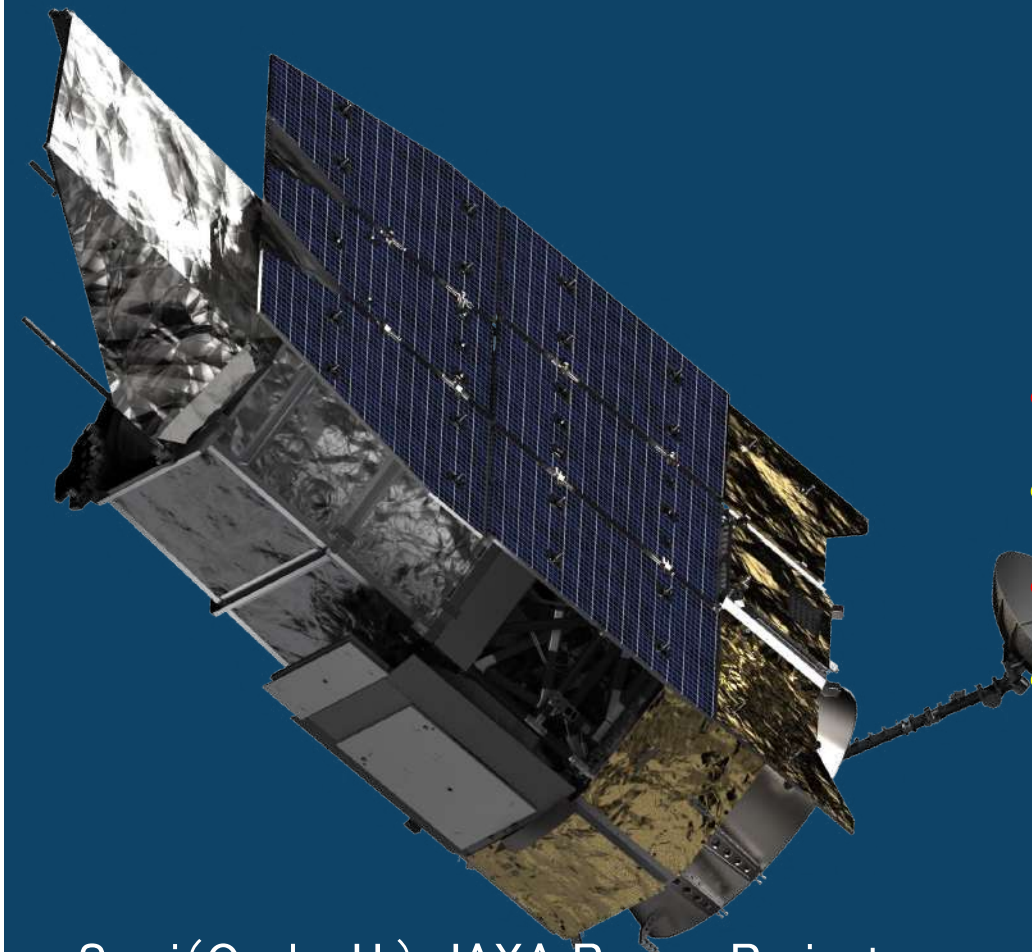
Roman Space Telescope

Recommended by Decadal survey astro2010
NASA's flagship mission following HST, JWST

Launch in 2026



- Dark Energy
- Exoplanet Microlensing
- Exoplanet Coronagraph
- Guest Observing Program
  (25%,1.5yrs)

Sumi（Osaka U.） JAXA Roman Project

Roman Space Telescope

Diameter: 2.4m given from NRO (National Reconnaissance Office)

