

# GRAVITATIONAL WAVES: PATHFINDER, ADVANCED LIGO & BEYOND

Shane L. Larson  
for the GW-SIG

CIERA, Northwestern University  
s.larson@northwestern.edu



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# Take Away Messages

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- Gravitational wave data will be a part of astronomical toolbox in the next 5 years
- The spectral coverage will expand to other wavebands over the next decade and more
- Space-based GW community is active; technology and science are moving forward



# Advanced LIGO

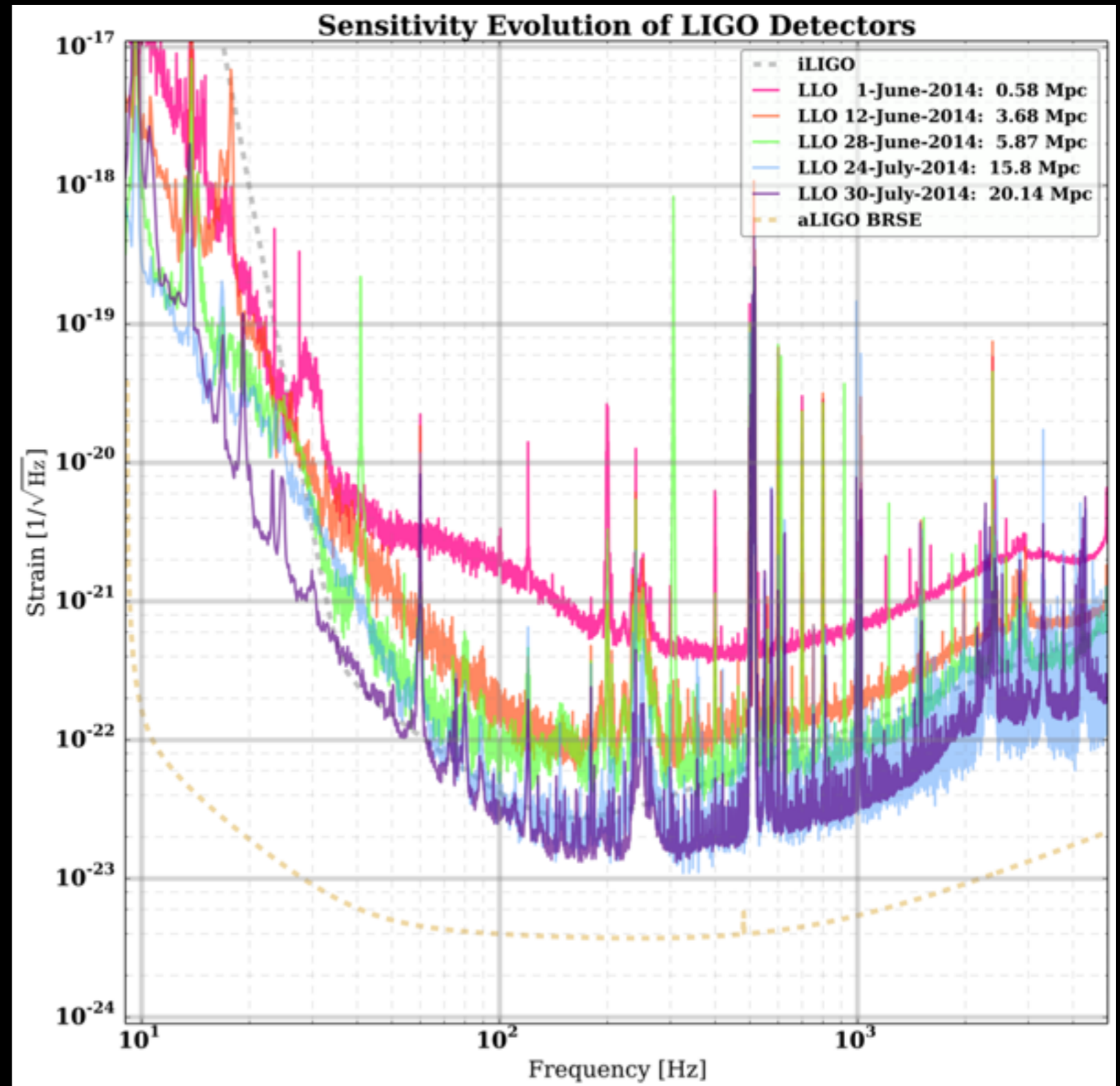
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- Last iLIGO science run (S6) concluded in October 2010
- The interferometers have been being upgraded since then
- First interferometer lock (arms brought into resonance) for aLIGO was made in Livingston on 14 May 2014

