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france



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Ondes gravitationnelles

Laser Interferometer Space Antenna

Antoine Petiteau (APC) for LISA France

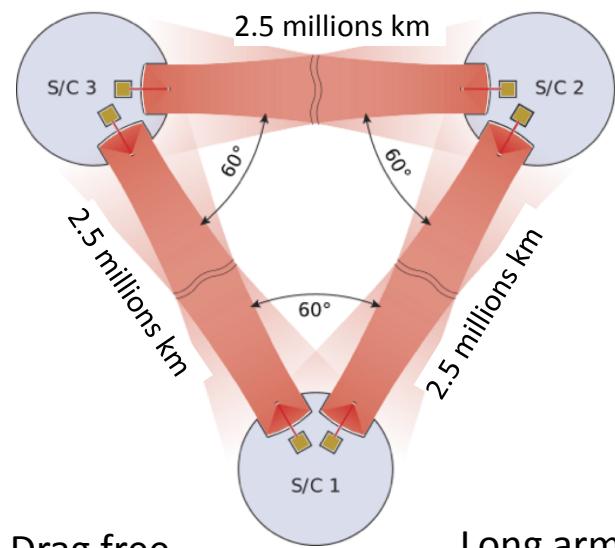
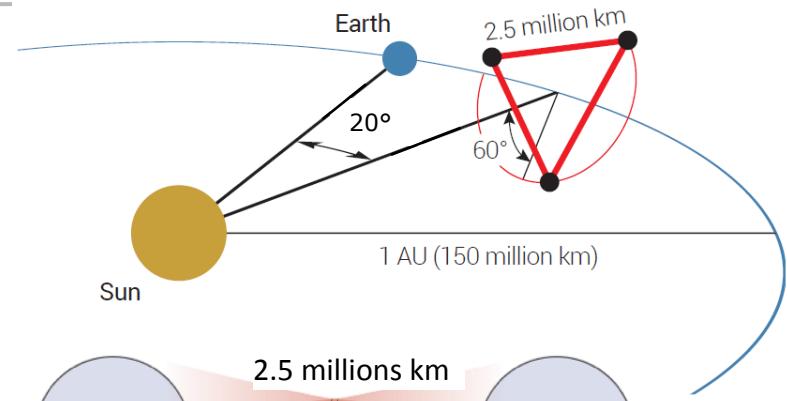
Assemblé générale GdR OG

19 octobre 2018

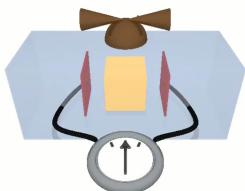
Principle and state-of-the-art



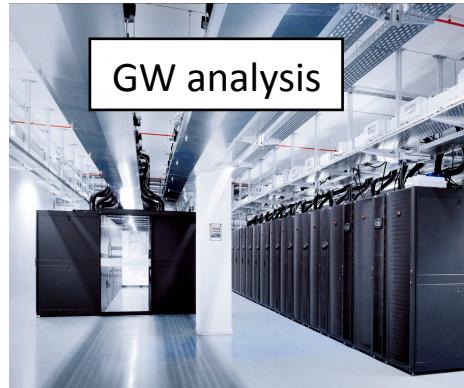
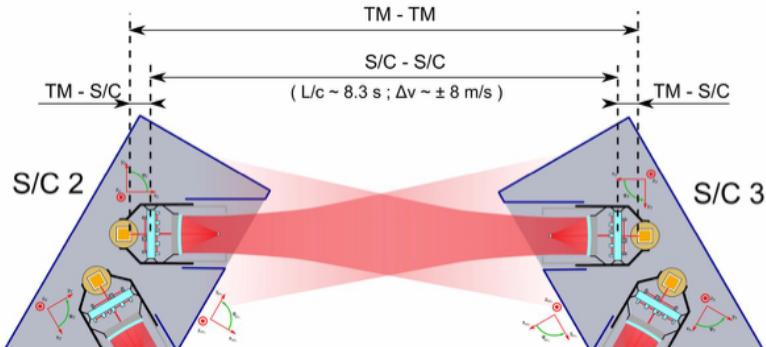
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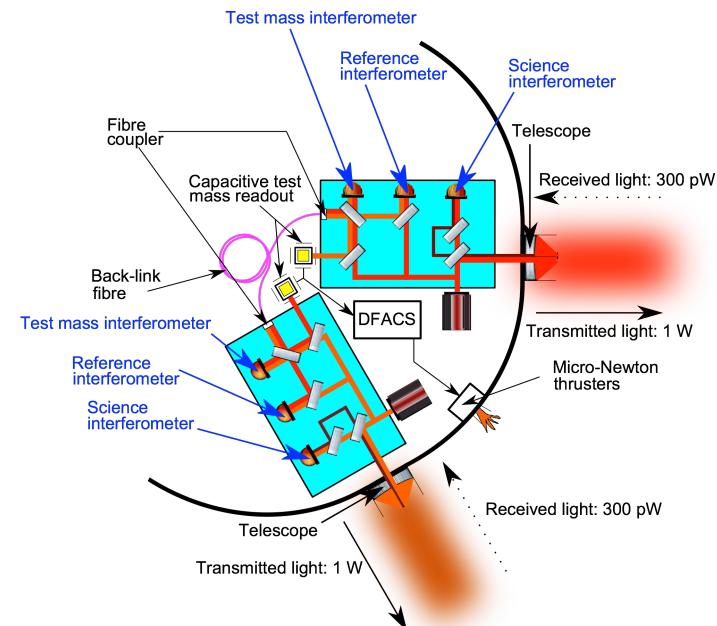
Drag free



