



Gravitational Wave Science Interest Group April APS Splinter Meeting

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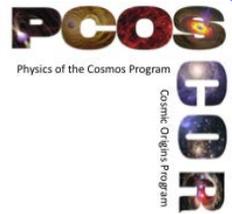
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Email list: <http://pcos.gsfc.nasa.gov/sags/gwsag/gwsag-maillist.php>



Preparing for the 2020 Decadal

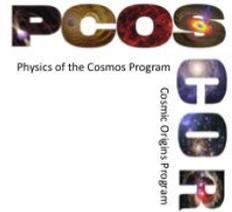


From Paul Hertz charge to the PAGs (January 2015):

- The 2020 Decadal Survey will prioritize large space missions to follow JWST and WFIRST
- Part A: Identify small set of candidate large missions
 - Community input from the PAGS (now)
 - Paul Hertz's initial list [2010 Decadal, 2014 Visionary Roadmap]
 1. Habitable-Exoplanet Imaging Mission
 2. UV/Optical/IP Surveyor
 3. Far IR Surveyor
 4. X-ray Surveyor
- Part B: Science and Technology Definition Team (STDT) studies
 - Identify technology needs and fund them through existing programs
 - Present to 2020 Decadal committee



LISA excluded from Short-list

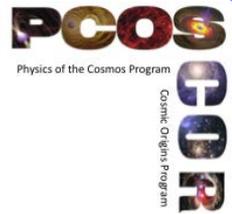


- **Hertz justification:**

- LISA is highest ranking large mission after WFIRST in the 2010 Decadal
- NASA is planning to partner with ESA on L3
- NASA will participate with ESA in preparatory studies (including the GOAT) that will lead to the L3 GW observatory
- NASA will also study participation in L3 at various levels to identify proper role in L3
- NASA will conduct the necessary technology development that will lead toward L3



Input requested from GWSIG



1. Short-list of 4 large candidate missions
 - Which missions should be studied to advance astrophysics as a whole (not just GW missions)
 - Additions/subtractions to/from the list
 - Paul will select 3-4 large missions to study
2. Commentary regarding exclusion of GW Surveyor from the list
3. Comments regarding Probes also accepted

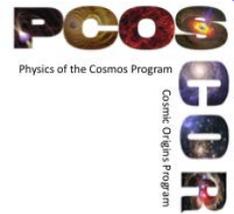


Timeline (2015)

- **January: Charge presented by Hertz**
- **February - March**
 - SIGs start collecting community input
 - Develop list of questions and issues the PhysPAG wants to address
- **19 March: Joint-PAG meeting @ STScI**
 - Initial input from PAGs
 - Discussion of possible joint-PAG report
- **April - June**
 - Continue collecting input (April APS + GWSIG email list)
 - Parallel work on PhysPAG report outline + parallel joint PAG meetings
- **July – September**
 - Write PhysPAG report & (possibly) coordinate with other PAGs
- **PAG reports delivered to ApS before Fall meeting**



The missions: HabEx and LUVOIR



1. HabEx

- 4-8 m monolithic primary
- Occulter: free-flying starshade (or coronagraph) with 10^{-10} contrast
- 1" FOV
- Optimized for exoplanets, but other uses of instruments possible
- L2 or Earth-trailing orbiting

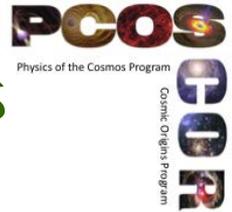
2. LUVOIR

- 8-16 m likely segmented, obscured primary
- HST-like bandpass (91 nm to ~2000 nm)
- Suite of imagers/spectrographs
- Need 10^{-10} contrast for planet imaging with coronagraph (or starshade)





