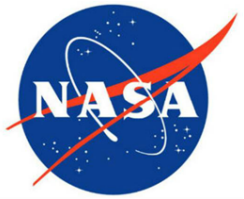
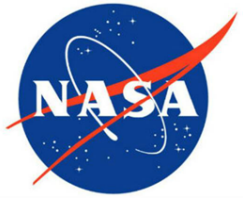


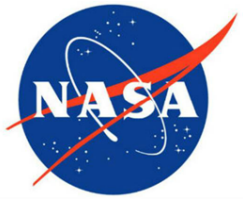
NASA LISA Study Office Science and Data Activities

Note: In the event there is any conflict between this charts package and the text of the ROSES LISA Preparatory Science (LPS) element, the ROSES LPS element takes precedence. This document is informative for proposers on the scope of LISA study activities funded by NASA.



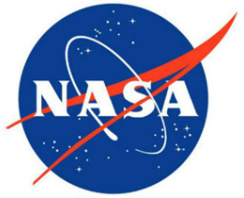
LISA Mission Overview

- The Laser Interferometer Space Antenna (LISA) will be a space-based gravitational wave observatory in the milliHertz frequency band. The European Space Agency (ESA) leads LISA.
- LISA is currently in formulation at ESA. NASA and the international LISA Consortium are participating in formulation activities and are negotiating roles for the implementation phase.
- In addition, the international LISA Consortium (www.lisamission.org) is the organization that is coordinating the development of analysis and science tools relevant to LISA. US scientists, including some supported by NASA, are participating in these activities.



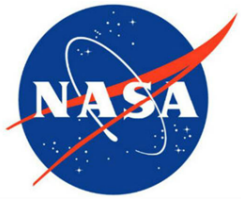
Science and Analysis Activities for LISA

- The international LISA Consortium has identified the following broad categories of science and analysis activities:
  - Waveform modeling
  - Instrument Response modeling
  - Source identification & characterization
  - Multimessenger analysis and operations strategies
  - Astrophysical interpretation
- Further detail of these activities can be found in the LISA Consortium Data Analysis Work Packages (DAWP) document
- Full URL for DAWP document: https://atrium.in2p3.fr/6a823cec-e597-40e8-9a49-7e3788770b45



Role of the NASA LISA Study Office and LPS

- NASA plans to support US participation in LISA science and analysis activities with a hybrid approach involving both the NASA LISA Study Office and the LISA Preparatory Science (LPS) program.
- The LISA Study Office will focus its support on those activities which are most directly related to the development of the mission or related to infrastructure which NASA may provide as part of its contribution to the ESA-led LISA project. Examples of such activities include high-fidelity instrument simulators and low-latency pipeline infrastructure.
- The LPS program, open to all US-based researchers, will focus its support on independent activities which support the LISA science effort. Examples include the calculation of waveforms for particular source classes, analysis strategies for LISA sources, and simulating astrophysical investigations with mock LISA source catalogs.
- In some cases, there may be overlap between activities supported by the Study Office and the LPS program. As stated in the LPS solicitation, the burden is on the proposer to clarify the extent of this overlap and demonstrate that the proposed LPS investigation augments and/or complements the Study Office efforts.



NASA LISA Study Office, Examples of Science and Data Activities

- NASA interface to ESA LISA study/project on data/science issues
  - Example: working with relevant instrument/subsystem leads on pipeline design and calibration needs
  - Example: working with calibration working groups on calibration data formats
  - Example: archiving pre-launch NASA test/calibration data on NASA hardware
- Design and planning for U.S. LISA Science and Data Activities:
  - Example: possible U.S. node of LISA Data/Science Center
  - Example: possible U.S. contributions to LISA data pipelines
  - Example: possible U.S. archive of LISA data
- Direct dialogue with ESA and the international LISA Consortium concerning high-level documentation on Science Ground Segment (SGS)
  - Regular participation in meetings/telecons
  - Participation in formal reviews/activities for both NASA and ESA
- Coordination of NASA science efforts
  - Coordination of directly-funded study office efforts and grant-funded activities (e.g. LPS)
- Interface with U.S. community on U.S. needs for LISA data analysis and scientific research
- Participation in LISA Mission Verification activities (LISA Data Challenges, simulations, etc)

Specific FY18-funded Study Office Science Activities
[All in coordination with ESA and LISA Consortium]

- LISA Data Challenges (LDCs): Definition of the scope/cadence of LDCs, working with instrumentation experts as well as astrophysicists doing modeling work, and promoting the LDCs to US-based scientists to encourage broader community engagement.
- Conceptualization of data analysis architectures that will meet LISA's needs, including exploration of newer methods and paradigms such as task-based parallelism, big-data Monte Carlo, and deep-learning techniques, that may be appropriate in the 2030s.
- Definition of the scope of the Science Ground Segment, including data products produced for the analysis teams and the wider science community, development of strategies for the cadence of releases and for coordination with Electromagnetic (EM) observations
- Instrument simulation and characterization efforts including assessing the scientific impact of artifacts such as gaps, stationarity, spectral lines, glitches, etc.
- Science Operations Center design including interfaces between instrument/calibration work