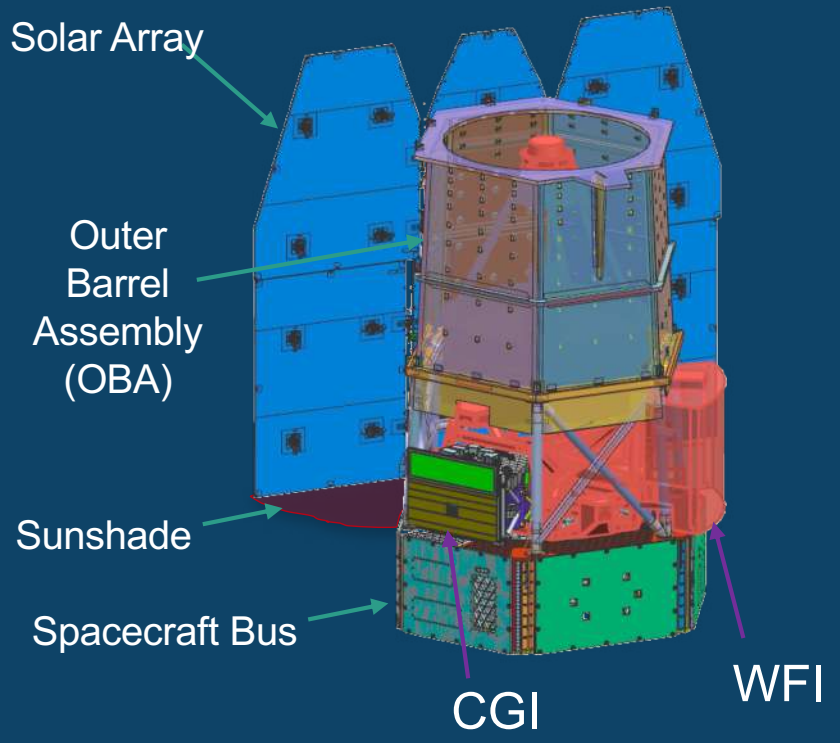
Wavelength: λ =0.6–2 μ m

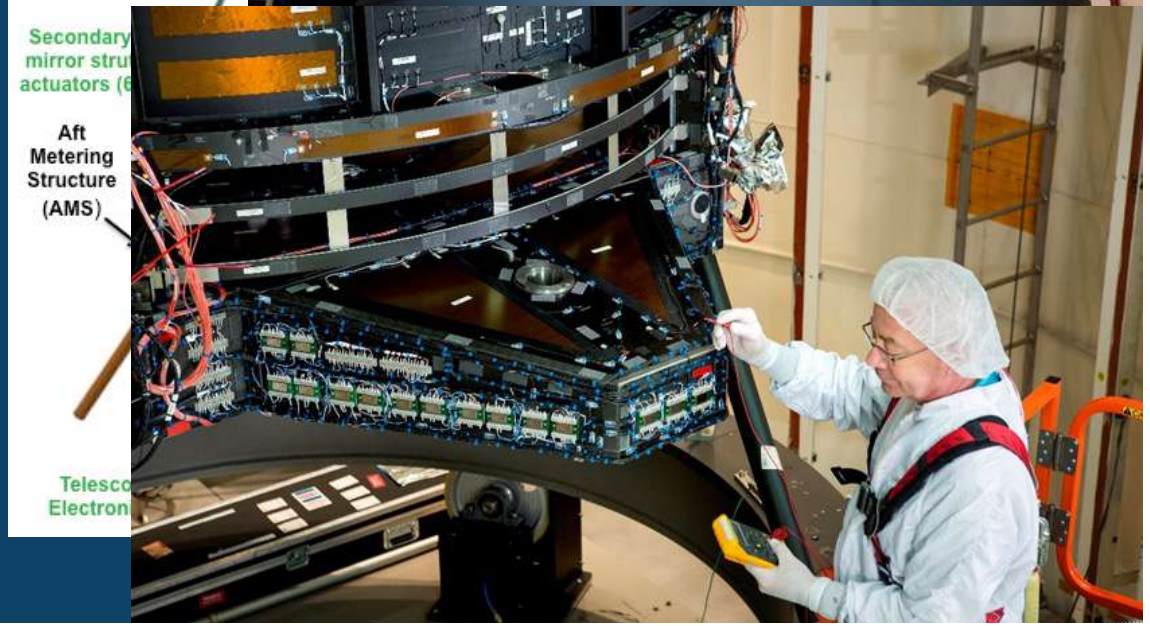
Wide Field Inst. (WFI)(FOV：0.281deg.^{2})