The missions: X-ray & Far-IR Surveyors



3. X-ray Surveyor

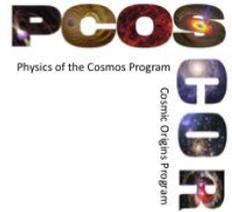
- $< 1''$ angular resolution
- 3 m^2 effective area
- High-resolution spectroscopy (few thousand) over a broad band
- $\sim 5'$ FOV
- Wavelength: $\sim 0.1\text{-}10 \text{ keV}$

4. Far-IR Surveyor (architecture TBD)

- A. 4-6 m filled aperture, single-dish, cold
 - B. $\geq 10 \text{ m}$ segmented
 - C. $\geq 10 \text{ m}$ equivalent interferometric system
- Imagers, spectrographs



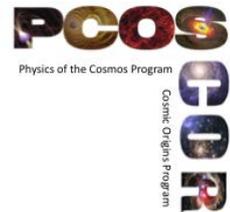
Initial questions/reactions from PhysPAG



- **X-ray Surveyor**
 - How are X-ray Surveyor's science goals related to those of Athena?
- **Gravitational-Wave L3 Mission**
 - Given that LISA is the highest priority unfinished business from the last decadal and does not appear on the list, how should strong and timely support for a GW mission be achieved?
 - The GW community requests that an implementation study for L3 be conducted concurrently with the other decadal studies
- **Inflation Probe**
 - Community generally agrees this is a probe-class mission, however
 - Mission development needs to be supported for 2020 Decadal survey preparation
 - Technology program needs to be supported and re-evaluated by mid-decadal panel
- **Probe Mission Line:** Strong interest



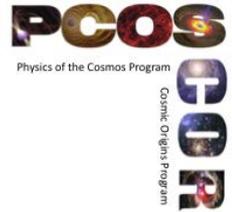
Initial GWSIG feedback to PhysPAG



- LISA is the highest priority large mission of the PCOS program and the highest ranked large mission of the Astrophysics Division after WFIRST [2010 Decadal].
- NASA unable to initiate a new start for LISA in the 2010 decade; financial support for LISA has fallen well below any reasonable expectation.
- Paul Hertz excluded the GW Surveyor from list, because NASA is initiating talks with ESA regarding L3.
- GW community acknowledges that NASA partnership on L3 represents one opportunity to realize a LISA-like mission.
- However, the community feels strongly (and unanimously) that a viable partnership with ESA needs immediate action from NASA.
- NASA participation in L3 requires strong recommendation in the 2020 Decadal.
- NASA must implement a plan now to assess the science, hardware contributions, tech development, costs, risks of range of participation levels.
- Without visible actions, many in the GW community feel a NASA-led GW mission should be considered by the 2020 Decadal.



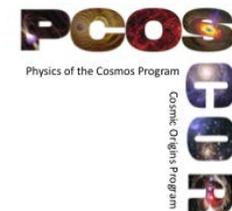
Future Meetings



- Early May, Virtual Town Hall – COPAG
- **May/June, Joint-PAG Virtual Town Hall (2 hours), TBD**
- June 3-5, Far-IR Workshop (Caltech) – COPAG
- Late June, UV/Optical Workshop (TBD) – COPAG
- June 13-14, ExoPAG #12 (Chicago) - ExoPAG
 - Half to full day to be spent on charge (2nd day)
- **June 29-July 1, 2015, HEAD meeting: L & M Space Missions**
 - X-Ray and Gamma-Ray SIG discussions planned
 - Last venue for community input
- **August 2015, IAU-AAS meeting in Honolulu**
 - Joint PAG meeting (chairs + overview)?
- **August, Virtual Town Hall – Joint PAG**
 - Chance to present overview of report to community



Questions we need to address



1. What is value the value of each of the 4 missions to the GW community?
2. Should any missions be added or cut?
3. How should we respond to the GW Surveyor being excluded?
4. How best do we advance a space-based GW observatory?
5. What type of NASA study is needed for a future GW mission?
6. Should we request that a SAG be formed to study such a study?
7. Do we need an additional GWSIG meeting (e.g. HEAD in Chicago), or is email sufficient?