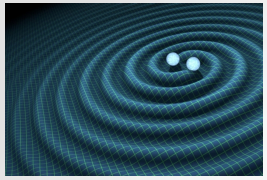
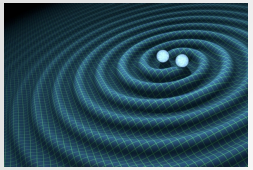
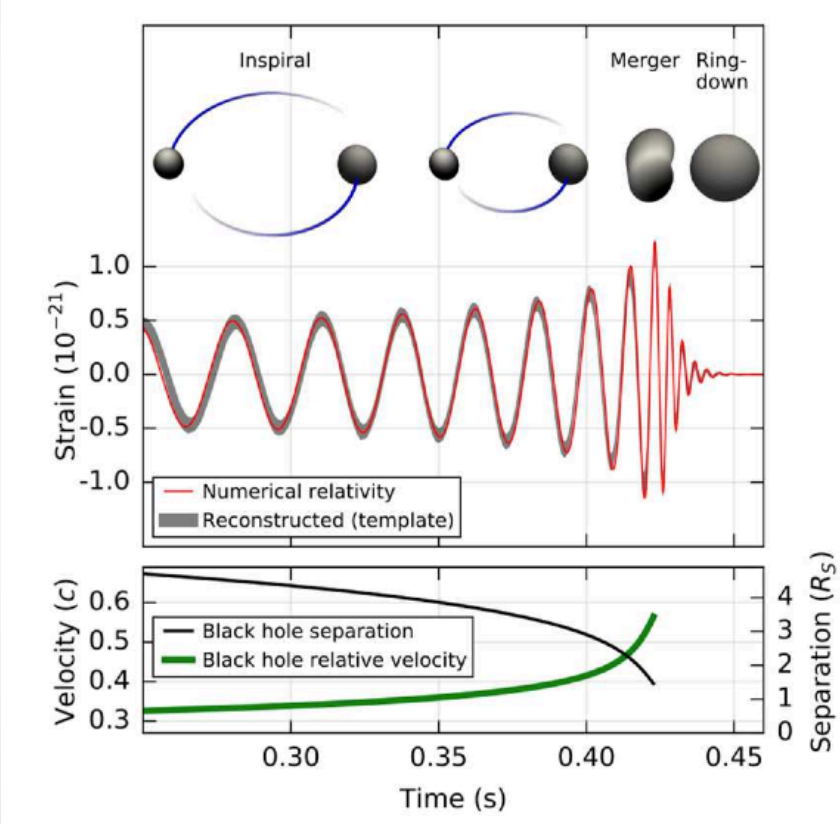


L3 Study Update

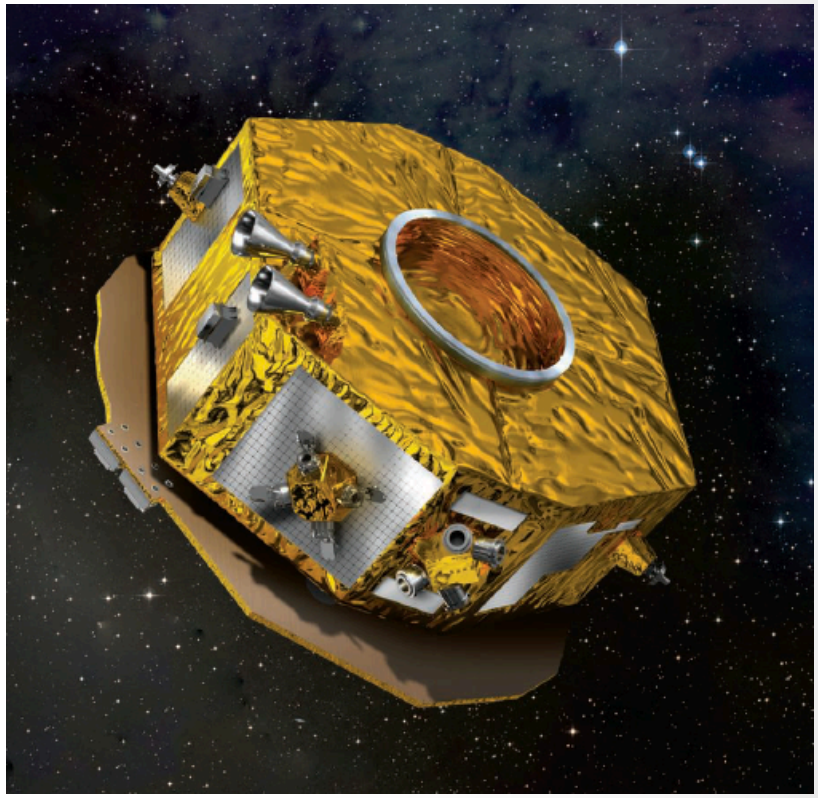
David Shoemaker, MIT
L3 Study Group Chair