Coronagraph Inst. (CGI)

Orbit: L2

Mission life time: 5 years: Serviceable





NASA Roman Project Status

- Launch Vehicle selection process completed; SpaceX (falcon heavy) awarded launch contract

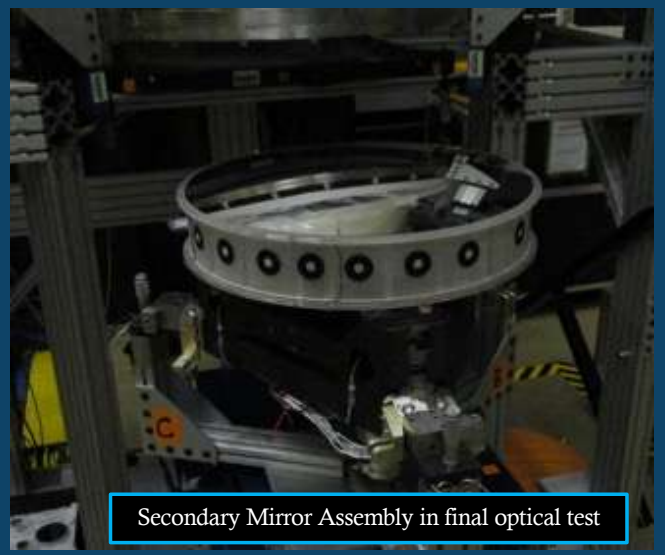
- Telescope
  - All optics coated, currently in integration, assembly and test of optical telescope assembly
- Spacecraft
  - Procurement of flight subsystems underway (all contracts awarded)
  - Initial delivery of panels and portions of S/C structure, expect receipt of flight hardware through end of CY
  - First ESA contribution to Roman (star trackers) being shipped
- Ground system
  - Construction started (groundbreaking) for dedicated ESA antenna at New Norcia, AU
  - Requirement review passed for dedicated antenna at White Sands, NM

Telescope

- 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


Primary Mirror Assembly (PMA) in the Modal Test


Forward Metering Shell (FMS)

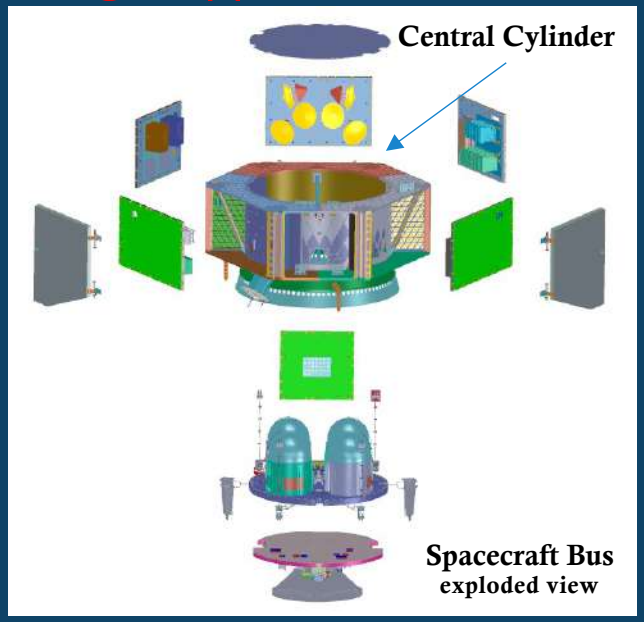

Secondary Mirror Assembly in final optical test

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
- First ESA contribution to Roman (star trackers) being shipped