Long arm interferometry



Pre-processing
Time Delay
Interferometry



Principle and state-of-the-art

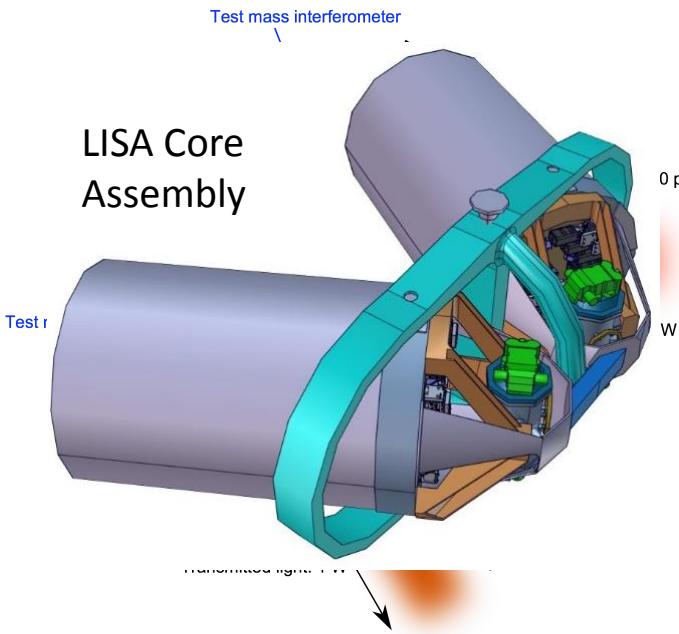


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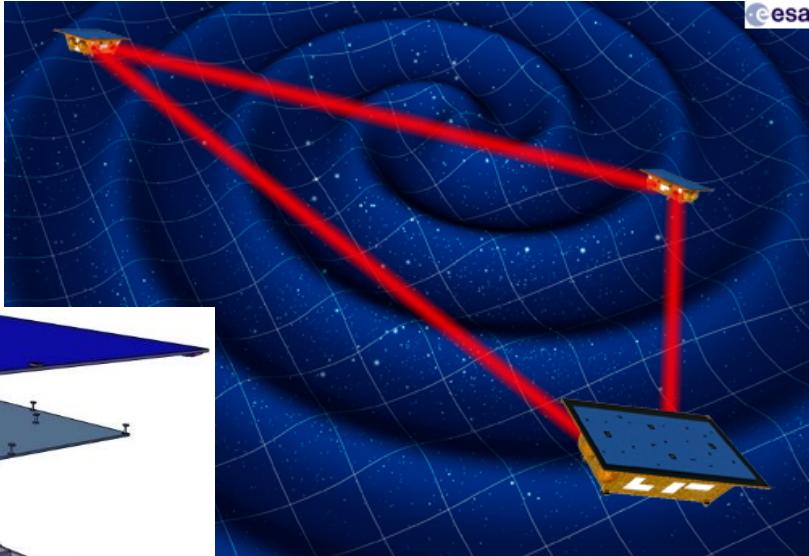
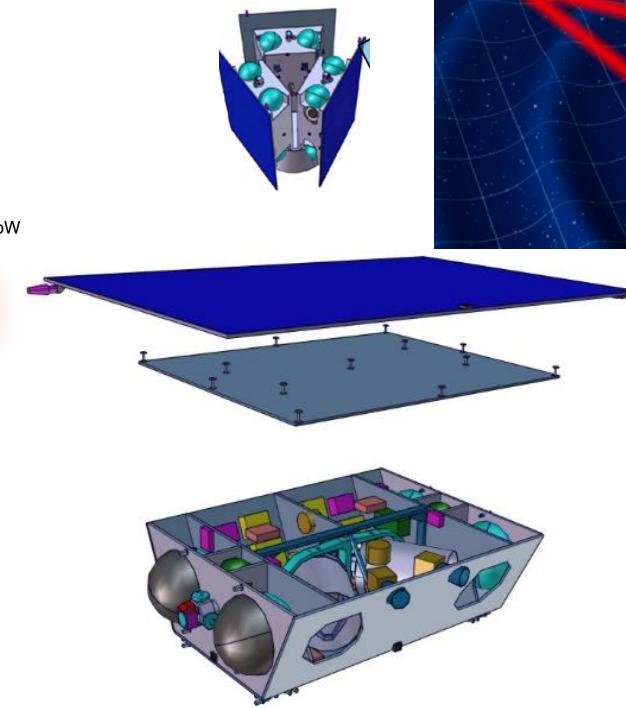


