

ExoPAG Report to Paul Hertz Regarding Large Mission Concepts to Study for the 2020 Decadal Survey

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Authors

Joint PAG Executive Summary

This is a joint summary of the reports from the three Astrophysics Program Analysis Groups (PAGs) in response to the charge given to the PAG Executive Committees by the Astrophysics Division Director, Paul Hertz, in the white paper "Planning for the 2020 Decadal Survey", issued January 4, 2015. This joint executive summary is common to all three PAG reports, and contains points of consensus across all three PAGs, achieved through extensive discussion and vetting within and between our respective communities. Additional information and findings specific to the individual PAG activities related to this charge are reported separately in the remainder of the individual reports. These additional findings are not necessarily in contradiction to material in the other reports, but rather generally focus on findings specific to the individual PAGs. We also present a table common to all three PAG reports that includes the range of nominal mission parameters and architectures for the missions suggested for further study

Having surveyed their communities, the PAGs concur that all four large mission concepts identified in the white paper as candidates for mission concept maturation prior to the 2020 Decadal Survey would advance astrophysics as a whole and are appropriate for study in detail. These include the Far-IR Surveyor, the Habitable-Exoplanet Imaging Mission, the UV/Optical/IR Surveyor, and the X-ray Surveyor. Other Flagship mission concepts were considered, but none achieved sufficiently broad community support to be elevated to the level of these four primary candidate missions.

This finding is predicated upon assumptions outlined in the white paper and subsequent charge, namely that 1) future Flagship missions under consideration are to follow JWST and WFIRST; 2) NASA will partner with the European Space Agency on its L3 Gravitational Wave Surveyor, participate in preparatory studies leading to this observatory, and conduct the necessary technology development and other activities leading to the L3 mission, including preparations that will be needed for the 2020 decadal review; and 3) that the Inflation Probe be classified as a probe-class mission to be developed according to the technology and mission planning recommendations in the 2010 Decadal Survey report. If these key

assumptions were to change, this PAG finding would need to be re-evaluated in light of the changes.

The PAGs find that there is strong community support for the second phase of this activity - maturation of the four proposed mission concept studies. The PAGs believe that these concept studies should be conducted by highly qualified scientists and technical experts assigned to the respective Science and Technology Definition Teams (STDTs). The PAGs find that the community is concerned about the composition of these STDTs and that there is strong consensus that all of the STDTs contain broad and interdisciplinary representation of the science community, and the most qualified technical experts. The PAGs also find that the community expects cross-STDT cooperation and exchange of information whenever possible to facilitate the sharing of expertise, especially in the case of the UVOIR Surveyor and the Habitable-Exoplanet Imaging Mission, which share some science goals and technological needs. The PAGs concur that a free and open process should be used to competitively select the STDTs.

Finally, the PAGs find that there is community support for a line of Probe-class missions within the Astrophysics mission portfolio. Our analysis for the Flagship mission studies revealed that there is substantial science need and community interest in missions of scope that is intermediate between Explorers and Flagships. The PAGs were unable to come to consensus on whether Probe concept studies should be funded in some formal manner by NASA prior to the decadal review, but are in agreement that a timely cross-PAG activity aimed at examining the discovery potential of Probes and current scope limits on the Astrophysics Division's community-proposed mission program would benefit the 2020 Decadal Survey process. The PAGs would be willing to collect further input on Probe missions from the community as a following strategic planning charge if asked to do so by the Astrophysics Director.

ExoPAG Report on the Four Missions Proposed by Paul Hertz

LUVOIR Surveyor

The Habitable-Exoplanet Mission (HabEx)

The Far-IR Surveyor

The X-Ray Surveyor

Additional Large Missions Considered

Probe-class Missions

Suggestions for How to Structure of the STDTs.

Summary and Conclusions

Appendix: Processes and Procedures Used and Community Response.