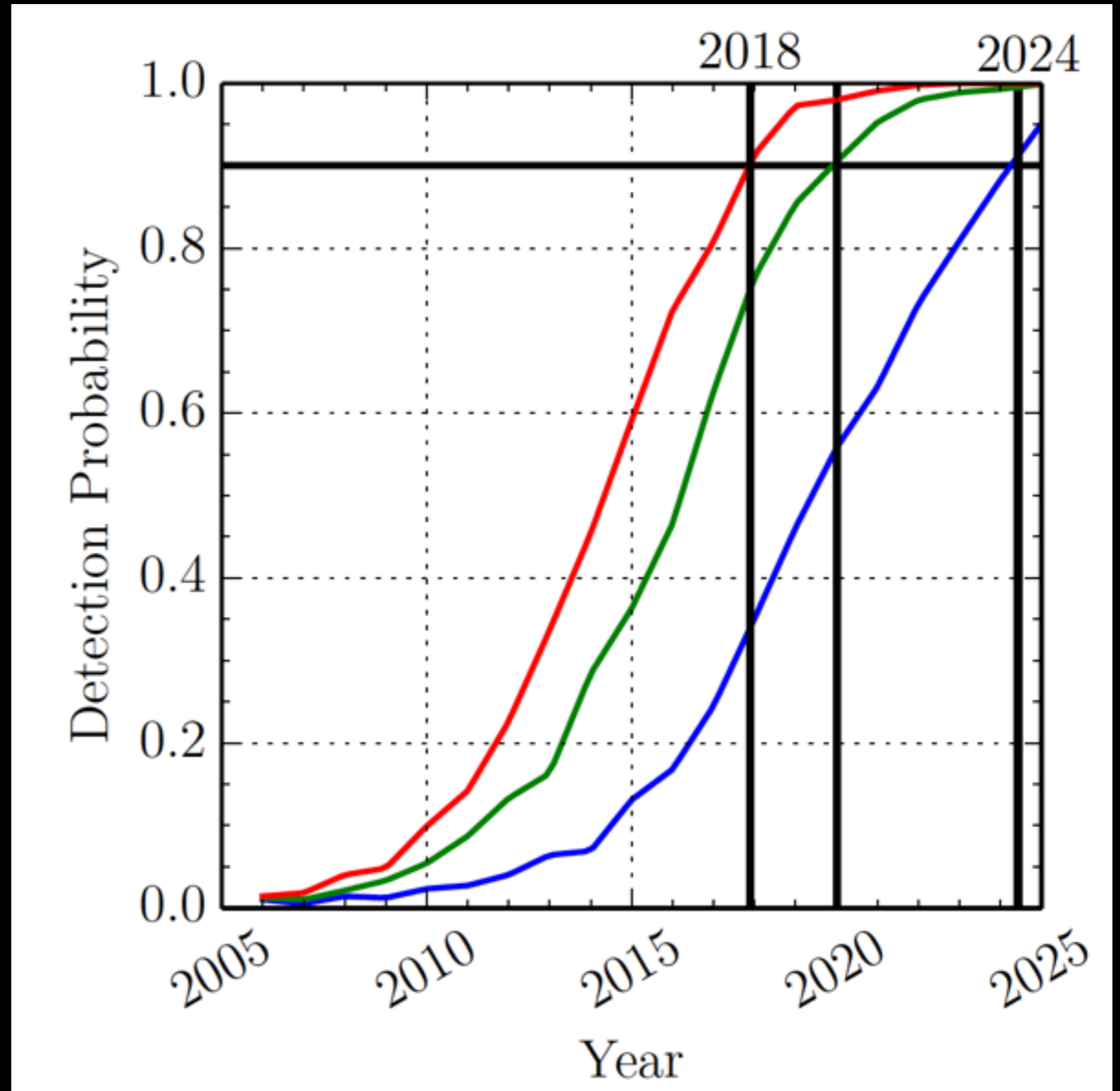
# Advanced LIGO

- Sensitivity at Livingston is already better than the last iLIGO run
- Range sensitivity to binary NS mergers is about 25 Mpc (goal is 200 Mpc at full sensitivity)
- First detections expected before the end of the decade



