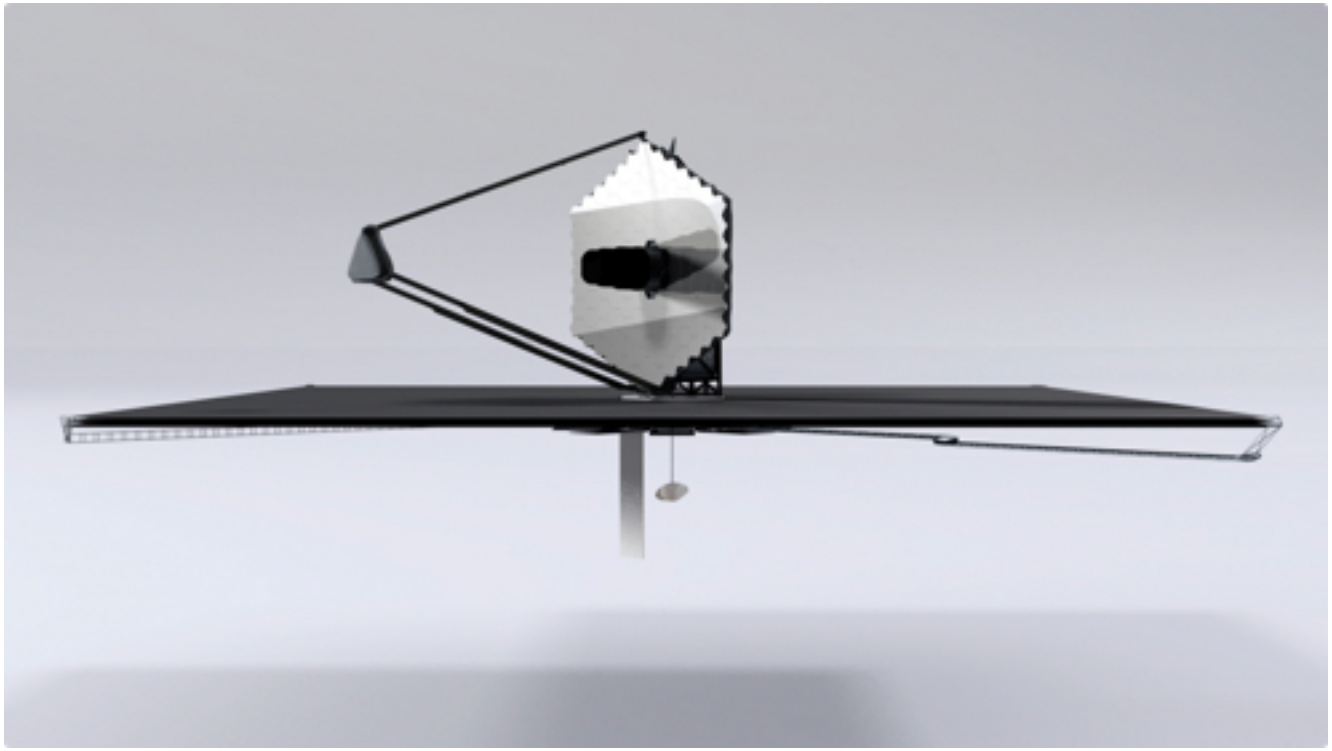
(Gaia)
WSO-UV
WFIRST
LUVOIR
HabEx
etc.



carmenes

CENTRO DE ASTROBIOLOGÍA
CSIC - INTA

EXCELENCIA
MARÍA
DE MAEZTU

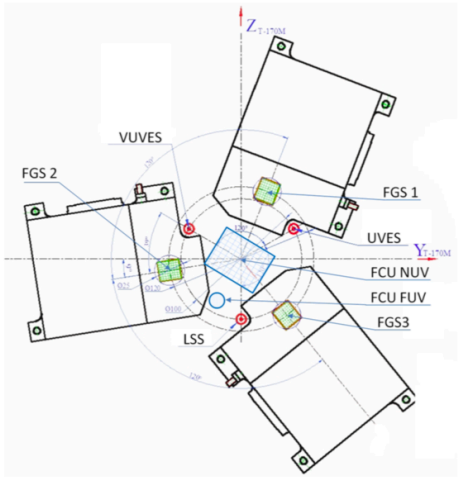
José A. Caballero
CAB (CSIC-INTA)

