# eLISA (or NGO): the New LISA

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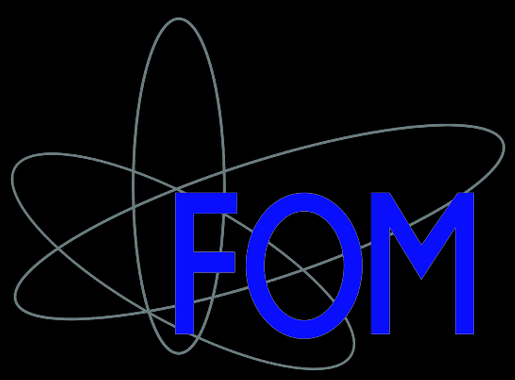


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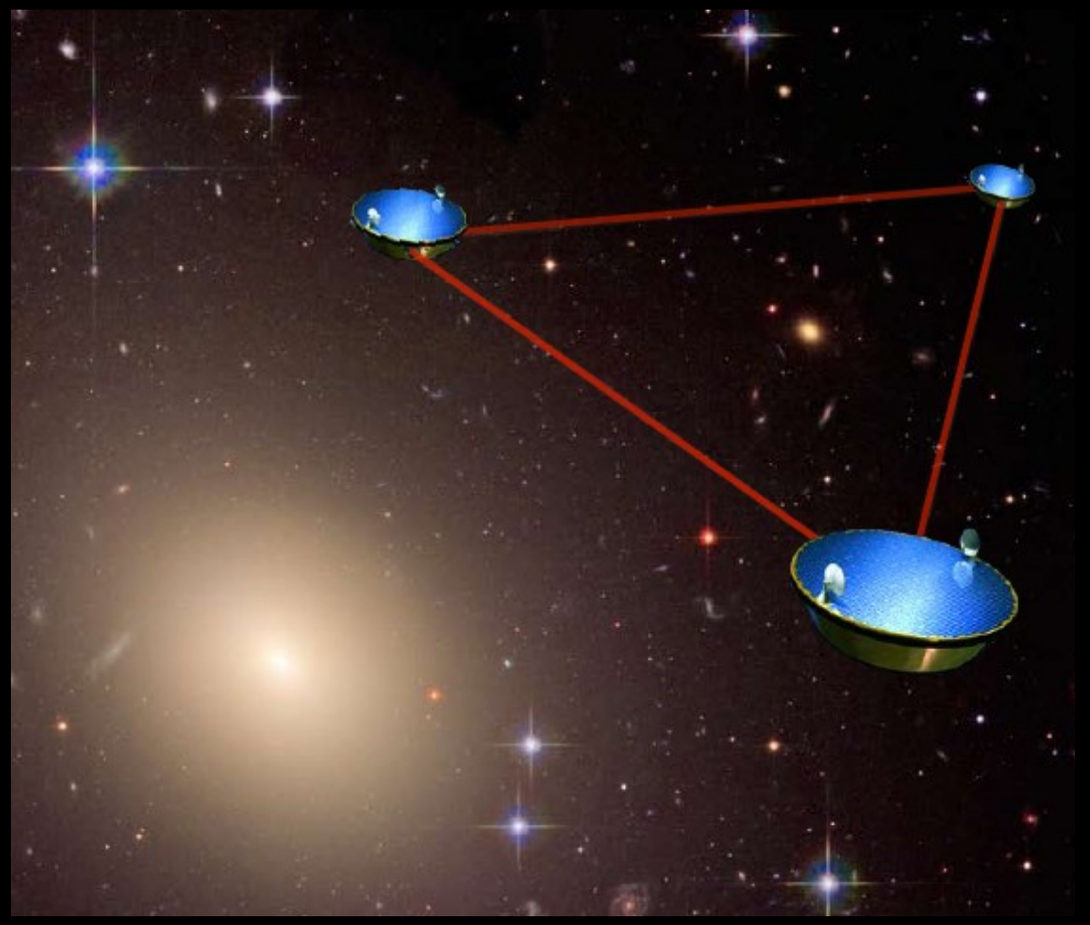
# Some history on GW detector in space