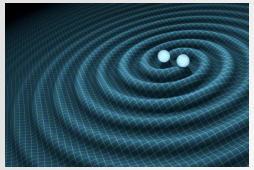
Gravitational Wave Astrophysics



https://www.ligo.caltech.edu/

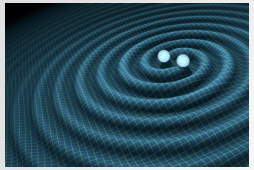


http://sci.esa.int/lisa-pathfinder/



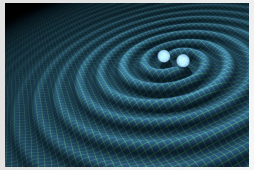
Context (1 of 2)

- LISA was prioritized in both the 2000 and 2010 decadals.
- ESA selected gravitational waves as the science theme for the third large mission (L3) in its Cosmic Vision 2015-2025 Programme
- Notional schedule for L3
  - Early 2017 – Announcement of Opportunity for mission concepts
  - Late 2017 – Phase A (formulation) start
  - Late 2018 – Announcement of Opportunity for payload consortium
  - Late 2018 – Start of payload "pre-developments" (all technologies at TRL5)
  - 2025 – SPC adoption, start of industrial contract (implementation)
  - 2034 – launch



Context (2 of 2)

- In Fall 2015, the Astrophysics Subcommittee recommended that NASA, as part of its preparation for the 2020 Decadal Survey, conduct a study in gravitational waves (GW), with the goals of defining the role of NASA in the ESA-led L3 GW mission.
- To this end NASA started the L3 Study to assess options for NASA's participation and to bring the discussion to readiness for the 2020 Decadal Survey
- At present NASA expects to make hardware contributions within a cost cap of $150M



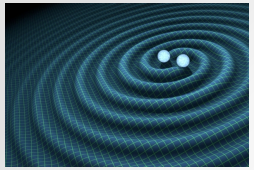
L3 Study Charter

(http://pcos.gsfc.nasa.gov/studies/L3)

- The purpose of the L3 Study is to understand how NASA might participate in ESA's L3 gravitational wave mission, to inform NASA's engagement through the mission's earliest stages, and to prepare for the 2020 decadal survey.

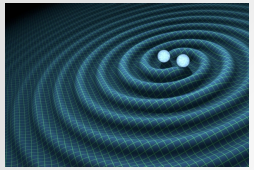
Structure of the study:

- Phase 1 (FY16-17): Analyze the options for NASA participation in the L3 mission and work with the European L3 consortium on proposals to ESA.
- Phase 2 (FY17-18): Prepare a report to the 2020 decadal survey on NASA's participation, including possible options, in the L3 mission as a minority partner



L3ST Members (announced 01/20/2016)

