ORIGINS Space Telescope

From the Rise of Metals to Water for Habitable Worlds

National Aeronautics and Space Administration

Origins Space Telescope: Study Plan

Asantha Cooray (University of California, Irvine) for the Origins Space Telescope Science and Technology Definition Team

Origins Space Telescope (previously Far-Infrared Surveyor) is a NASA flagship observatory mission concept for the 2020 Decadal review.

Potential Wavelength Coverage from 5 μm–1 mm

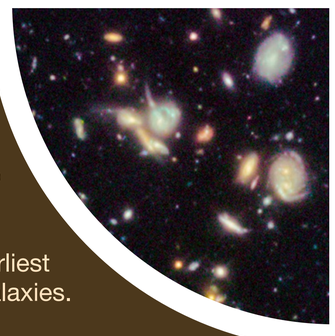
Enables observations of biosignatures in the atmospheres of transiting Earth-like planets, mid- and far-infrared diagnostic lines in galaxies out to redshifts of 10, and characterization of water from the Solar System to the ISM.

Tracing the Signatures of Life and the Ingredients of Habitable Worlds

Origins will map the trail of water through all stage of star and planet formation and characterize the atmospheres of potentially habitable worlds.

Unveiling the Growth of Black Holes and Galaxies over Cosmic Time

Origins will reveal powerful starbursts and buried black holes, energetic feedback, and the dynamic interstellar medium from which stars are born.

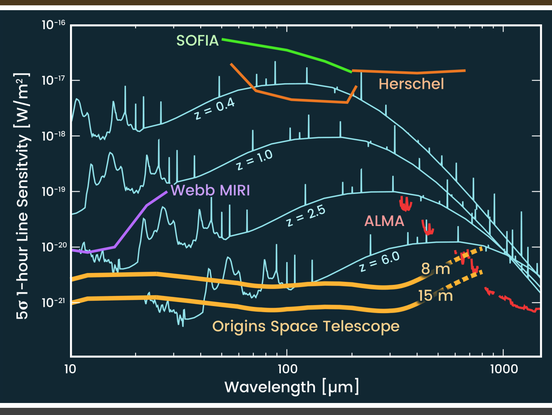


Origins will trace the rise of metals in thousands of galaxies to z~10, probe the first sources of cosmic dust and signatures of the earliest stars, and the birth of galaxies.

Charting the Rise of Metals, Dust, and the First Galaxies

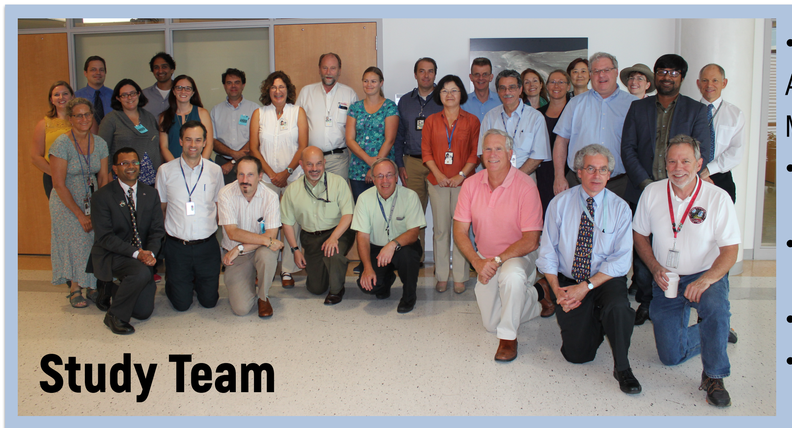
Origins will chart the role of comets in delivering water to the early Earth, and survey thousands of ancient Trans Neptunian Objects at distances greater than 100 AU and down to sizes of less than 10 km.

Characterizing Small Bodies in the Solar System



Unprecedented Sensitivity

Fast mapping speed with hundreds or thousands of independent beams will enable 3D surveys of large areas of sky, pushing to unprecedented depths to discover and characterize the most distant galaxies to the outer reaches of our Solar System.