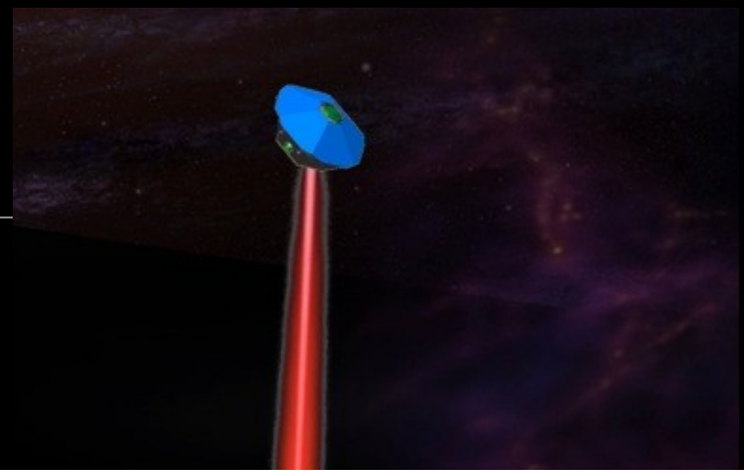
- Low-frequency gravitational wave mission first proposed in '80s (LAGOS)
- '90s: LISA as joint NASA/ESA mission
- In the end LISA became (1 of 3) L1 candidate for ESA Cosmic Vision program (decision foreseen in 2011)
- Early 2011, NASA: no money to contribute to any ESA L1 mission……
- Rapid definition teams for all L1 candidates to ESA-led mission. New mission (eLISA/NGO) developed, significant cost reduction, science still strong
- Now: April 2012, ESA will select 1 of 3 L1 candidates for launch ~2020

