FUNDAMENTAL PHYSICS WG

Philippe Jetzer, Thomas Hertog and Nico Yunes

LISA Consortium Meeting, 10 April 2018, Hannover

In the LISA proposal we have listed the following Science Objectives (SO) and Science Investigations (SI) related to fundamental physics:

SO5: Explore the fundamental nature of gravity and black holes

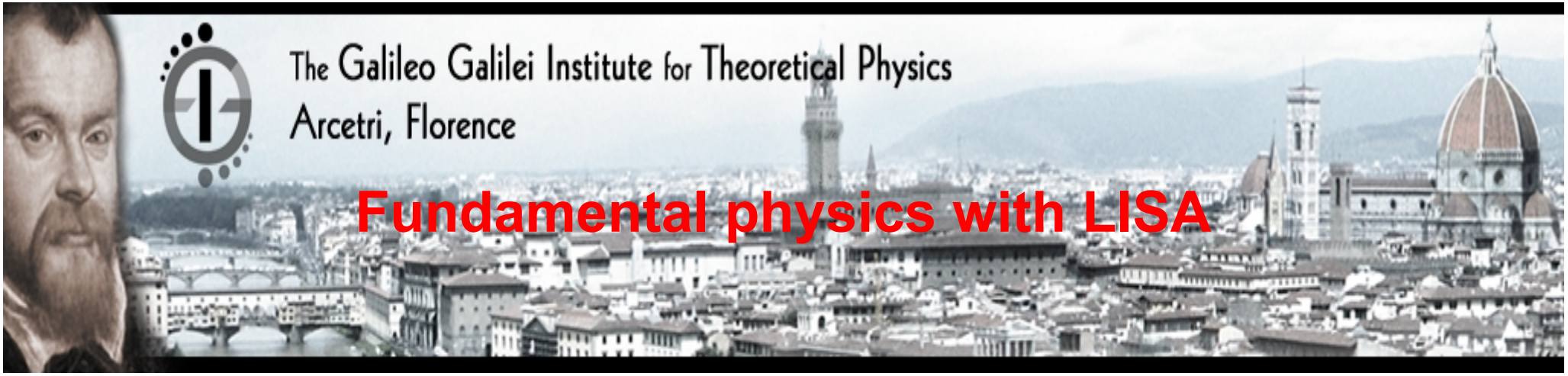
SI5.1 Use ring-down characteristics observed in MBHB coalescences to test whether the post-merger objects are the black holes predicted by GR

SI5.2 Use EMRIs to explore the multipolar structure of MHBs

SI5.3 Testing for the presence of beyond GR emission channels

SI5.4 Test the propagation properties of GWs

SI5.5 Test the presence of massive fields around massive black holes with masses $> 10^3$ Solar masses

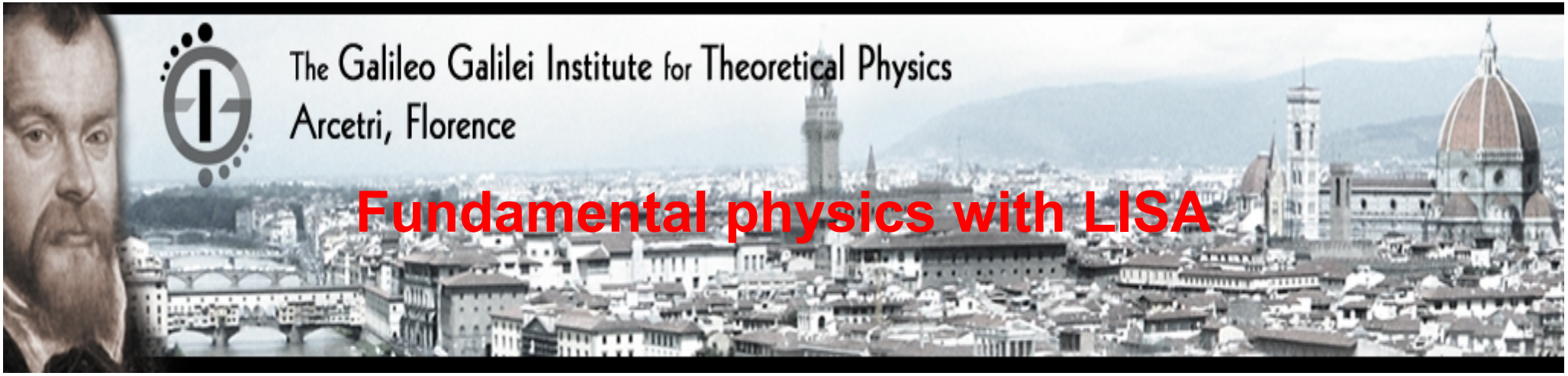


- 12-14 Nov 2018
- Galilei Institute, Florence (IT)
- http://www.ggi.infn.it/showevent.pl?id=305
- Deadline to apply: **XXXXX**