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

Roughly 1 ½ m tall
by 2 ½ m across

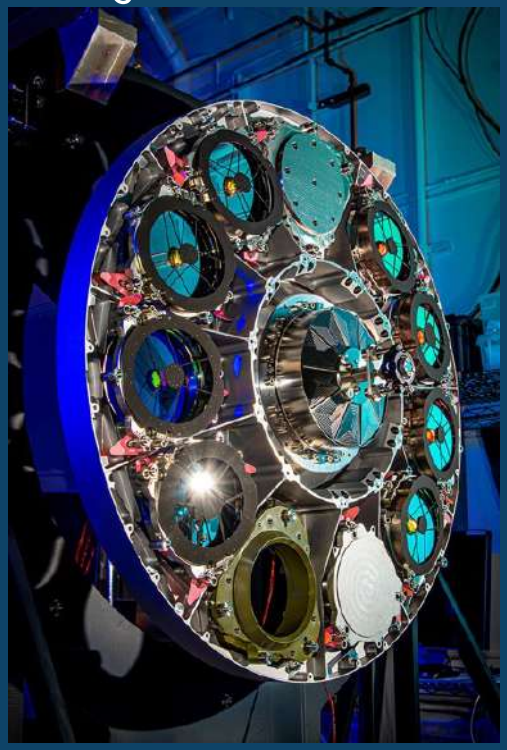


Wide Field Instrument (WFI)

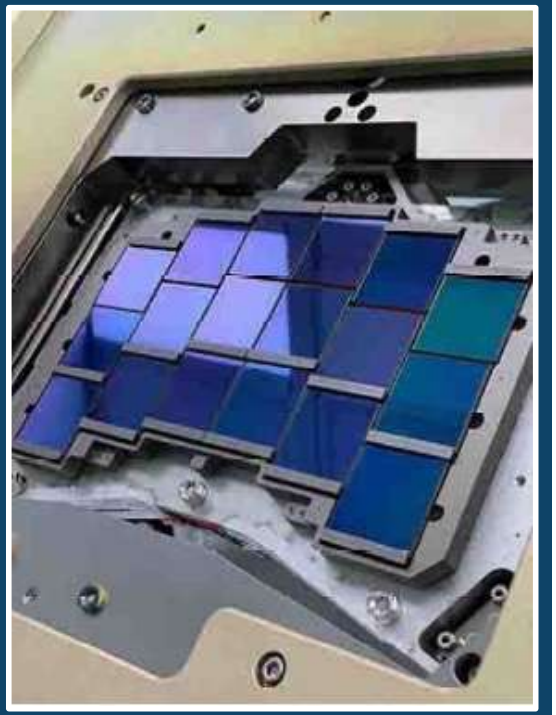
- Optical bench through vibration testing, Ball portion starting assembly
- Element wheel through testing, flight filters to be installed soon
- Flight detectors.18 selected. characterized, installed, & aligned in flight mosaic plate
- Flight electronics being assembled, engineering test unit electronics testing completed
- Flight grism, prism completed;
- relative calibration system in fabrication & assembly