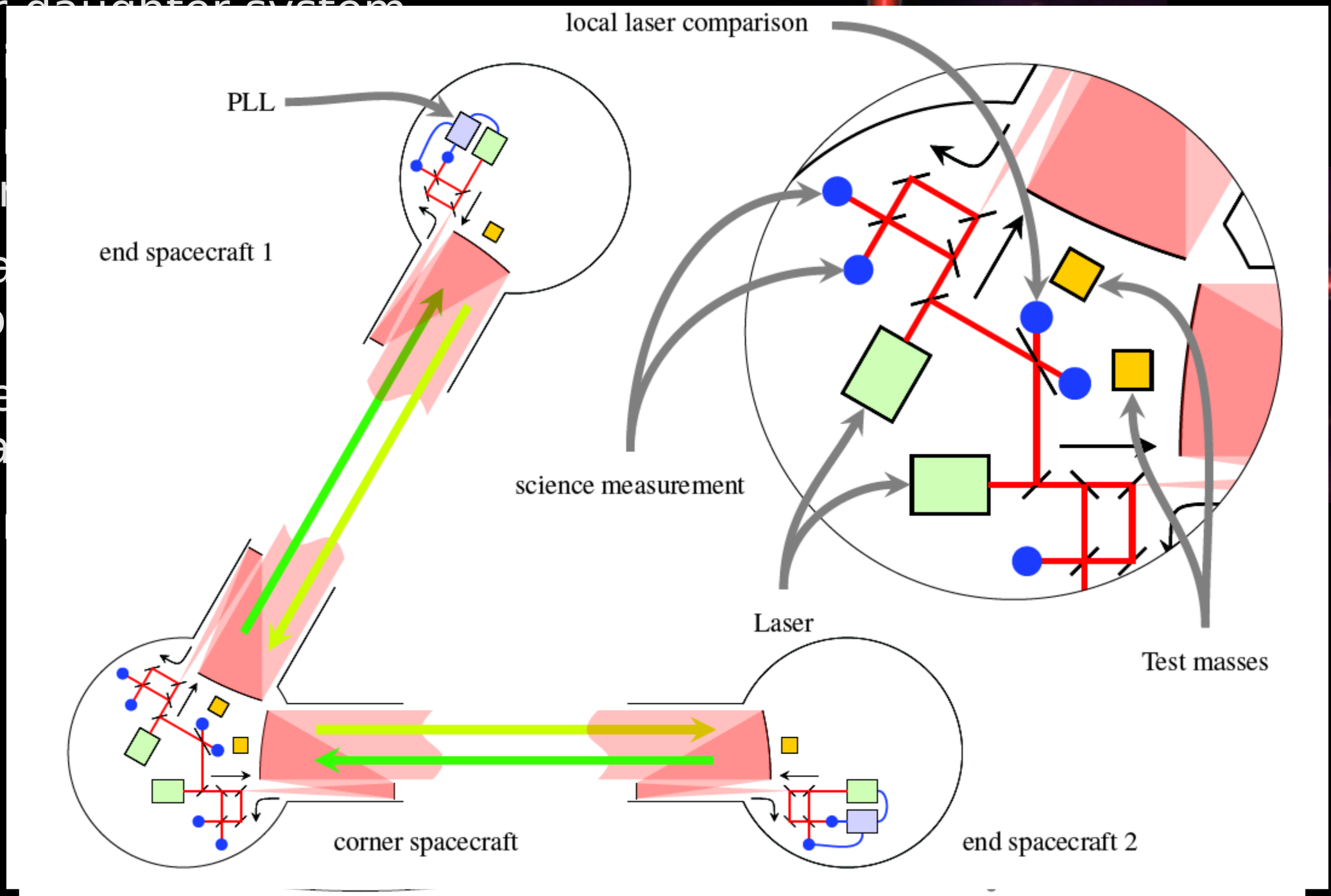


LISA

# eLISA

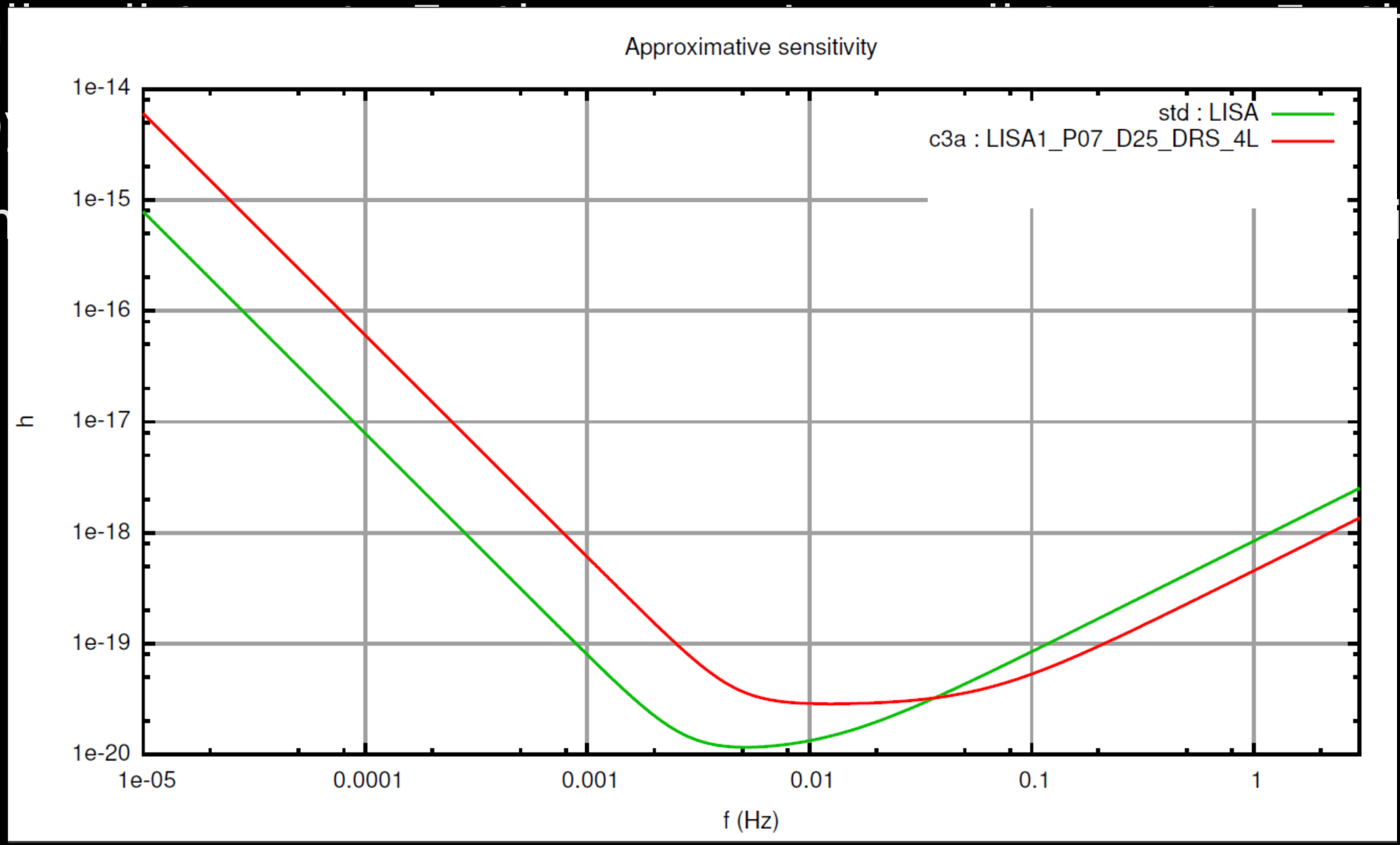
- Affordable mission: smaller arms, closer to Earth (save on launcher)
- Mother daughter system (i.e. 4 l
- Reuse compor
- Pay-loa telesco
- Membe (as in a
- Conso