# Pulsar Timing

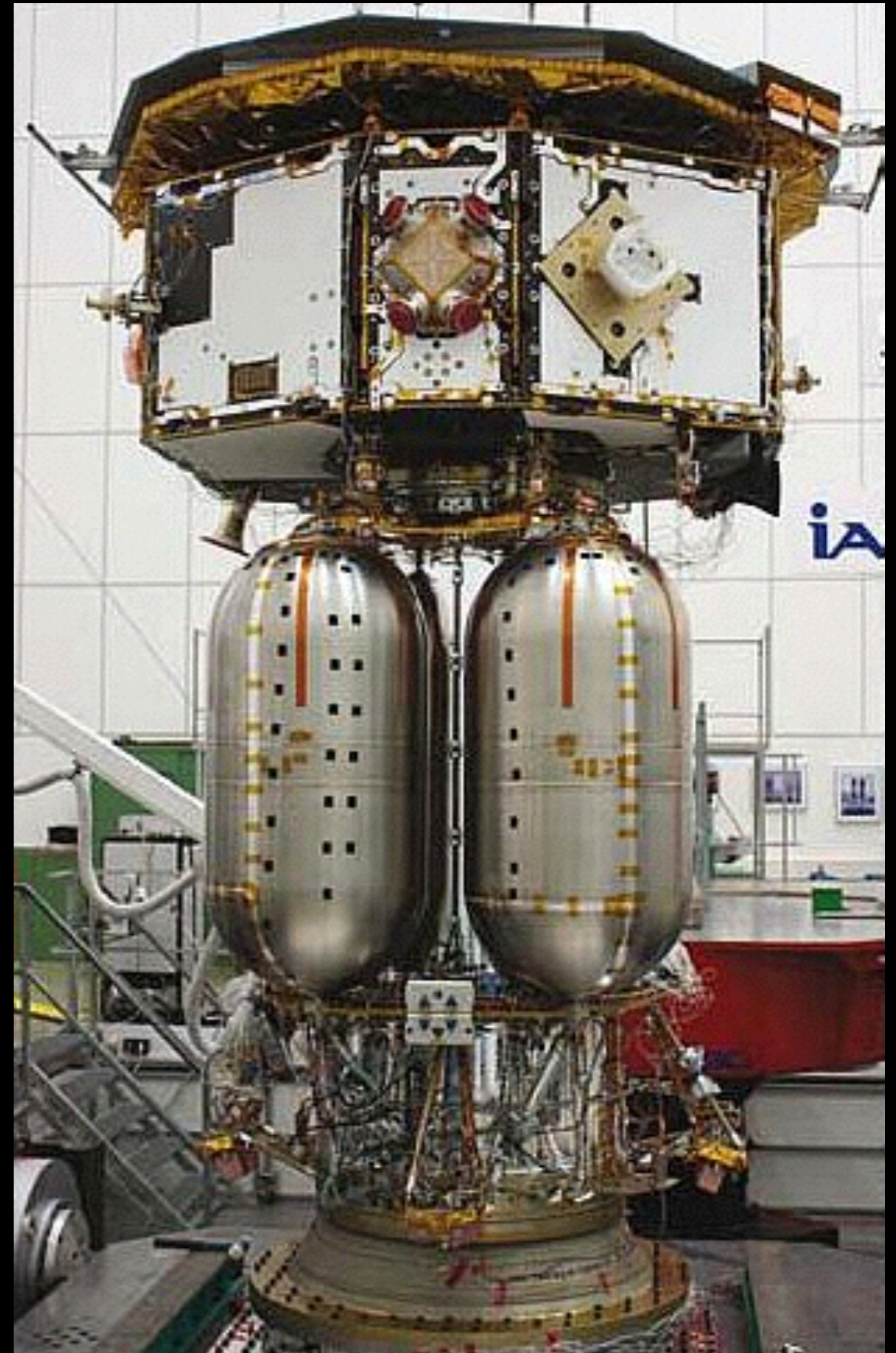
- Pulsar timing arrays are growing and becoming more sensitive
- Detections at nano-hertz frequencies are also likely before the end of the decade



