SPHERE\textsuperscript{x}
Launching no later than April 2025.

SPHERE\textsuperscript{x} Addresses NASA’s Three Core Astrophysics Goals

**Probe the origin and destiny of the Universe.**
SPHERE\textsuperscript{x} maps the large-scale three dimensional distribution of galaxies to study the inflationary birth of the Universe.

**Explore whether planets around other stars could harbor life.**
SPHERE\textsuperscript{x} surveys water and key ingredients for life in interstellar ices through the early stages of star and planet formation.

**Explore the origin and evolution of galaxies.**
SPHERE\textsuperscript{x} traces the total light emitted over cosmic time from the first stars to modern galaxies.

First Near-Infrared All-Sky Spectral Survey for Astronomy Community

SPHERE\textsuperscript{x} achieves its science objectives with four all-sky surveys over two years. This first near-infrared full-sky spectral dataset yields a public legacy archive, supporting a rich variety of investigations, from galactic and extragalactic science, to X-ray astronomy, to exoplanet characterization.

**Spectra Provided to Community**

<table>
<thead>
<tr>
<th>Object</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galaxies</td>
<td>&gt;450 million</td>
</tr>
<tr>
<td>Exoplanet target stars</td>
<td>&gt;600 thousand</td>
</tr>
<tr>
<td>Quasars</td>
<td>&gt;1 million</td>
</tr>
<tr>
<td>X-ray counterparts</td>
<td>&gt;100,000</td>
</tr>
<tr>
<td>Clusters</td>
<td>&gt;100,000</td>
</tr>
<tr>
<td>Stars with hot dust</td>
<td>&gt;1,000</td>
</tr>
<tr>
<td>Asteroids and comets</td>
<td>&gt;100,000</td>
</tr>
</tbody>
</table>
A Simple Payload Paired with a High-Heritage Spacecraft Bus

Hardware Integration and Test Proceeding

**Flight Mirrors**
- Free-form mirror fabrication completed

**Cryogenic Test Chamber**
- KASI-provided system for end-to-end optical testing

**Hawaii-2RG Detector**
- Six H2RGs using 2.5 and 5.3 μm cutoffs

**Linear Variable Filter**
- Spectroscopy using a unique LVF over each H2RG

**SPHERE\* Sensitivity**
*Point source sensitivity per spectral channel for full sky (red) and deep fields (brown) after two years, ranging between best- and worst case predictions excluding confusion noise.

**All Sky Survey Observations**
SPHERE\* maps the full sky four times in 102 spectral channels over two years.

**Specifications**
- 20cm telescope effective diameter
- λ = 0.75-5 μm
- λ/Δλ = 35-130
- 3.5° x 11.3° field of view
- 6.2" pixel size
- Falcon 9 launch