

## **A. Background**

Starshades (or External Occulters) are one of the starlight suppression technologies for high contrast imaging of exoplanets and are baselined for large- and probe-class mission concept studies<sup>1</sup> funded by the NASA Astrophysics Division for submission to the Astro2020 Decadal Survey. Recently the Astrophysics Division authorized the Exoplanet Exploration Program (ExEP) to execute a directed technology development activity to advance starshades to Technology Readiness Level (TRL) 5 to enable potential future exoplanet science missions. The Starshade Technology Development Activity to TRL5, or S5, follows an approved Technology Development Plan<sup>2</sup> with technology milestones that respond to documented mission performance requirements. The ExEP recognizes that robust and impactful technology maturation requires ongoing consideration of new technology approaches and new mission concept drivers. Therefore the ExEP charters the Starshade Science and Industry Partnership (SIP). The purpose of the Starshade SIP is to maximize the technology readiness level of starshades to enable potential future exoplanet science missions.

## **B. Expected Outcomes**

Expected outcomes of the Starshade SIP are to:

1. Identify solutions to challenges and risks faced by the S5 development activity;
2. Propose new approaches, techniques, and research beyond planned S5 activities that can maximize starshade technology readiness;
3. Document new mission concept drivers for starshade technology performance requirements;
4. Maintain alignment between S5 technology development activities and future mission needs;
5. Facilitate groups of investigators to communicate research, new technology, and new mission concepts across disciplinary, organizational, and geographic boundaries;
6. Enable continued participation of the community in NASA's starshade technology development activities.

## **C. Participation**

The Starshade SIP is open to all participants from NASA, industry, academia, and any organization or individual with research, technology, or science capabilities and

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<sup>1</sup> <https://science.nasa.gov/astrophysics/2020-decadal-survey-planning>

<sup>2</sup> <https://exoplanets.nasa.gov/exep/technology/starshade/>

contributions in starshade-related technology. *Ex officio* participants in the SIP include S5 project staff, ExEP Chief Technologists and Chief Scientists, and the Exoplanet Technical Assessment Committee (ExoTAC)<sup>3</sup> chaired by Dr. Alan Boss. Non-US participation is welcome. Export-controlled topics, if any, will be covered in a separate forum.

The Starshade SIP will be managed by the ExEP Manager (Dr. Gary Blackwood) and supported by the ExEP Scientist for Starshade Technology (Dr. Renyu Hu).

To maximize participation of small businesses and academia in the Starshade SIP within limited program funds the following opportunities are planned:

1. Up to three set aside contracts for small business to be announced on FedBizOps by the Jet Propulsion Laboratory.
2. A Technology and Science Working Group (TSWG) of approximately 8 members solicited through a NASA *Dear Colleague* letter. Travel expenses will be reimbursed to TSWG members.
3. Up to four graduate students and/or post-docs will be selected by the TSWG to attend and present at Starshade SIP events. Travel expenses will be reimbursed for these students.

#### **D. Work Structure and Timeframe:**

The Starshade SIP will convene periodically by telecon (approximately bimonthly) and biannually in face-to-face Starshade SIP forums facilitated for remote participation. Small-business awardees and TSWG members, when selected, are expected to participate in the Starshade SIP telecons and forums. Agendas for telecons and Forums will include status from the S5 Project and presentations from Starshade SIP participants recommended by the TSWG.

##### **Timeline:**

- Dec 2018: SIP informational telecon
- Jan 2019: Request for Proposal for cost-sharing contracts
- Feb 2019: *Dear Colleague* letter for the Technology and Science and Working Group
- Jun 2019: Award of small business contracts; announce TSWG membership
- Aug 2019: Starshade SIP forum #1
- Feb 2019: Starshade SIP forum #2
- July 2020: Starshade SIP forum #3
- Nov 2020: Starshade SIP forum #4

The Starshade SIP, TSWG, and contracts will conclude in December 2020 and may be renewed pending the outcome of the Astro2020 Decadal Survey.

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<sup>3</sup> <https://exoplanets.nasa.gov/exep/technology/technology-overview/>

## **E. Reporting**

The Starshade SIP Manager, The ExEP Scientist for Starshade Technology, and the TSWG will prepare a report summarizing each forum. Annually the SIP Chair and TSWG will provide a briefing to the NASA Astrophysics Division.

Approved by:

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Dr. Gary Blackwood  
Manager, NASA Exoplanet Exploration Program  
Jet Propulsion Laboratory  
California Institute of Technology

Concurred by:

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Dr. Shahid Habib  
Program Executive, NASA Exoplanet Exploration Program  
Astrophysics Division, NASA Headquarters

Concurred by:

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Dr. Douglas Hudgins  
Program Scientist, NASA Exoplanet Exploration Program  
Astrophysics Division, NASA Headquarters