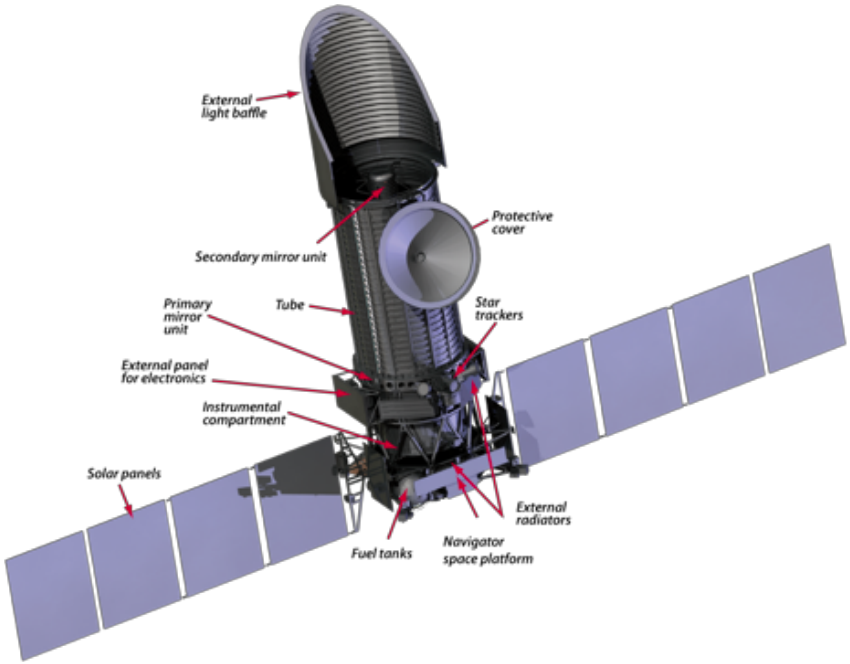
BajaMasa RecGaia research lines

- **EXOS:** exoplanetary systems
  - EXOS-1: astrometry of known systems
  - EXOS-2: radial velocity of new systems
  - EXOS-3: detailed characterisation
- **MLT:** ultracool dwarfs
  - MLT-1: late M (H-R diagrams, kinematics…)
  - MLT-2: L and T (isolated or companions)
- **YBD:** young brown dwarfs
  - Bottom of the (I)MF in young open clusters and stellar associations

World Space Observatory - UltraViolet

- Russian *Spektr-UV*
- Telescope 1.7 m
- VUVES (115-176 nm) and UVES (174-310 nm): R=50,000 échelle spectrographs
- LSS (115-315 nm): R=1,000 long-slit spectrograph
- FCU (Lyα-Hα): 146 mas-resolution field camera unit (broad, mid, narrow; FUV: MCP; UVO: CCD 10.0x7.5 arcmin^2)





World Space Observatory - UltraViolet

World Space Observatory - UltraViolet

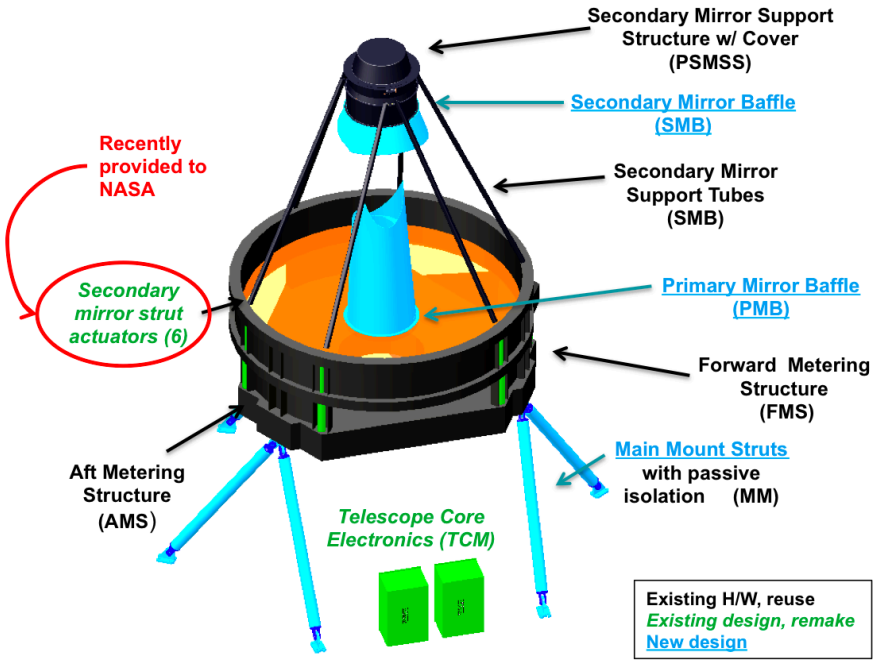
- Core Programme Proposals (**Spain+Russia**) deadline passed
- Dimitry Bisikalo et al. (INASAN): exoplanet atmospheres (Lyα…)
- Russia+Japan: proposed stellar imaging coronograph and exoplanet coronal spectrometer…
- *Spektr-RG* (eROSITA): June 2019
- WSO-UV launch: 2024?

