Roman Community Forum

Mission Status

September 14, 2022

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Deputy Senior Project Scientist
Roman Mission Overview

- **Mission Description**
  - 2.4m Primary Mirror
  - Class A, with tailoring
  - 5-year primary mission, 10-year goal
- **Mission Orbit**
  - Quasi-Halo Orbit about Sun-Earth L2, with no Moon or Earth Shadows

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- **Mission Elements Responsibility**
  - **Flight Segment**
    - Launch Vehicle & Services: NASA Launch Services Program (LSP)
    - NASA GSFC Space Flight Center (GSFC)
    - Optical Telescope Assembly (OTA): L3Harris
    - Wide Field Instrument (WFI): NASA GSFC & Ball Aerospace
    - Coronagraph Instrument (CGI)*: NASA Jet Propulsion Laboratory (JPL)
    - Instrument Carrier (IC): NASA GSFC
  - **Ground Segment**
    - Ground Stations/Networks: NASA SCaN / International Contributors
    - NASA GSFC
    - Flight Dynamics Operations Area (FDOA)
    - NASA GSFC Flight Dynamics Facility (FDF)
    - Science Operations Center (SOC)
    - Space Telescope Science Institute (STScI)
    - Science Support Center (SSC)
    - Infrared Processing and Analysis Center (IPAC)
    - Coronagraph Technology Center (CTC): NASA Jet Propulsion Laboratory (JPL)

- **Observing Zone**
  - 54° - 126° off Sun Line
  - 360° about Sun Line
  - ±15° about line of sight (LOS) off max power roll angle

- **The Roman field of regard (FOR)** provides ~60% total sky coverage each day (72 deg swath with 360 deg rotation)

- **Observing Zone**: HLTD fields fixed fields ±20° off of the ecliptic poles, located in continuous viewing zone (CVZ)
  - Galactic Bulge (Available twice yearly)
  - Earth/Moon LOS avoidance angles are a minor sporadic constraint
  - Galactic Bulge (GB) fields accessible for 72 days, twice a year

*CGI is managed by NASA HQ

*NASA GSFC (Greenbelt, MD); L3Harris (Rochester, NY); Ball Aerospace (Boulder, CO); NASA JPL (Pasadena, CA); STScI (Baltimore, MD); IPAC (Pasadena, CA)*

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Roman Space Telescope Community Forum - Kruk

09/14/2022
Ground Segment Architecture

CMD – Command; TLM – Telemetry; TRK – Tracking; HK – Housekeeping; SCI – Science; SITs – Science Investigation Teams;
DAPHNE – Data Acquisition Processing and Handling Network Environment; GI – General Investigator; CPP – Community Participating Program

Science Users & Community
SITs, Public, GI

JPL Project
Science Team
CPP

Coronagraph Technology Center
(CTC) – NASA/JPL

Science Operations Center
(SOC) - STScI

Science Support Center
(SSC) – IPAC/Caltech

Flight Dynamics Operations Area
(FDOA) – NASA/GSFC

Mission Operations Center
(MOC) – NASA/GSFC

Observatory Commands

Acquisition & Tracking Data

Housekeeping Data

Observation & Operations Planning Products, Calibrated Engineering Data

Calibrated Engineering Data

CGI Command Products

SR (Launch Support):
S-Band (CMD/TLM)

DAPHNE:

NSN-WS: S-Band (CMD/TLM/TRK); Ka-Band (SCI)
ESA-NN03: Ka-Band (SCI)
JAXA-MDSS: Ka-Band (SCI)
DSN: S-Band (CMD/TLM/TRK)

JPL Project Science Team
CGI Observation Planning

Archive

GI/Theory Proposals, Data Product Support

CGI Observation Planning, Calibrated Engineering Data

WFI Observation Planning, WFI/CGI Data Products

CGI Observation Planning, WFI/CGI Data Products

Catalog

Calibrated Engineering Data

Observation & Operations Planning Products, Calibrated Engineering Data

Calibrated Engineering Data

GI/Theory Proposals, Data Product Support

CGI Command Products
**Observatory Description**

**Expanded View**

**Observatory = Spacecraft + Integrated Payload Assembly**
We have completed 10 of the 14 years from start of Development to Launch
Project schedule and budget are consistent with Management Agreement, with all required margins
Mission Status

• Flight Hardware
  – Design, fabrication, test of engineering units completed by Mission Critical Design Review, just under a year ago
  – Flight systems now being fabricated and tested at component level
  – Completion of payload elements planned for early 2024
    • Telescope, instrument carrier, wide-field instrument, coronagraph
  – Completion of spacecraft, outer barrel assembly, solar arrays, etc planned for early-mid 2025
  – All elements will be fully-tested prior to delivery to Observatory I&T (Phase D)

• Ground System
  – Mission Ops Center (GSFC), Science Operations Center (STScI), Science Support Center (IPAC), ground stations (White Sands, ESA, JAXA)
    • All in similar stage of development
All optics fabricated, coated, mounted, tested
Most structural elements fabricated
Thermo-electric hardware in midst of installation
Primary and secondary mirror assemblies complete
Relay optics for WFI, CGI in various stages of test
Spacecraft

- Structural components beginning to arrive (central cylinder, avionics panels, Comm deck - rest due in coming months)
- Solar array substrate panels, Propulsion system components beginning to arrive
- Antenna pointing system components being assembled
- Antenna, Ka transmitter undergoing environmental tests
- Reaction wheels about to begin environmental testing
- Avionics in various stages of assembly

Receiving Central Cylinder in B.5 high bay for Spacecraft Bus

Roughly 1 ½ m tall by 2 ½ m across
Science Performance

- We now have measured mirror reflectivities, detector QE, filter transmission (and out-of-band rejection)
- Mirror surface figures meet specs at ambient (cold tests coming)
- Structure mechanical and thermal properties match model inputs
- All predictions for survey efficiency, optical performance, etc presented to date are consistent with measured properties of the observatory