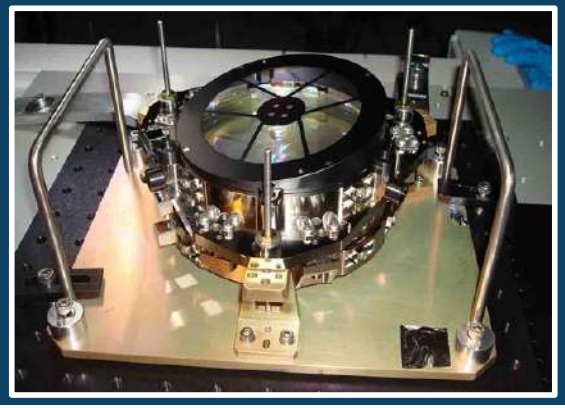
Flight optical bench

Flight EWA with Filters



Flight focal plane array

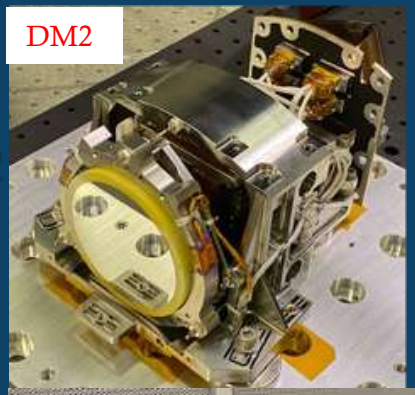


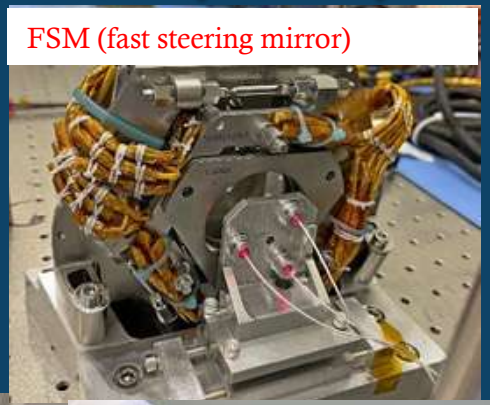


Flight Grism assembly

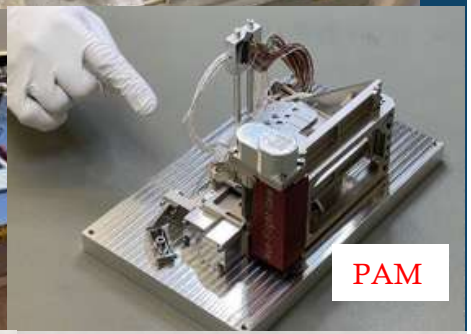
Roman Coronagraph Instrument (CGI)

- Coronagraph Instrument passed its System Integration review successfully on June 14 2022
- Most assembly-level hardware delivered. CGI Flight Assemblies now in Final Assembly and Testing Phase
- Both flight DMs are assembled. Vibe and TVAC thermal cycling tests completed successfully. Performance stability tests on-going
- Both flight cameras (ExCam and LoCam) assembled and shielded. Completed decontamination bake, thermal balance and waveform optimization. Next are vibe and TVAC tests
- All Precision Alignment Mechanisms (PAMs) completed testing at MPIA and received at JPL. Starting to bond components
- All flight coronagraph masks completed and selected in May 2022
- Flight optical bench coming together rapidly! OAPs and other static optics have been installed. Total wavefront error from these components is >2x better than the reqt (14.1nm vs 39.7nm)

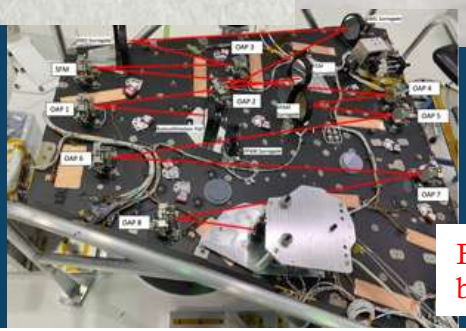

DM2


FSM (fast steering mirror)