# LISA Pathfinder

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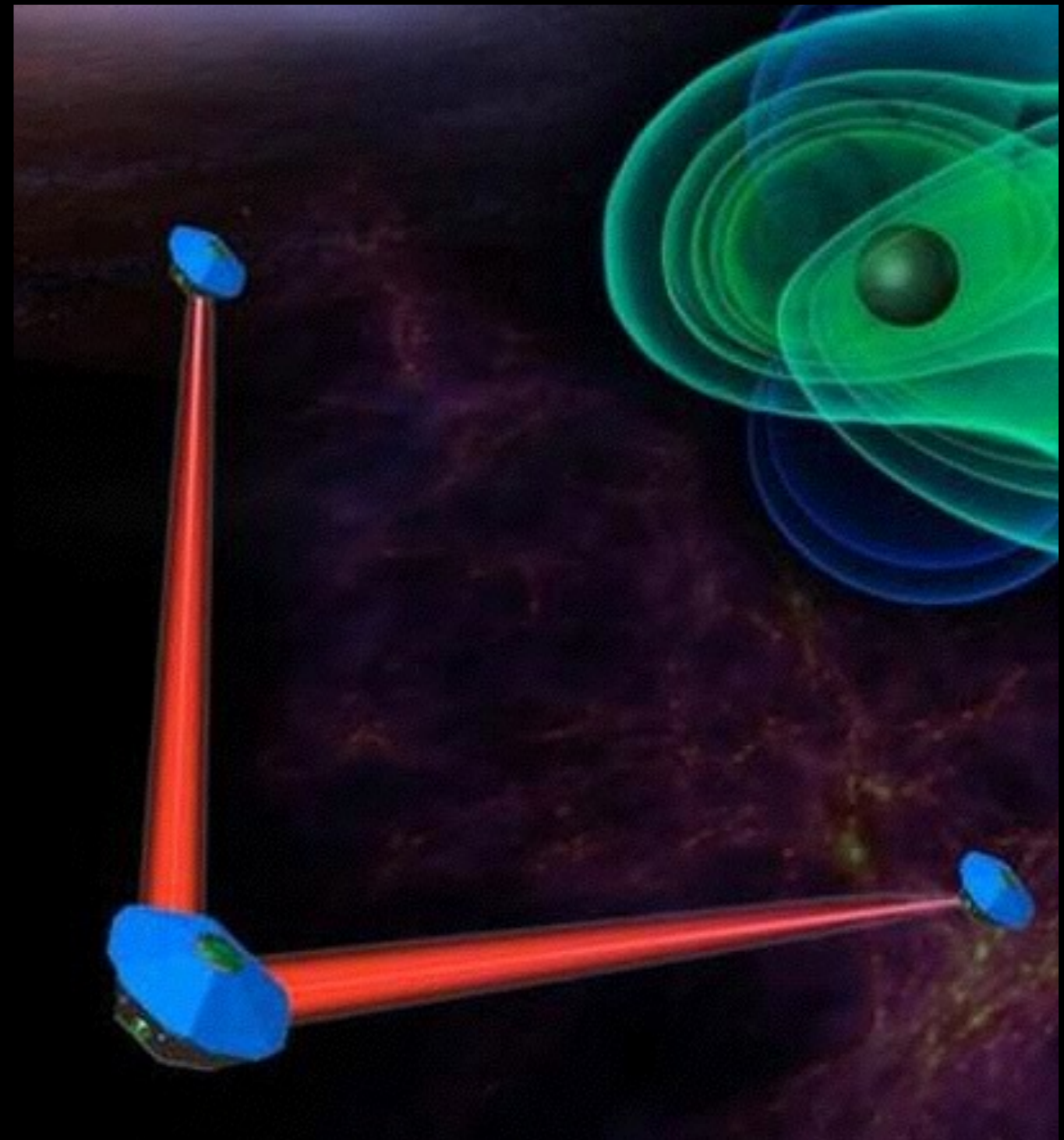
- Pathfinder is moving steadily forward; launch scheduled for July 2015
- Launch schedule stable for more than 1 year now!
- Core LISA technology demonstration
  - Drag Free Control, Microthrusters, using both European system and US ST-7
  - Interferometry
  - Noise Stability



