PSAA Topical Investigations

- Scientific Investigations
  - Identify the most compelling subjects of study within the topical areas that Astrophysical Assets may investigate.
  - Identify the key capabilities that are unique to AA platforms that facilitate the investigations of the highest-priority subjects.
  - Identify the range of Spacecraft/Platform and Payload Criteria that are required to span the populations of interest in the topical areas of investigation.

Examples

- Compelling Topics:
  - Drivers of MBC activity.
  - Distribution and Composition of Oort Cloud Objects.
  - Giant Planet Aurorae.
  - Comet D/H ratios.
  - Planet IX
  - Tracing Solar System Evolution through asteroid composition

Examples

- Key Capabilities:
  - Large Area FOV.
  - High Spatial or High Spectral Resolution.
  - High sensitivity and collection area.
  - Rapid read-out/sampling.
  - Multiple visit cadence.

Examples

- Range of criteria:
  - Range of non-sidereal tracking capabilities necessary to track the objects of interest, e.g. NEOs, comets, SDOs.
  - High-speed readout for planetary occultations for giant planet atmospheres vs. for Pluto or Triton vs. for serendipitous occultations (e.g. HST-FGS occultations of TNOs)
  - Sensitivity/Saturation limits to observe 10km KBOs and spectra of giant planets.

PSAA Topical Investigations

- Technical Investigations
  - Identify the gaps in instrumentation and spacecraft architecture from previous-generation AAs relative to the present technologies that profoundly expand the capabilities of platforms to investigate solar system objects.
  - Investigate the trade spaces of the technical desirables.
  - Weigh implementation costs against the range of capabilities, or instrumentation, and prioritizing the platform capabilities accordingly.

Examples

- Technical topics
  - Gaps:
    - Nonlinear optics and improvements in reflector deployment allow for significantly larger collection apertures and mitigate imaging artifacts.
    - Low noise/fast-read detectors, MKIDS, and IFS allow for time-critical and combine spectral resolution with spatial resolution over several wavelength regimes.
    - Thermal design improvements
    - Higher-speed communications and high-accuracy station-keeping.

Examples

- Technical topics
  - Trade Spaces:
    - Larger apertures and spacecraft are more expensive/harder to track at high rates/harder to cool to uniform temperatures.
    - Different detectors trade spatial for spectral resolution.
    - Passive vs. active cooling and longevity considerations.
    - FOV and coverage vs. resolution.
    - TRL levels

Examples

- Technical topics
  - Cost vs Capabilites:
    - Tracking NEOs passing within a LD for a large aperture telescope.
    - Cooling at longer wavelengths.
    - Collection area for high-energy photons.
    - MKIDS vs IFS vs “drift-scan” like surveys with heterodyne receiver arrays.