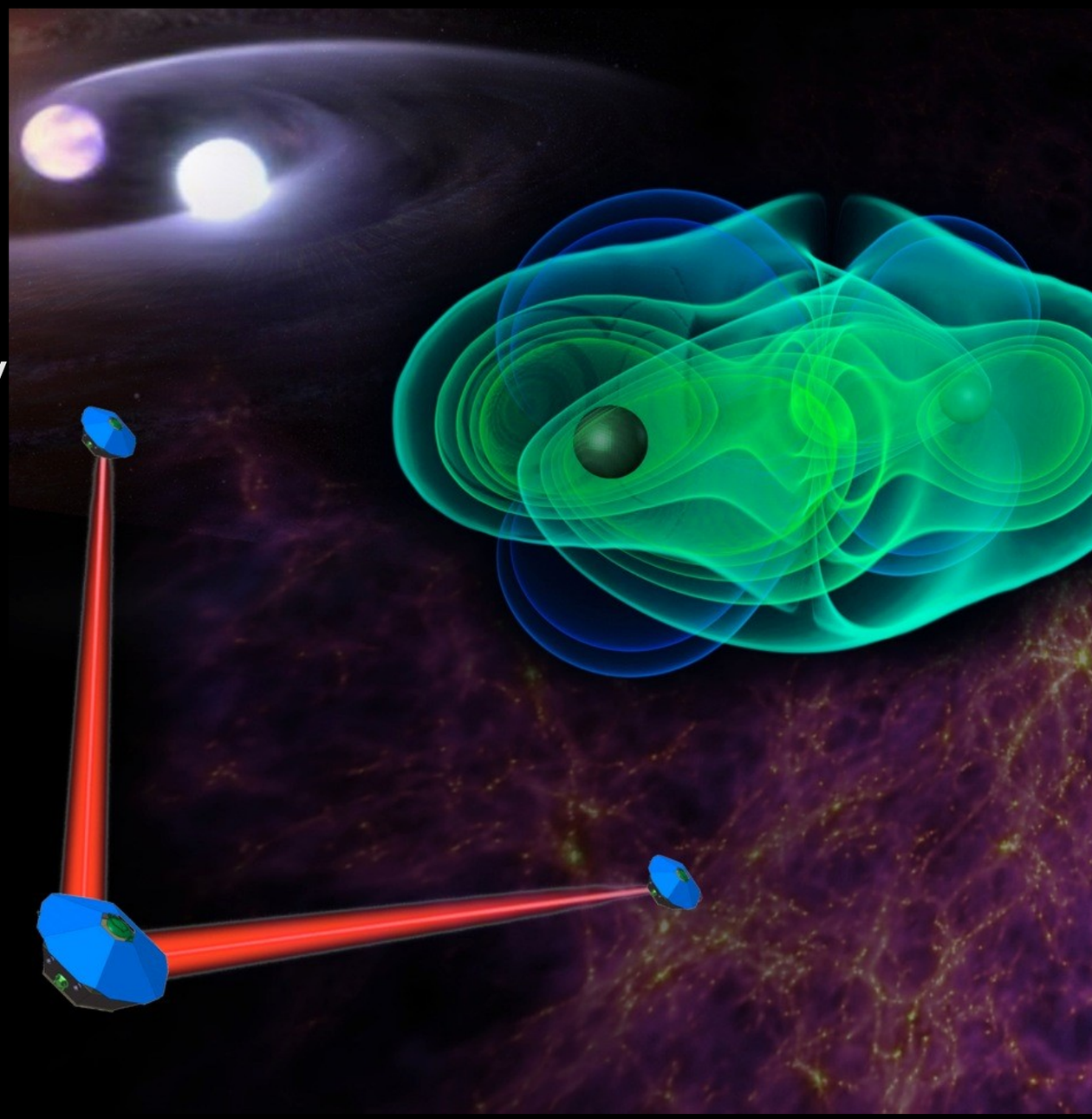
# What is different from LISA?

