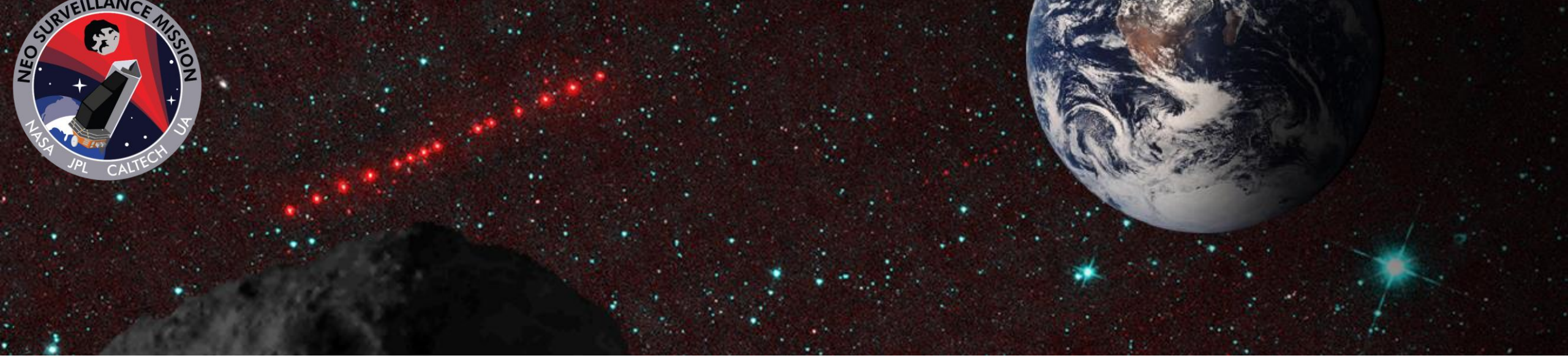

Science and Technology Opportunities with NEO Surveyor

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What is the NEO Surveyor?

50 cm off-axis telescope, dichroic focal plane covering ~11.6 sq deg at 4.6 & 8 um simultaneously with 3” pixels, background-limited sensitivity, launch 2026

Located at L1, using passively cooled HgCdTe 2Kx2K detector arrays

Exposures every 30 seconds transmitted to the ground

The basic unit of data is the “visit” consisting of 6 dithered exposures

Sequences of 4 visits spaced by 2 hours to find NEOs by their motion

The sky area covered is between -40 and +40 deg ecliptic latitude and 45-120 deg longitude relative to the Sun (both leading and trailing sides)

Whole pattern will be repeated every two weeks

Science Opportunities with NEOS Data

- **This is a Planetary Defense Coordination Office mission so the NEO search will set the observing cadence**
- **But the full frames will be transmitted to the ground, given astrometric and photometric calibrations, and served to the community by IRSA, like the NEOWISE L1B images**
- **This data will enable many astrophysical studies over the 64% of the sky that will be covered**
  - Variability over 30 second, 2 hour, 2 week, 6 month, and 12 year [mission lifetime goal] timescales
  - Proper motions for objects too cool to show up in GAIA (brown dwarfs)

Planetary Science Opportunities

- NEOS will observe millions of main belt asteroids
- MBAs will be seen ~50 times per year over 12 years, allowing for sparse light-curve inversion to get rotation periods and poles
- Near Earth Objects will be observed over a wide range of phase angles, allowing for thermal inertia determinations
- Rubin Observatory and NEOS are similar in sensitivity so albedos can be found for millions of asteroids
- Comets and comet trails are bright in the thermal IR
- Zodiacal light structures

Technological Opportunities

- **NEO Surveyor (and its predecessor NEOCam) have developed long-wavelength (~10.5 micron) cutoff arrays with background-limited performance in the zodiacal light at ~1 AU.**
  - These arrays require cooling to ~40 K which can be achieved with passive cooling:
    - Post-cyro COBE <45 K
    - Post-cyro WISE ~74 K
    - SPHEREx estimated <39 K
    - Post-cryo Spitzer ~28 K
    - Planck telescope ~36 K
- **These arrays could enable SMEX-size or smaller thermal IR missions aimed at wide-field time domain science**