Terms of Reference Probes Concept Assessment Team (PCAT)

4 Introduction

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- 6 NASA is sponsoring 10 medium-size mission concept studies for missions in the cost range
- 7 \$400M \$1B ("Probes") as part of its preparations for the 2020 Astrophysics Decadal Survey.
- 8 The 10 Probe concepts were selected competitively in February 2017. The proposing Teams
- 9 were each awarded a grant (~\$150K) to develop the concepts through an 18 months long study
- and prepare a written report that NASA will review and then submit to the Decadal Survey
- 11 Committee. The 10 Probes concept studies are:
- 12

Probe Concept Mission	Primary Investigator	Assigned to/Design Lab
Transient Astrophysics Probe (TAP)	J. Camp, GSFC	GSFC/MDL
Cosmic Evolution through UV Spectroscopy (CETUS)	W. Danchi, GSFC	GSFC/MDL
A High Spatial Resolution X- ray Probe Satellite (AXIS)	R. Mushotzky, UMD	GSFC/MDL
Probe of Extreme Multi-	A. Olinto, Univ. of Chicago	GSFC/MDL
Messenger Astrophysics (POEMMA)		
X-ray Timing and	P. Ray, NRL	GSFC/MDL
Spectroscopy on Dynamical		
Timescale from		
Microseconds to Years		
(STROBE-X)		
Cosmic Dawn Intensity	A. Cooray, Univ. of Irvine	JPL/Team-X
Mapper (CDIM)		
Galaxy Evolution Probe	J. Glenn, Univ. of Colorado	JPL/Team-X
(GEP)		
Inflation Probe Mission	S. Hanany, Univ. of	JPL/Team-X
Concept Study (PICO)	Minnesota	
EarthFinder: A Diffraction-	P. Plavchan, George Mason	none (proof of concept)
limited Precise Radial	Univ.	
Velocity Observatory in		
Space		
Starshade Rendevous	S. Seager, MIT	JPL
Missions		

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14 Five Probes (TAP, CETUS, AXIS, POEMMA, and STROBE-X) are assigned to the PCOS/COR

15 Program Office at GSFC for oversight, while four (CDIM, PICO, GEP, and Starshade

16 Rendezvous) are assigned to the Exoplanet Program Office at JPL. One Probe (EarthFinder) was

17 accepted as proof of concept, and overseen at JPL.

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NASA also provided resources to 9 Principal Investigators to utilize design labs, i.e., Mission 19

20 Design Lab (MDL) at Goddard Space Flight Center and Team-X at the Jet Propulsion

- Laboratory (hereafter "the design labs"), to conduct mission level design studies and costs. The 21
- 22 above Table delineates which studies were assigned to each respective design labs. The two
- design labs will generate separate high-level mission design products that will be attached to the 23
- 24 Teams' final reports before submission to the Decadal Survey by NASA HQ.
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- 26 NASA has requested GSFC and JPL's costing offices (Resource Analysis Office and Cost
- 27 Estimation and Pricing Section, respectively; hereafter the "costing offices.") to perform
- 28 independent cost assessments of the Probes that used the resources of their respective Centers. 29
- 30 In order to provide an independent, non-advocate assessment of the costing offices' results,
- 31 NASA is assembling an independent Probes Concept Assessment Team (PCAT). The PCAT will
- 32 validate the cost estimates provided by the costing offices, the design labs, and the PI-led studies.
- 33 The PCAT is composed of subject matter experts who will work with the costing offices and the
- 34 study teams.
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36 **Charge and Review Criteria**

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The PCAT will conduct a "cost and technical validation" of the Probe mission concepts. A cost 38

39 and technical validation is not an Independent Cost Estimate (ICE) and it is not a Cost and

Technical Estimate (CATE); rather it is validation that the mission design as proposed by each 40

41 Probe mission concept team is consistent with the costs developed by the costing offices, and

feasible for within \$1 billion. 42

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The purpose of conducting a cost and technical validation of the Probe mission concept studies is 44 to provide NASA Headquarters confidence in the science, technical, cost, and risk conclusions of 45 the Probe Mission Concept Reports that will be presented to the Decadal Survey. 46

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Specifically, the PCAT will: 48

- Provide a high-level assessment whether the proposed Probe can achieve the stated science goals and objectives with the proposed architecture
- Comment on the technology maturity of any enabling technologies
- Working with both offices, develop a process for cost validation
- 53 • Provide validation of independent cost assessments. This will be a qualitative estimate of the likelihood that the Probe concept is feasible within \$1 billion based on the Probes 54 55 reports and design lab data products 56
 - Be briefed by RAO and CEPS on their respective process •
- 57 58
- 59 **PCAT Deliverables to HQ**
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The primary final deliverable to NASA HQ will be a written report covering: 61

- Overall Summary 62
- 63 • Brief description of PCAT Methodology and Process

64 65 66	 High-level assessment of whether the proposed mission addresses science goals and objectives Strengths and Weaknesses in the context of costing models
67 68 69	 Qualitative assessment of the confidence that the Probe Mission Cost is under the \$1B maximum cost target (Likely, Possible, Unlikely) Comments to NASA
70 71	The DCAT final written report will be in the form of a short perrative summers and a set of
71 72 73	PowerPoint slides with explanatory notes. Additionally, the PCAT's Chair and his/her delegates will debrief HQ orally on the written report.
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75 76	After the delivery of the written report and outbrief, NASA will disband the PCAT.
77	Probes Teams deliverables to HQ
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79 80	The Probes Teams will provide the PCAT with the needed documents for their assessment, including:
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82 83	• The final report. This is to be structured as per the guidelines in the Implementation Plan
84	• The Engineering Concept Definition Package from the IDC and Team-X runs
85 86	Casting Offices' Deliverables to HO
80 87	Costing Offices Deriverables to fig
88	• The output of the cost assessments by RAO and CEPS.
89	1 5
90	The Probes Executive Secretary at HQ, Rita Sambruna, will be the point of contact for the
91	Probes Teams, PCAT, and Costing Offices' deliverables and will be responsible for
92 02	disseminating to the all parties.
95 94	PCAT Schedule
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96 97	The PCAT will commence its task based on the following proposed schedule:

Milestones	Due Date
Select Chair and populate the PCAT	November 2018
Kickoff Telecon of the PCAT	December 2018
Probes Final Reports to HQ	NLT December 31, 2018
Briefing of the Probes Teams to PCAT	3 rd week of January 2019
Briefing of the Costing Offices to the PCAT	3 rd week of January 2019
Costing Offices deliver their ICA to HQ	March 2019
PCAT review	March-May 2019
PCAT debriefs to each Probe team	May 2019 (as early as practical)
PCAT report to HQ	June 2019
HQ review and submit to Decadal Survey	July 2019

99 NASA HQ POCs

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- 101 Rita Sambruna, Probes Program Officer
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- 103 202-358-2166 office
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- 105 Shahid Habib, Probes Program Executive
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- 107 202-358-0450 office
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109 PCAT Membership

- 110 The PCAT will consist of a core membership with experience in overall mission design,
- 111 development, and implementation. The PCAT will supplement its core membership, if required,
- 112 with SMEs familiar with specific instrumental approaches.
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- 114 Jay Bookbinder Chair
- 115 TBD
- 116 TBD
- 117 TBD
- 118 TBD
- 119 TBD