Study Team

- **Community Chairs:**
  Asantha Cooray, *UC Irvine*
  Margaret Meixner, *STSCI/JHU*
- **Study Scientist:**
  David Leisawitz, *GSFC*
- **Deputy Study Scientist:**
  Johannes Staguhn, *GSFC/JHU*
- **Study Manager:** Ruth Carter, *GSFC*
- **NASA HQ Program Scientists:**
  Kartik Sheth, Dominic Benford

- **NASA Appointed Members:** Lee Armus, IPAC; Cara Battersby, CfA; Edwin Bergin, Michigan; Matt Bradford, JPL; Kim Ennico-Smith, Ames; Gary Melnick, CfA; Stefanie Milam, GSFC; Desika Narayanan, University of Florida; Klaus Pontopiddan, STSCI; Alexandra Pope, UMass; Thomas Roellig, Ames; Karin Sandstrom, UCSD; Kate Y. L. Su, Arizona; Joaquin Vieira, UIUC; Edward Wright, UCLA; Jonas Zmuidzinas, Caltech
- **Ex-officio representatives:** Susan Neff & Deborah Padgett, NASA Cosmic Origins Program Office; Susanne Alato, SNSB; Douglas Scott, CAS; Maryvonne Gerin, CNES; Itsuki Sakon, JAXA; Frank Helmich, SRON; Roland Vavrek, ESA; Karl Menten, DLR; Yong-Seon Song, KASI; Sean Carey, IPAC
- **NASA Study Center (Goddard Space Flight Center) Team:** Anel Flores (Mission Systems Engr), James Kellogg (Instrument Systems Engr), Michael DiPirro (Chief Technologist), Louis Fantano (Thermal Systems Engr), Andrew Jones (Mechanical Systems Engr), Joseph Howard (Optical Systems Engr), James Corsetti (Optical Engr), Ed Canavan (Cryo Engr), Johannes Staguhn (Instrument Scientist)
- **Study Advisory Board:** Jon Arenberg,Northrup Grumman; John Carlstrom, Chicago, Harry Ferguson, STScI, Tom Greene, Ames; George Helou, IPAC; Charles Lawrence, JPL; Sarah Lipscy, Ball Aerospace; John Mather, GSFC; Harvey Moseley, GSFC; George Rieke, Arizona; Marcia Rieke, Arizona; Jean Turner, UCLA; Meg Urry, Yale.

How to get involved:

Join one or more of our science working groups (SWGs):

- **Planet Formation and Exoplanets**: Klaus Pontoppidan and Kate Su (**exoplanet** science study led by Eric Nielsen, Tyler Robinson)
- **Galaxy Evolution over Cosmic Time**: Lee Armus and Alex Pope
- **Milky Way, ISM and Nearby Galaxies**: Karin Sandstrom and Cara Battersby
- **Early Universe and Cosmology**: Matt Bradford and Joaquin Vieira
- **Solar System**: Stefanie Milam

Or one of our five instrument teams:

- **Far-Infrared imager/polarimeter:** Johannes Staguhn (Lead), Margaret Meixner (Instrument Scientist)
- **Low-Res Spectrometer** (Study led at JPL): Matt Bradford (Lead), Lee Armus (Instrument Scientist)
- **Mid-IR imager/coronagraph/IFU:** Tom Roellig/Itsuki Sakon (Leads), Kim Ennico-Smith (Instrument Scientist)
- **Heterodyne Instrument** (Study led in Europe under CNES): Martina Weidner (Lead), Gary Melnick/Maryvonne Gerin (Instrument Scientists)
- **High-Res Spectrometer:** Dave Leisawitz (lead), Ed Bergin (Instrument Scientist)

Origins will be an actively cooled telescope covering the infrared spectrum. Spectrographs and imagers will enable 3D surveys and discover and characterize distant galaxies, exoplanets, and the outer reaches of the Solar System. We would like to hear from you. Contact us at:

email: **firsurveyor_info@lists.ipac.caltech.edu** *twitter:* **@NASAOriginsTele**
web: **origins.ipac.caltech.edu** • **asd.gsfc.nasa.gov/firs**

The **Origins Space Telescope** is the mission concept for the **Far Infrared Surveyor**, a study in development by NASA in preparation for the *2020 Astronomy and Astrophysics Decadal Survey*.

http://origins.ipac.caltech.edu/
Secret OST Word: Infrared