Scope

- **1st meeting of the LISA WG on Fundamental Physics**
- **Discuss tests of GR and of fundamental theoretical physics with future LISA observations**
- **Gather together the diverse theoretical physics community, the astro community, and the data-analysis community**
- **Structure of the WG webpage**
- **Discuss deliverables for this WG**

Organizers: E. Barausse, T. Hertog, P. Jetzer, P. Pani, N. Yunes



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Topics to be covered

- Model independent tests versus Model-Specific tests of GR
- Tests of GR and inferences from the inspiral of MBHs.
- Tests of GR and inferences from the ringdown of MBH merger
- Tests of GR and inferences from EMRIs
- Tests of the nature of supermassive BHs
- Superradiance and tests of ultralight boson fields and fuzzy DM
- Exotic compact objects, GW echoes, quantum gravity effects,..
- Environmental effects

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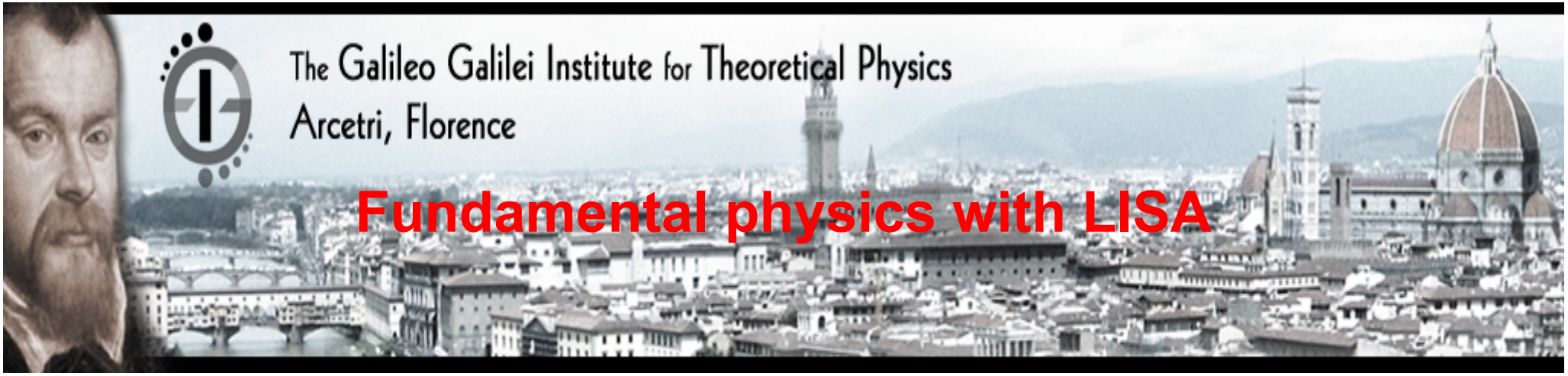

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Preliminary Program

- ***Day 1. THEORETICAL PHYSICS FOUNDATIONS***
  - **A. Black holes**
  - **B. Cosmology**
  - **C. Gravity**
- ***Day 2. GRAVITATIONAL WAVE SIGNATURES***
  - **A. Inferences on exotic objects**
  - **B. Inferences on particle physics**
  - **C. Inferences on theoretical physics**
- ***Day 3. SYSTEMATICS AND DATA ANALYSIS***
  - **Waveform modeling and its systematics**
  - **Environmental effects and its systematics**
  - **Data-analysis tools and strategies**

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Most of the topics mentioned are the same as the ones

of the COST Action CA16104, lead by Vitor Cardoso, on:

“Gravitational waves, black holes and fundamental physics”

which started in April 2017 and will last till April 2021

(website: https://gwverse.tecnico.ulisboa.pt/).

WG3 of the COST action is on: “Black holes and fundamental physics”.

Given the strong overlap the Florence meeting will get some financial

support by the COST action.