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esa

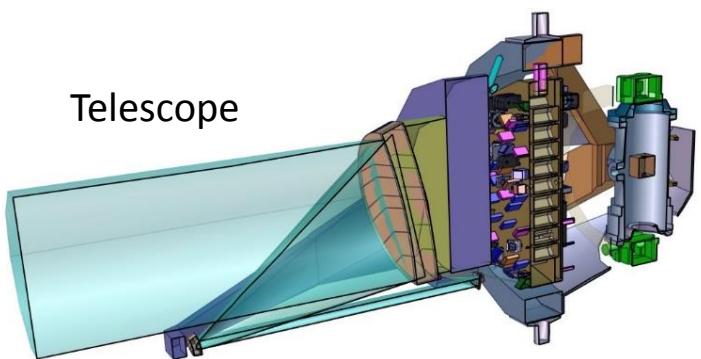


LISA Core
Assembly

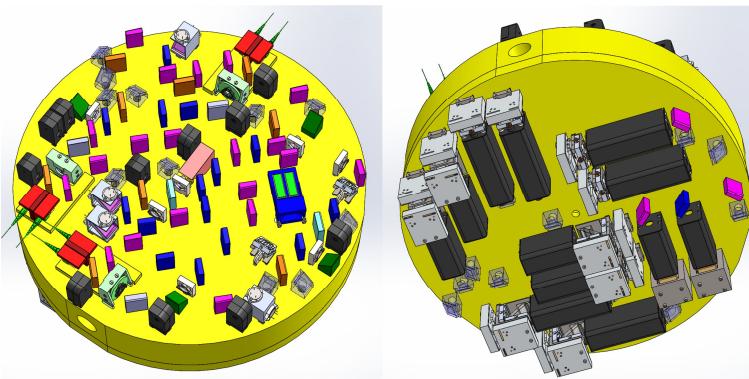


Gravitational
Reference
Sensor

Movable Optical SubAssembly



Telescope



Optical Bench



Questions & Challenges



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- ✓ Technological demonstrations:
 - ✓ LISAPathfinder => drag free
 - ✓ Grace Follow On => interferometry heterodyne at MHz between 2 separated S/C
- ✓ => Individually all technologies are ready or almost ready (ongoing R&T for)
- BUT:
 - Highly integrated instrument from individual sub-systems until data processing
 - Maintain picometer stability over the whole measurement chains
 - Complex points to study carefully:
 - Clock synchronisation
 - Scattered light
 - Precision on absolute armlength measurement
 - Coupling on sensitive axis due to misalignment
 - Other correlations
 - Pre-processing / TDI
 - ...
 - Complex system / one “shot” ...
we need to think about all potential
noises sources

LISAFrance contributions:

- Assembly, Integration & Test
- Distributed Data Processing Center
- Part of performance management

Planning



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- 1978 : first study (rigid structure)
- 1993 : proposal ESA/NASA ...
- 2011 : NASA stopped => eLISA/NGO with ESA only
- 2015-2017 : LISAPathfinder
- 25/10/2016 : Call for mission
- 13/01/2017 : submission of «LISA proposal» (LISA consortium)
- 8/3/2017 : Phase 0 mission (CDF 8/3/17 → 5/5/17)
- 20/06/2017 : LISA mission approved by SPC
- 8/3/2017 : Phase 0 payload (CDF June → Nov. 2017)
- 2018→2020 : phase A:
 - mission : competitive (Airbus / Thales)
 - instrument : Consortium + ESA
- 2020→2022 : B1: start industrial implementation
- 2022/2024 : mission adoption
- During about 8.5 years : construction
- 2030/2034 : launch Ariane 6.4
- 1.5 years for transfert => 2032/2036
- 4 years of nominal mission
- Possible extension to 10 years

Apr. 2018: LISA
Consortium reboot:
1000 members with
150 in France
signup.lisamission.org



GW sources observation !