Members of the L3ST		
Name	**Affiliation**	**Area of Expertise**
Baker, John	NASA Goddard Space Flight Center	Theory
Bender, Peter	University of Colorado at Boulder	Instrumentation
Berti, Emanuele	University of Mississippi	Data Analysis/Theory
Conklin, John	University of Florida	Instrumentation
Cornish, Neil	Montana State University	Data Analysis
Cutler, Curt	Jet Propulsion Laboratory	Data Analysis
Holley-Bockelman, Kelly	Vanderbilt University	Data Analysis
Hughes, Scott	Massachusetts Institute of Technology	Data Analysis
Larson, Shane	Northwestern University	Data Analysis
McWilliams, Sean	West Virginia University	Theory/Data Analysis
Miller, Cole	University of Maryland	Theory/outreach
Robertson, Norna	California Institute of Technology	Instrumentation
Shoemaker, David (Chair)	Massachusetts Institute of Technology	Instrumentation
Thorpe, Ira	NASA Goddard Space Flight Center	Instrumentation
Vallisneri, Michele	Jet Propulsion Laboratory	Data analysis
Note: Ex-Officio NASA members of the L3ST: R. Sambruna, A. Hornschemeier, R. Stebbins. In addition, A. Parmar has been appointed by ESA as an observer on the L3ST.		

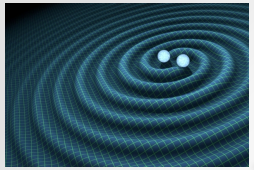


The Technology Analysis Group (TAG)

- Assist the L3ST with technical analyses

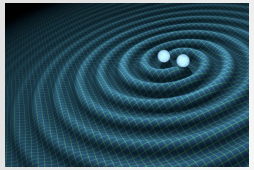
Name	Affiliation
Camp, Jordan	NASA's Goddard Space Flight Center
Klipstein, William	Jet Propulsion Laboratory
Livas, Jeffrey	NASA's Goddard Space Flight Center
McKenzie, Kirk	Jet Propulsion Laboratory
Mueller, Guido	University of Florida
Ziemer, John	Jet Propulsion Laboratory

The union of the L3ST and TAG is the 'L3 Study Group'



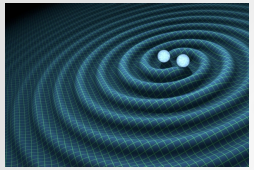
Activities of the L3 Study Group

- The L3 Study Group started its activities in February 2016 with its first telecon on February 17.
- The first order of business is investigating the roadmap to technical maturity for key technologies. We've asked technology contributors in the Team to present status and next steps for their technology as well as impacts on mission design
- A science taskforce has also been formed. This Team is in the process of assembling the necessary tools to conduct science trade studies to assess the cost to NASA of the various



Final Products

- The final product of the L3 Study Group is a written report to NASA providing options for possible contributions as a function of mission design
- The main deliverable will be a matrix, or set of matrices, outlining the options and their cost to NASA
- It is expected that the report and its deliverables will be of assistance to the APD Director as he negotiates with ESA later on



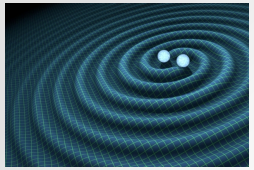
Meetings and Reports

Meetings of the L3 Study Group:

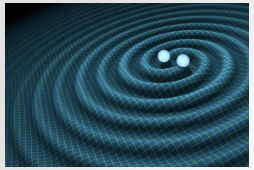
- Kickoff telecon was held February 17th
- Second telecon was held March 3rd
- Weekly telecons afterwards
- First face to face meeting at the American Physical Society meeting April 19-20
- Future in person meetings at GSFC and JPL through Fall 2016

Reporting to NASA and community:

- NAC's APS meeting March 15-16
- Interim debrief to APD Director ~May 2016
- Final report September 2016



Backup



The L3 Study Team

- A call for nominations to participate in the L3 Study through an L3 Study Team (L3ST) was issued December 7, 2015
- The deadline for applications was December 20, 2015
- 31 applications were received
- Selections were announced January 20, 2016