# L3 (eLISA)

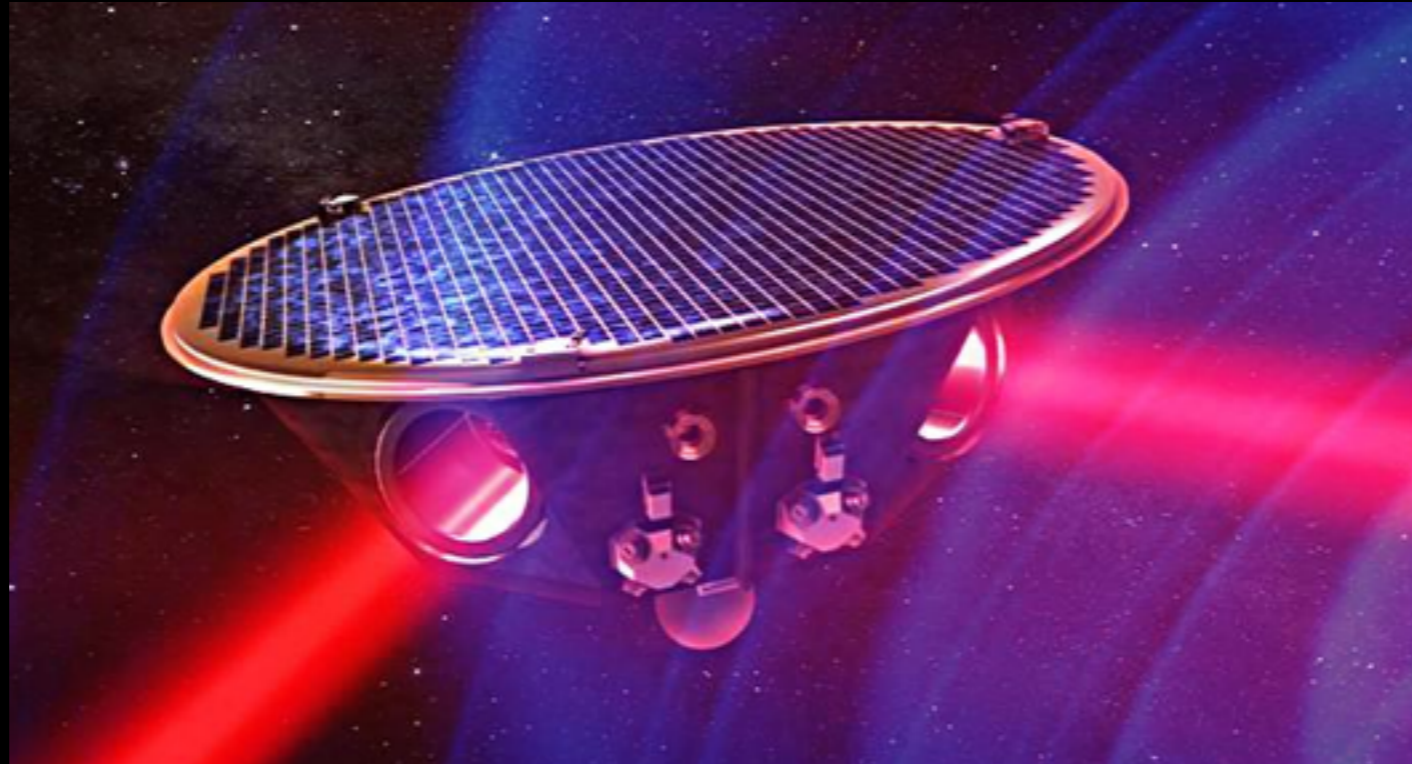
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- “The Gravitational Universe” was selected as the theme for L3
- eLISA is the leading mission concept; selection near end of the decade
- Technology development is ongoing in both Europe and US
  - Phase meter, laser metrology
  - Telescope design
  - UV LED charge control
  - DRS testing and systems