| eLISA | LISA |
| --- | --- |
| ▸ 1 million km arms | ▸ 5 million km arms |
| ▸ 4 laser links | ▸ 6 laser links |
| ▸ Sma | ▸ h |
| ▸ 2 So | |
| ▸ Mem | ▸ ibution |

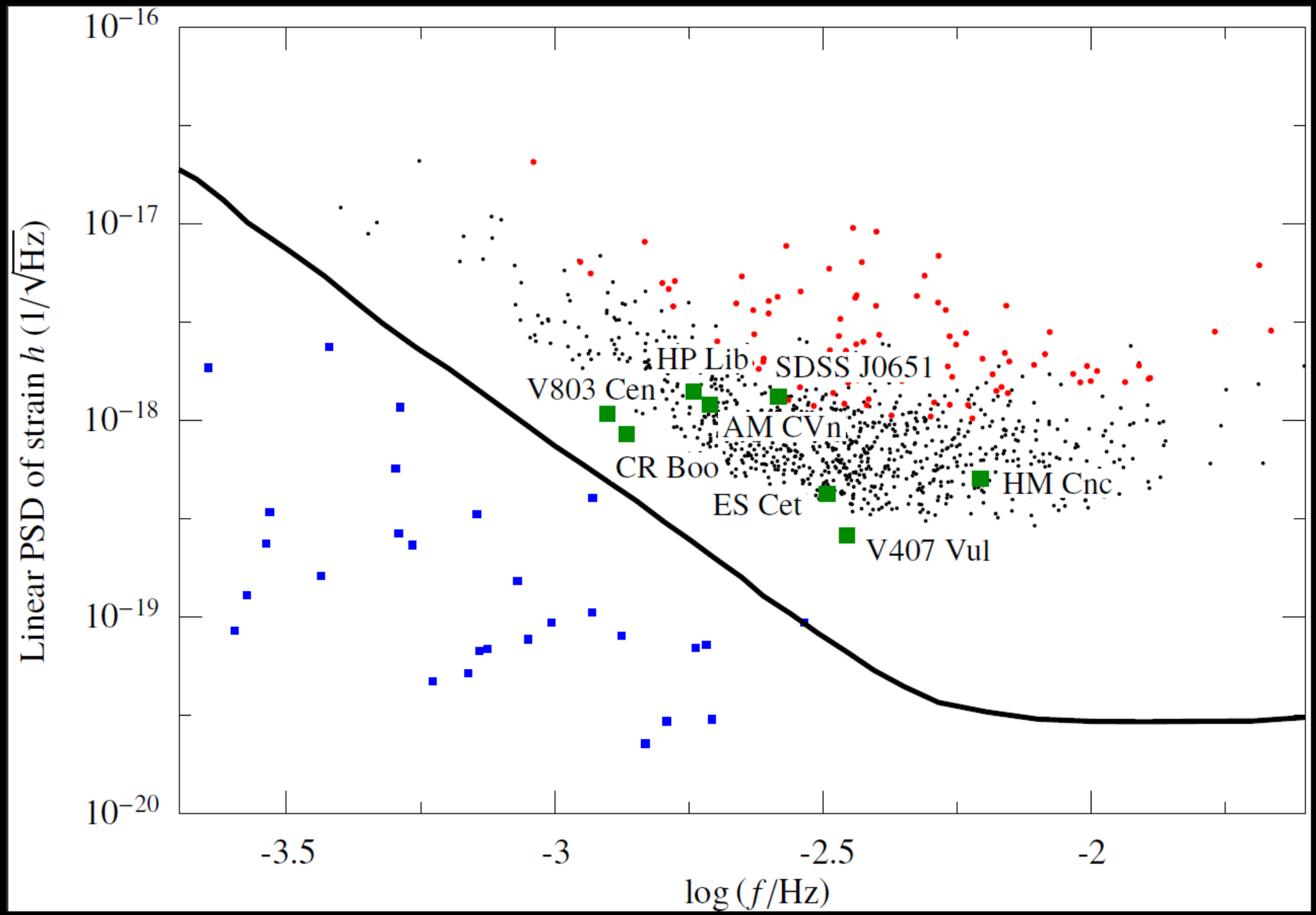


# Overview eLISA science

- Precision test of strong-field gravity
- Detect SMBH mergers at high redshift
- Trace merger history of BHs over large redshift and mass range
- Characterise environment of galaxy central objects and test if are GR Kerr BH
- Measure spectrum or set limits on backgrounds (probe inflation)
- Detect thousands of Galactic binaries (tests binary evolution, type Ia supernovae, tides, mass transfer, Galactic structure)
- http://arxiv.org/abs/1201.3621

