**PCOS Program Strategic Technology Capability Gap Input Form**

**Instructions**

Use this form to submit to the Astrophysics Division Physics of the Cosmos (PCOS) Program Office information on technology capability gaps for future NASA PCOS missions. Since all gaps considered last year will be reevaluated along with new submissions, submit one of those only if you’re suggesting a modification (see the most recent Program Annual Technology Report, PATR, at <http://pcos.gsfc.nasa.gov/technology/>). If your input affects a gap submitted by a large-mission-concept Science and Technology Definition Team (STDT) or the L3 Study Team (L3ST) it will be forwarded to the team for consideration and possible implementation.

Understanding and addressing the gaps between current technology capabilities and those needed for future applications and missions is critical to mission success. This form is intended to describe a technology capability gap that needs to be filled to enable or enhance a future PCOS mission mentioned in the 2010 Astrophysics Decadal Survey ([New Worlds, New Horizons](https://science.nasa.gov/astrophysics/special-events/astro2010-astronomy-and-astrophysics-decadal-survey/), NWNH), [Astrophysics Implementation Plan](https://science.nasa.gov/astrophysics/documents/) (AIP), or Astrophysics Roadmap ([Enduring Quests, Daring Visions](https://science.nasa.gov/astrophysics/documents/), EQDV), not a specific candidate technology to fill such a gap, nor a gap not relevant to any mission mentioned in those documents.

The Program Office will use the information provided in this form to assess how this technology gap affects potential future missions, and to gauge the impact a successful technical solution would provide. That information will guide our technology prioritization process that feeds into the PATR, informing future Strategic Astrophysics Technology (SAT) calls and selections, as well as Program technology planning.

Please send your completed form to thai.pham@nasa.gov. Ithai.pham@nasa.govnputs received by June 1 will be incorporated into that year’s prioritization process. Inputs received after that cutoff date will be included in the following year’s process. Early submissions are appreciated.

**PATR Prioritization Information**

The information provided will be used as input to the PCOS Program’s annual technology gaps prioritization process as described in the PATR and may be included, in part or in whole, in the PATR and publicly released**:**

**Brief Description of the Technology Capability Needed:** Describe the technology capability gap and associated key performance parameters in 100 – 150 words. Please describe a technology capability gap, (e.g., Single-photon-counting, high-QE, megapixel UV/Vis detector”) not a specific implementation approach to fill such a gap (e.g., not “Megapixel UV/Vis EMCCDs,” not because there is anything intrinsically wrong with EMCCDs, but they are a specific solution, not a technology gap. Potential solutions and their state of the art are to be described in the next section).

**Assessment of the Current State of the Art:** In 100 – 150 words, describe the current state of the art (SOTA) of relevant technologies that may fill this capability gap partially or imperfectly. Describe their performance capabilities and functional shortcomings relative to applicable PCOS missions and application needs. Please include here publicly accessible references justifying the SOTA and full solution Technology Readiness Levels (TRLs, see below).

**Current TRL of SOTA:** Enter the estimated current TRL of these relevant SOTA technologies. Base your TRL estimates on the definitions given by NASA Procedural Requirement (NPR) [7123.1B, Appendix E](http://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal_ID=N_PR_7123_001B_&page_name=AppendixE). Note that these technologies and/or their derivatives need not be the ones used to close the gap.

**Current TRL of Solution Closing the Gap:** Enter the estimated current TRL of relevant technologies expected to completely fill the gap. Base your TRL estimates on the definitions given by NPR 7123.1B, Appendix E. Note that the SAT program funds technology maturation in the mid-TRL range (3 – 5). Thus, gaps where the relevant technologies expected to completely fulfil the needs are at a TRL of 6 or higher will not be considered. Note also that this TRL should be no higher than for the SOTA, else this becomes the state of the art and the two TRLs are the same.

**Technical Goals and Objectives to Fill the Capability Gap:** Describe the quantitative, measurable, technical goals and objectives (key performance parameters) for a candidate technology to fill the described capability gap. For example, “*The goal is to produce a detector with a sensitivity of X over a wavelength range of Y to Z nm as required for optimal science return for mission ABC.*” Capability gaps with clearly quantified objectives are more easily assessed during the prioritization process.

**Scientific, Engineering, and/or Programmatic Benefits:** In 100 – 150 words, describe the scientific, engineering, and/or programmatic benefits of filling this technology gap, and state the expected impact, from mission-enabling to mission-enhancing. Benefits could be scientific (e.g., better science output), engineering (e.g., lower mass), and/or programmatic (e.g., reduced cost, schedule, and/or risk). For example, “*The desired material will be 50% stronger than the current state-of-the-art, reducing the mass of a 4 m telescope optical subsystem by X kg.*”

**Applications and Potential Relevant Missions for COR, PCOS, and ExEP:** Identify potential missions or applications that would benefit from technologies that can fill this capability gap, concentrating on PCOS, but adding Cosmic Origins (COR) and/or Exo-planet Exploration Program (ExEP) missions if the gap is cross-cutting. Submissions enabling or enhancing more than one PCOS science mission identified in NWNH, AIP, and/or EQDV will receive higher priority scores.

**Urgency:** What are the anticipated or estimated launch dates of missions expected to be enabled or enhanced by solutions closing the technology gap? If there is an earlier schedule driver (e.g., ESA requirement to be at TRL 6 by a certain date to be considered for L3), state the driver and its date. Gaps with greater urgency will receive higher priority scores.

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| **PCOS Program Technology Capability Gap Input Form** |
| Technology Capability Gap Name:       | Date Submitted:      |
| Your Name:       | Organization:       |
| Telephone:       | Email Address:       |
| **PATR Prioritization Information (see accompanying instructions)** |
| Brief Description of the Technology Capability Needed (100 – 150 words):      |
| Assessment of the Current State-of-the-Art (SOTA) and references justifying TRLs quoted at right (100 – 150 words):      | Current TRL of SOTA: |   |
| Current TRL of Full Solution: |   |
|  |  |  |
| Target Goals and Objectives to Fill the Capability Gap:      |
| Scientific, Engineering, and/or Programmatic Benefits (100 – 150 words):      |
| Applications and Potential Relevant Missions for PCOS, COR, and ExEP:      |
| Urgency (time to estimated launch date for enabled/enhanced missions or other schedule driver):      |
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