ExCam and LoCam


PAM


HLC Masks


Flight Optical bench

JAXA Roman project status

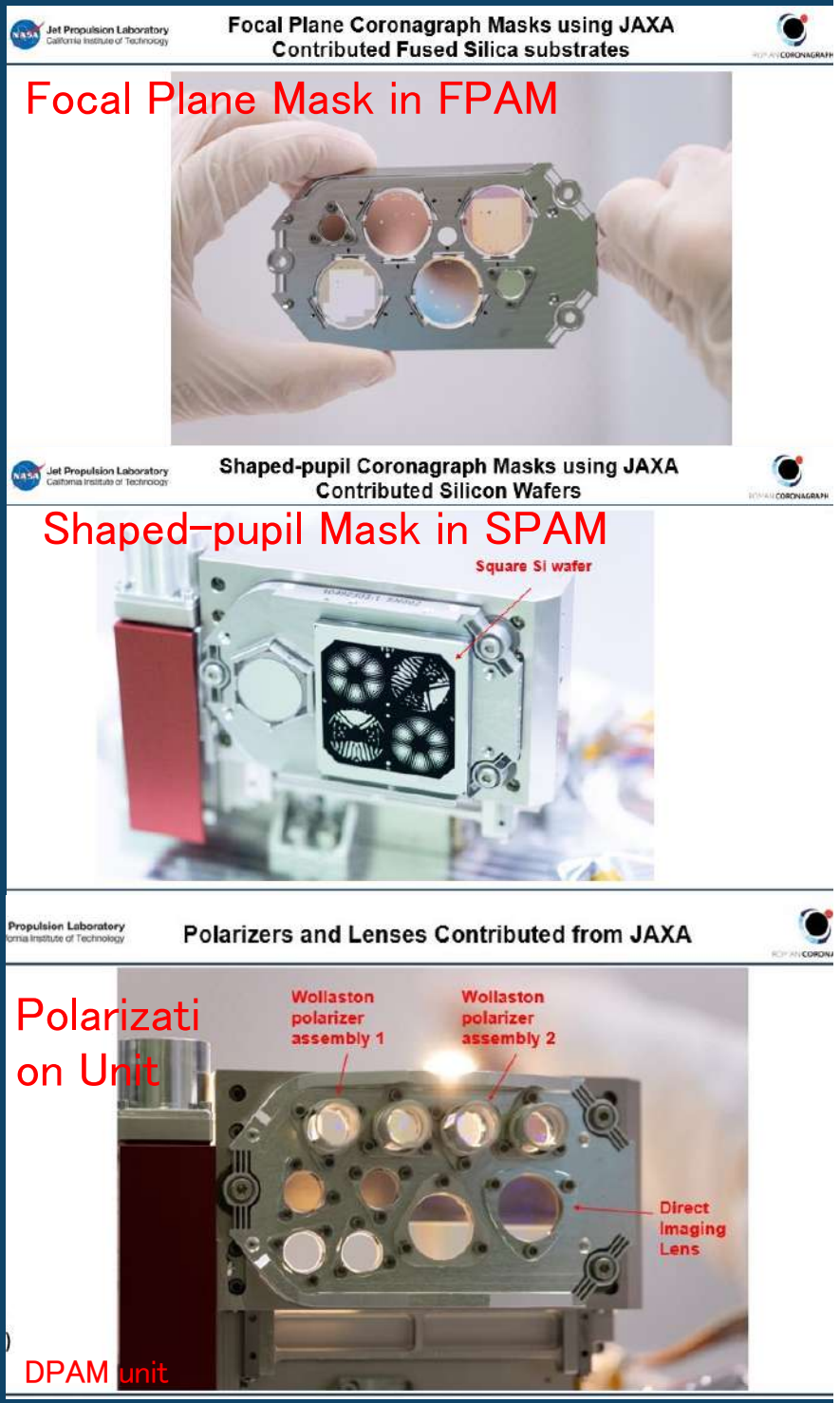
- All in progress well

- 2022/04 JAXA Roman pre-project passed
  - System Requirements Review
  - System Definition Review
  - JAXA ISAS Project Transition Review

Roman “project” has officially been approved

Coronagraph Instrument: JAXA contribution

- **High precision mask substrates** have been delivered to NASA and tested.
- **Flight & backup masks have been fabricated in NASA by using JAXA's substrate.**
- Assembled to optical interface ("FPAM","SPAM"). Optical test in progress
- **Polarization Unit (Wollastron Prisms and camera Lenses are designed and fabricated in Japan)**
- **Delivered to NASA and tested**
- **Assembled to optical interface** ("DPAM"). optical test in progress



