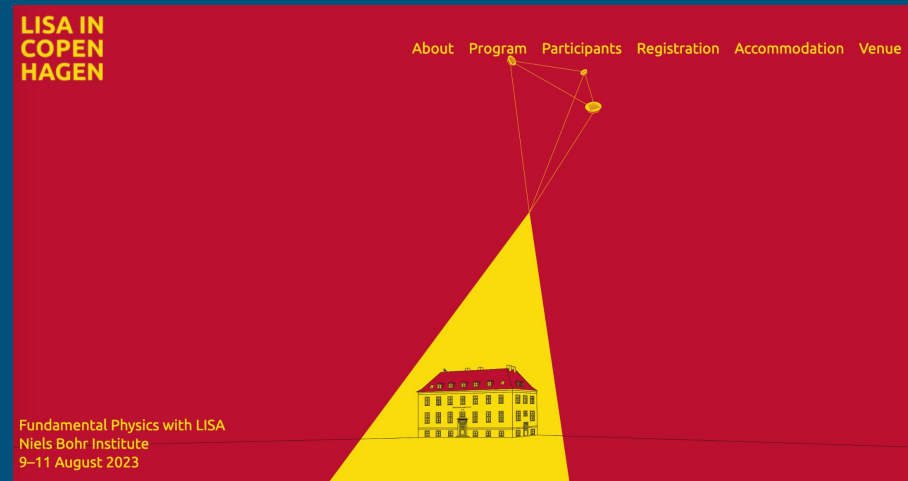
- Enrico Barausse (SISSA, Italy)
- Diego Blas (ICFO, Spain)
- Paulo Dente (Universidade de Coimbra, Portugal)
- Antonia Chiribella (ULB, Belgium)
- Kay Christian (Munich, USA)
- Daniel Dwyer (University of Göttingen, Germany)
- José María Ezquiaga (U. of Chicago, USA)
- Gabrielle Franciolini (Sapienza U. Roma, Italy)
- Noémie Frochard (Université de Poitiers, France)
- Levin Hoferberg (ETH Zurich, Switzerland)
- Carlos Hinderer (Averro U., Portugal)
- Tanja Hinderer (Universiteit Utrecht, The Netherlands)
- Paolo Pani (Sapienza U. Roma, Italy)
- Mehi Sokalariadou (King's College London & VUB, UK & Belgium)
- Thomas Sotiriou (Northumbria U., UK)
- Silvio Vernizzi (IN2P3, Saclay, France)

Organizing Committee

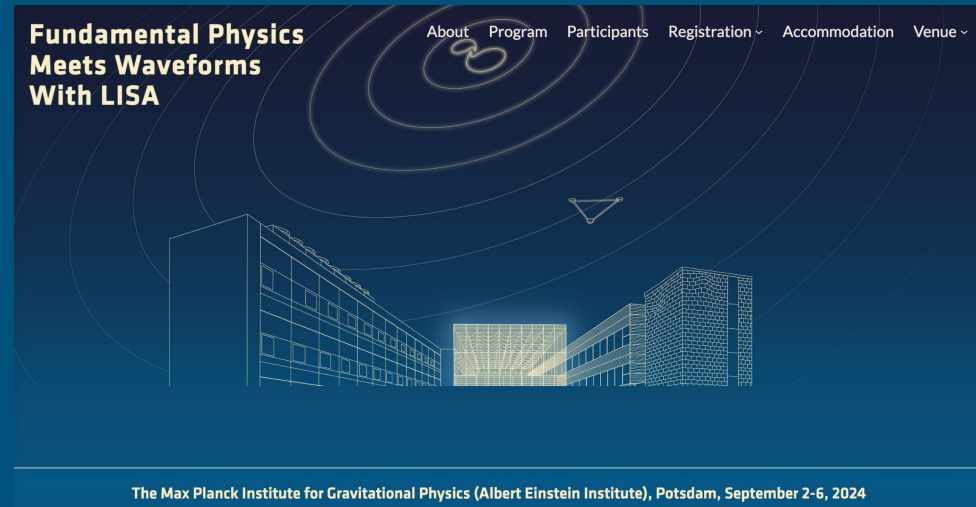
- Nimrod Ashour (IC, Canada)
- Geddyf Compeau (ULB, Belgium)
- Thomas Hertog (KU Leuven, Belgium)
- Philippe Jetzer (Zurich U., Switzerland)
- Tjonnin Li (KU Leuven, Belgium)
- Alberto Marchetti (VUB, Belgium)
- Alexandre Sotiriou (VUB, Belgium)
- Danielle Steer (APC, France)
- Nicolas Yunes (Illinois Urbana-Champaign U., USA)

Covid, 2020-2021

Solvay Inst., Brussels,
2022



NBI, Copenhagen, 2023



AEI, Potsdam, 2024

????, 2026 (year and place TBD)

Collaborative Projects

- Ringdown Group
 - Coordinators: Marc Besançon, Lorena Magaña Zertuche, Haris Markakis
 - email: fpwg-ringdown@lisamission.org
 - webpage: <https://wiki-lisa.in2p3.fr/LSGFPWG/RingdownTestsOfTheNo-hairTheoremWithLISA>
- Systematics Group
 - Coordinator: Elisa Maggio
 - email: fpwg-systematics@lisamission.org
 - webpage: <https://wiki-lisa.in2p3.fr/LSGFPWG/EffectOfSystematicsOnParametrizedIMRTests>

Feel free to reach out if you want to join these projects or have ideas for new collaborative projects relevant for the FPWG.

- See slides in meeting [webpage](#) for more info.

General Relativity and Gravitation (2020) 52:81
<https://doi.org/10.1007/s10714-020-02691-1>

INVITED REPORT: INTRODUCTION TO CURRENT RESEARCH



Prospects for fundamental physics with LISA

<https://arxiv.org/abs/2001.09793>

- “Manifesto” born out of the Florence meeting



New horizons for fundamental physics with LISA

<https://arxiv.org/abs/2205.01597>

Given all of this, it is hopefully clear that a great amount of work is still needed to extract the most fundamental physics from LISA data and to ensure such inferences are robust. A close collaboration between the LISA fundamental physics WG, and other WGs, such as the waveform modelling and the cosmology, is called for and will be paramount to successfully overcome all these difficulties. We remain nonetheless optimistic that through the infrastructure of the LISA Consortium these collaborations can be organized and structured, so that we can get the most science out of the data, when LISA flies.

- We plan to update White Paper in the next few years

Elections for a new chair

- Philippe Jetzer will be dropping down at the end of year
- We will start procedure to start election process in the next few weeks
- Expect to have elections by the end of year

Enjoy the rest of the meeting!