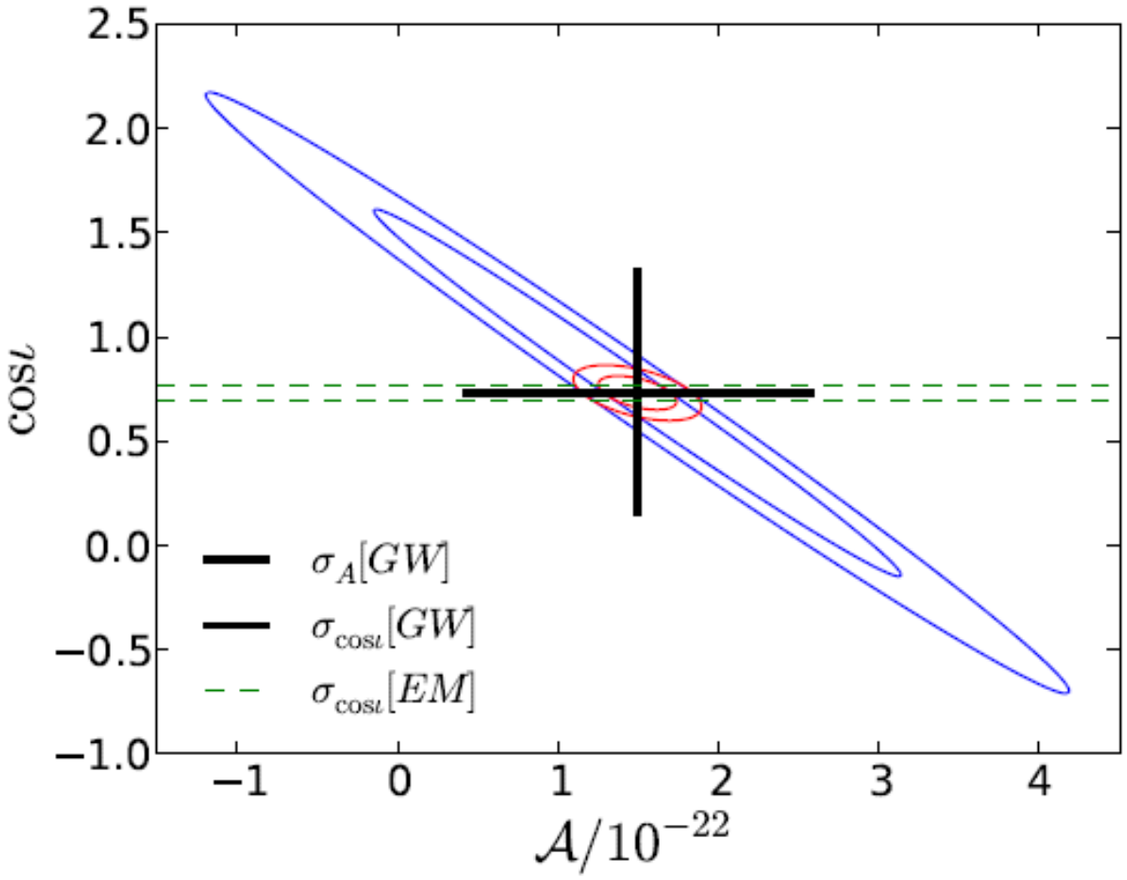


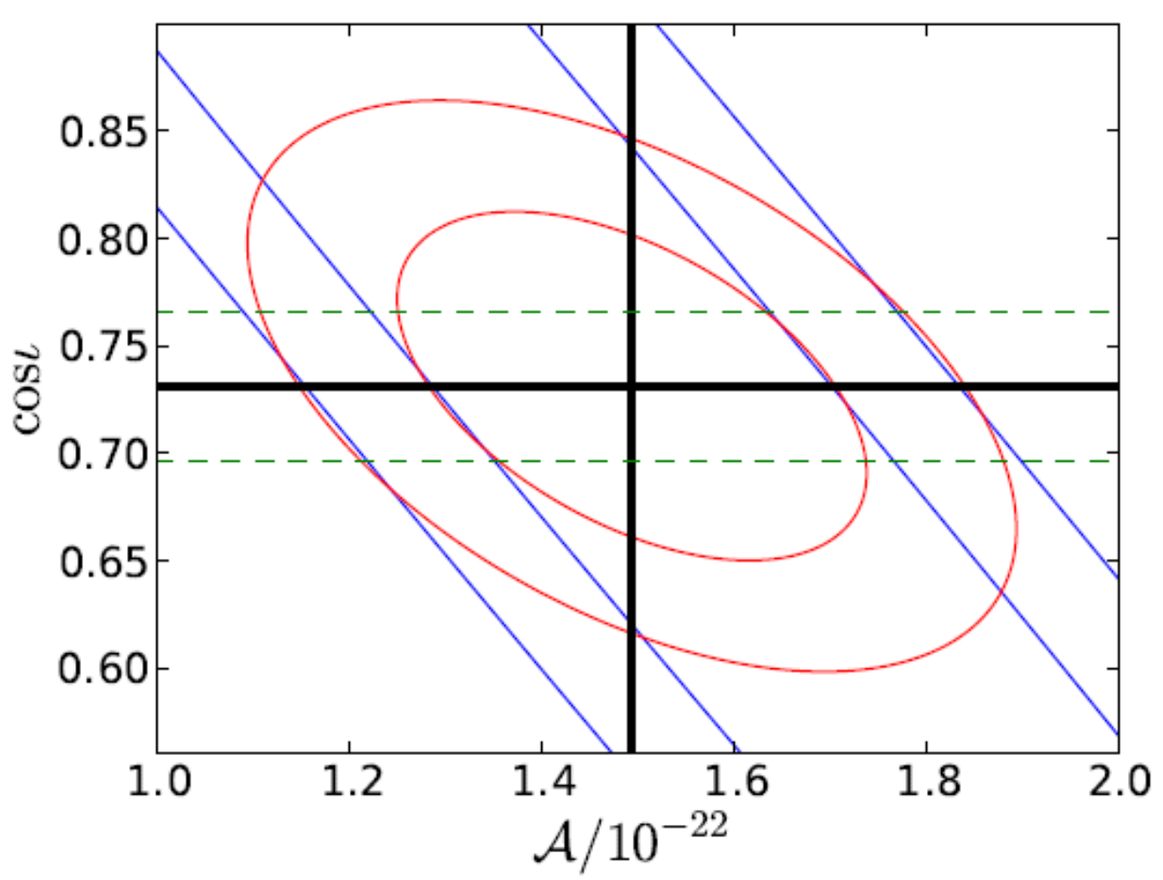
# Galactic binaries




Galactic binaries
- Verification
- Simulated pop.

