

Technology Requirements to Operate at and utilize the Solar Gravity Lens for Exoplanet Imaging

Workshop objectives and agenda
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Context

- This KISS Technology Development Workshop is a follow-on to the 2014-15 KISS Study, Science and Enabling Technologies to Explore the Interstellar Medium. Several mission possibilities were identified there, in terms of increasing distance into the interstellar medium: Kuiper Belt Objects, Far Interstellar Medium (>200 AU), and **the Solar Gravity Lens Focus (SGLF) Mission (>600 AU)**.
- The interest in the SGLF mission is that it may provide the best, affordable way to achieve kilometer scale images and spatially resolved spectra of resolved features associated with a putative biomass.
- This study will provide an opportunity for in-depth discussion in science, instrumentation and mission – which we hope will lead to specific design and technology development proposals to enable this mission to be launched in the mid-2020s.

Objective I: Science

- Potential targets: need to know where to point, rely on other measurements (direct imaging), how accurate should the target position be (orbits?)?
- What can we measure with the SGLT?
 - Surface map
 - Spectroscopy? Biosignatures?
 - Take advantage of spatial resolution to resolve large-scale features (e.g. Oceans, Continents, Mountains, water bodies, large-scale organisms such as plankton)

Objective II: instrument concept

- Flown down from science requirement
- Camera specifications:
 - Solar Coronagraph
 - Imager: wavelength range, detector technology
 - Spectrograph: spectral resolution
- On-board processing
- ...

Objective III: mission concept

- Chemical propulsion options:
- Solar sail requirements
- Multiple spacecraft options for
 - Einstein Ring operations and
 - for communications
- Navigation
- Options for maneuvering: trajectory corrections, focal line flight and Einstein Ring operations
- Communications options: radio, optical, use of relays
- Power options

Objective IV: development roadmap

- Identify technology gaps, coordinate with EXEP
- Draft roadmap
- Advocacy/Funding (NASA, NAS, foundations)
- Synthesis, result dissemination, outreach