# US LISA Community

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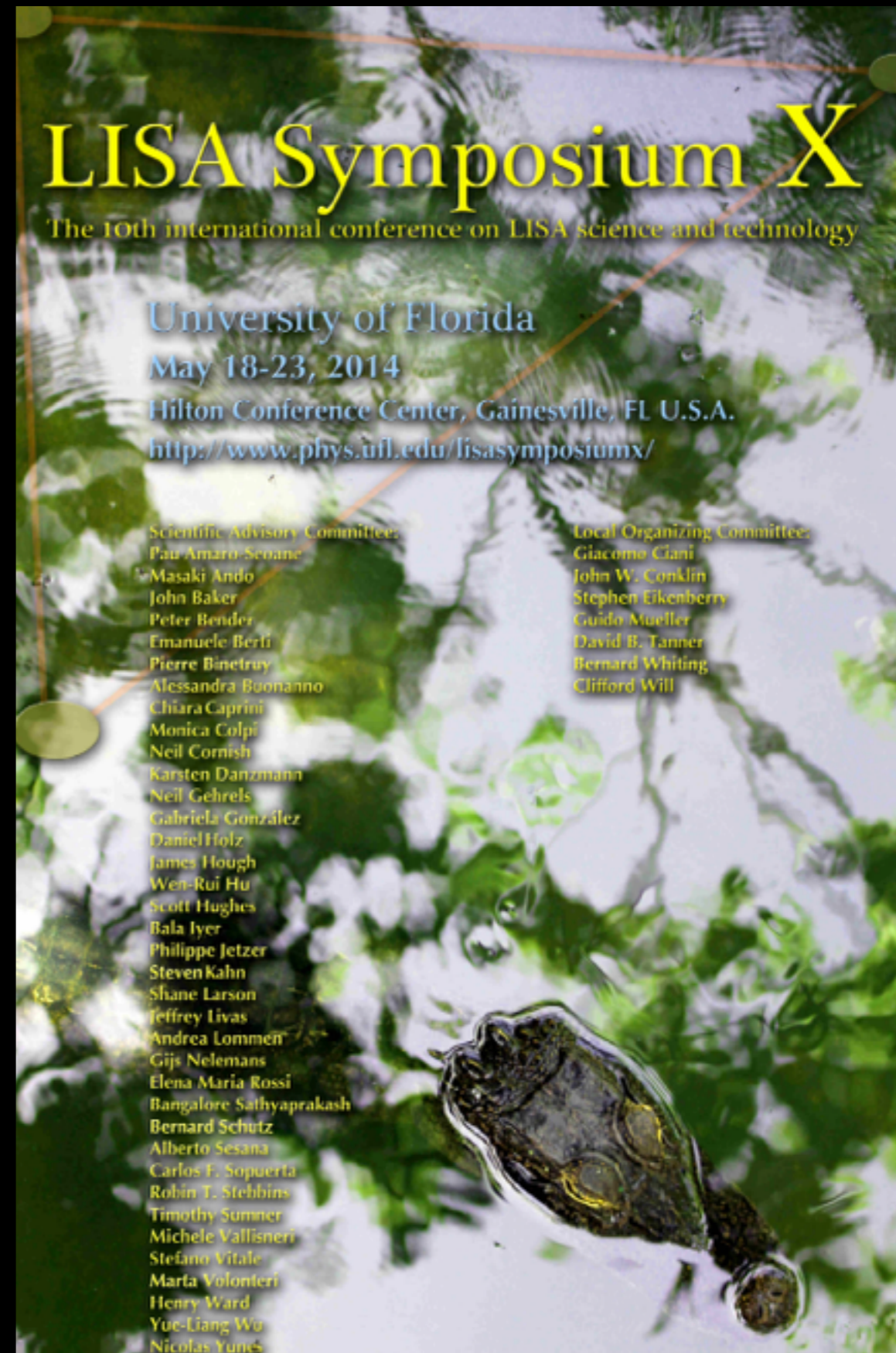
- Organized around the GW-SIG
- Working with European colleagues on many fronts, including Pathfinder and technology development
- Worked on US led study to identify technology gaps
- Now preparing for the upcoming decadal survey
- GRACE Follow-on is on track; will demonstrate LISA compatible technologies



# LISA Symposium X

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- Gainesville, May 2014
- 150 scientists from Europe and US
- 100 Scientific Presentations
  - Pathfinder
  - Science
  - Technology
- Next Symposium (after Pathfinder!)  
Zurich, 2016



# **Special Session**

**Thursday, 10:30am**

**402: THE GRAVITATIONAL UNIVERSE**

**Huron**

**THANKS!**