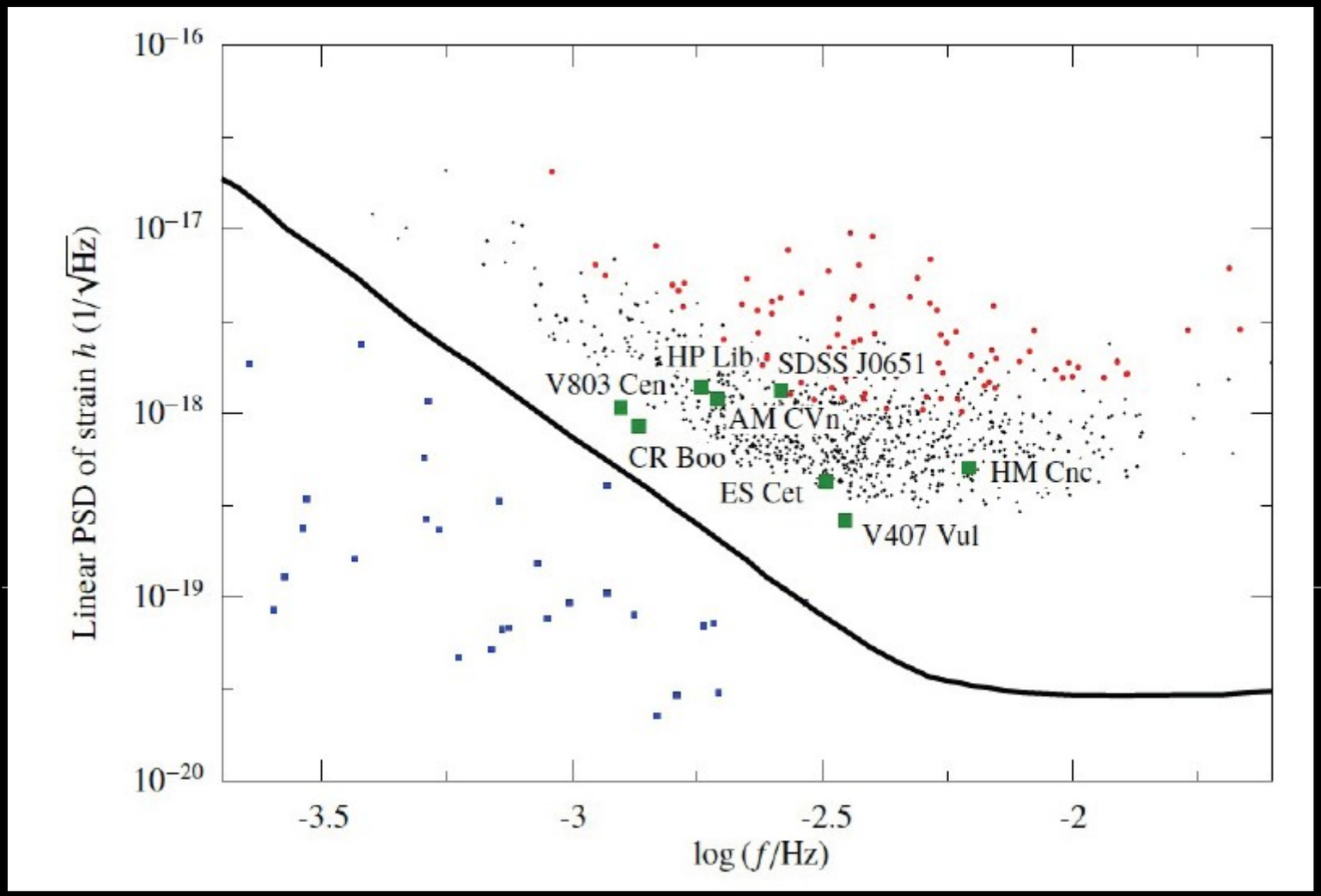
# Complementary EM observations




- Some correlations GW parameters
- Constrain one with EM data → improve accuratcy other
- Inclination important Shah et al. submitted
- Need to sort out fdot (and all other parameters)

# eLISA


$10^{-16}$
$10^{-17}$
$10^{-18}$
$10^{-19}$
$10^{-20}$
Linear PSD of strain $h$ $(1/\sqrt{\text{Hz}})$
HP Lib
SDSS J0651
V803 Cen
AM CVn
CR Boo
HM Cnc
ES Cet
V407 Vul
-3.5
-3
-2.5
-2
log ($f$/Hz)

# Complementary EM observations