Ground station

■Construction started for dedicated ESA antenna at New Norcia, AU
■Req'ts review passed for dedicated NASA antenna at White Sands, NM

■JAXA Ground station : Misasa 54m Station

- Data rate:20,000 Tbyte/5yr (11Tbyte/day) 700xHST (172Tbyte/30yr by HST)
- **250 Mbps data downlink.(Goal of 500 Mbps) 100x existing satellite at L2**
- **Ka-band 26.7 GHz.**

Status:

- 2022/06 Started to develop subsystems for Ka-band reception system at Misasa station.
- Production will be completed by the first quarter of FY2024
- Complete the test by the end of FY2024
- Coordinating Interface and test plans between NASA and satellite-ground stations and between ground stations (Misasa station NASA operation station) to be developed by FY2022
- The operational availability rat is being studied using atmospheric models and data in the Ka band (32 GHz) for which data is currently available.

Science team: Three Opportunities

- **Wide Field Instrument Science (WFS)**
  - This opportunity provides support to prepare for and enhance the science return of *Roman* that can be addressed with its Wide Field Instrument (WFI).
  - Multiple calls between now and launch (every two years)
  - Regular and Large categories
- **WFI Project Infrastructure Teams (PIT)**
  - This opportunity provides sustained funding for teams to work in partnership with the science centers to develop infrastructure needed to enable the community to pursue *Roman*'s ambitious science goals in cosmology and exoplanet demographics that are part of Roman's mission success criteria.
  - Additional science areas that require extensive and sustained infrastructure development will also be considered.
- **Coronagraph Community Participation Program (CPP)**
  - This provides an opportunity for proposers to work with the coronagraph instrument team to plan and execute its technology demonstration observations.
  - Multiple calls between now and launch

January 20: NOI due
March 21: Proposal due

Call for Community Input into the Definition of the Roman Space Telescope's Core Community Surveys

- Core Community Survey(CCS):
  - High Latitude Wide Area survey,
  - High Latitude Time Domain survey
  - Galactic Bulge Time Domain survey

Basic survey pan have been considered by previous SIT. Now asking for input for the detail survey plan to maximize not only key sciences but also other sciences.

Two avenues to respond to the initial request for community input

●Science pitch plus questionnaire (deadline:2/17)

•1-2 paragraphs "pitching" a science investigation that could be done with an appropriately configured CCS

•an associated questionnaire to collect *high level* input on important survey characteristics for a given science pitch (e.g., survey area, depth, filters, cadence, etc.)

boundary condition: mission requirement for cosmology & exoplanet demographycs

●White paper (deadline: late spring 2023)

White papers – several page document with details on science case, sketch of survey design and methods/metrics on how to evaluate science FOM against survey parameters

•Community members can respond to one or the other or both.

•All inputs will be given to the CCS definition committees (form in late spring 2023).

General Investigator Program

- First General Investigator proposal opportunity one year prior to launch, and annually thereafter which provides:
  - funding to conduct Roman science investigations
  - and/or new general astrophysics surveys
  - No proprietary period for any Roman science data

Schedule

- **Roman progressing; remains within cost & schedule commitments**
- **For more information**
  - https://roman.gsfc.nasa.gov/science/roses.html

Summary

- JAXA Roman Project passed Transition Review
  ->Roman project officially started
- Japanese contributions on schedule
  1) Subaru-Roman Synergy Survey — in prep.
  2) Ground microlensing obs. — Commissioning
  3) Coronagraph Instrument — assembled
  4) Ground station — Started developing

- NASA Roman Flight model fabrication and test on schedule(launch Oct 2026)
- **Call for Science teams**
- **Call for Community Input into the Definition of the Roman Core Community Surveys**