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Precision formation flying of an OpticsSat with X-ray Phase Fresnel Lens (PFL) Optics and a DetectorSat with an X-ray camera forming a 1 km focal length X-ray telescope with 55 milli-arcsecond angular resolution and 8 arcsecond FoV.
ConOps

- Loose formation leaves perigee.
- Science formation forms in ~10 hr to 1 km focal length at 5 hr before apogee:
  - Thrusters keep image on X-ray camera within ± 5 mm for ±5 hr around apogee.
  - Navigation filter uses NISTEx-II star tracker & Nav sensors also imaging beacons on OpticsSat to obtain 53 mas telescope pointing resolution.
- Formation relaxes moving to perigee.
- Ground com occurs before perigee.
- Process repeats.

S-band radios provide inter-satellite data link and ranging. ~30 kbps ground com bandwidth around apogee. GPS positions and velocities available for entire orbit, resolution reduced above GPS constellation.

Spacecraft

DetectorSat:
Dry Mass: 72 kg
Wet Mass: 109 kg
Power: 48 W

OpticsSat:
Dry Mass: 9.7 kg
Wet Mass: 12 kg
Power: 24 W

Telemetry:
200 Mbits/orbit

VTXO AS³ Team

Principle Investigator: John Krizmanic¹
Science Team: Mike Corcoran², Alice Harding³, Chris Shrader²
Engineering Team: Neerav Shah³, Steve Stochaj⁴, Phil Calhoun³, Lloyd Purves³, Cassandra Webster³, Kyle Rankin⁴, Daniel Smith⁴, Asal Nasari⁵, Laura Boucheron⁴, Krishna Kota⁴, Hyeongun Park⁴

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AS³ Summary

Spacecraft, flight dynamics, and GN&C finalized in weeklong MPL study at Wallops.
SmallSats use components with flight heritage to the best extent possible.
NISTEx-II Interferometric star tracker operational on ISS STP-H6 platform.
Small charged particle radiation detector included to verify rad environment during science observations.
Mission costing performed by GSFC CEMA office using MPL-developed MELs and Price-H parametric cost model with cost risk analysis: Mission Cost estimate is ~40% above $35M.