WFIRST

- *Wide-Field Infrared Survey Telescope*
- 2.4 m (one of two KH-11 Kennen donated by NRO to NASA)
- Heritage of Joint Dark Energy Mission and WFIRST-ATCA
- Wide-Field Instrument: 0.48-2.0 μm, 110 mas-resolution and f.o.v = 0.281 deg^2… (+grism and integral field spectrograph)
- Coronograph Instrument: 0.43-0.98 μm, 10^{-9} contrast…

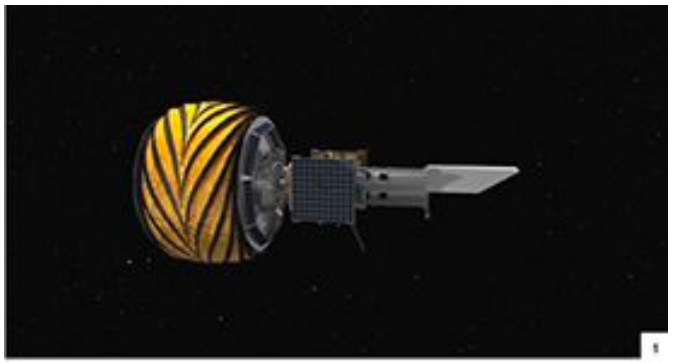
WFIRST

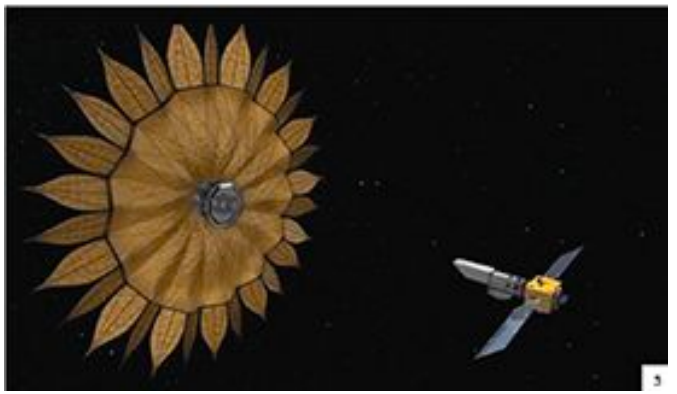
- 2018 March: approved by US Congress
- 2018 May: Ball Aerospace, WFI opto-mechanical assembly: 113.2 M$
- 2018 June: Teledyne, short-wave IR sensor chip assembly: 23 M$
- 2018 November: Harris Corp., optical telescope assembly: 195.9 M$



WFIRST

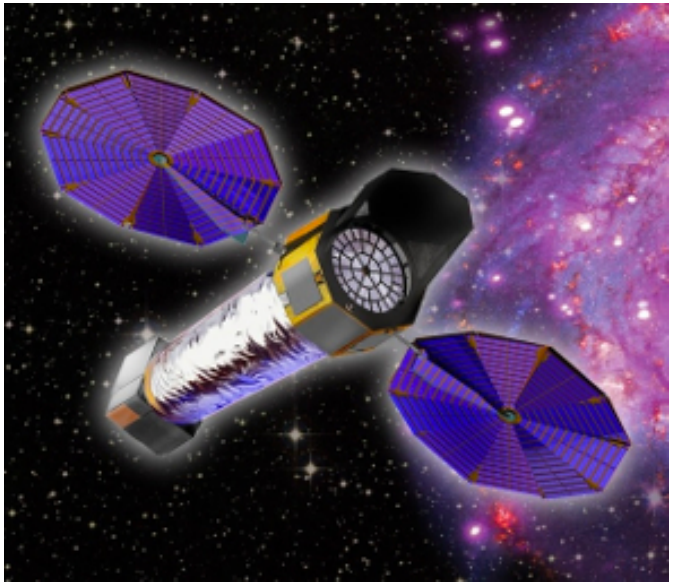
- JAXA: polarimeter
- ESA: coronograph, spacecraft, ground segment
- CNES: …
- DLR: …
- MPIA: coronograph masks filter wheel!
- Launch: 2027+
- Halo orbit in L2: future starshade (stellar occulter)?

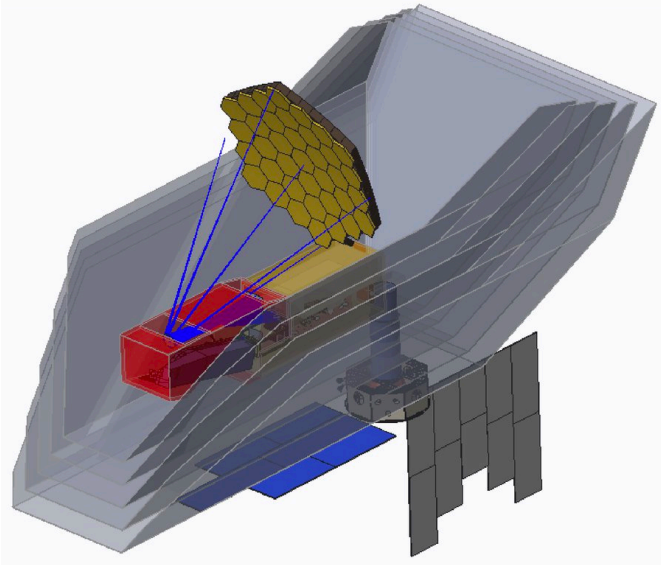




Next Great Observatory

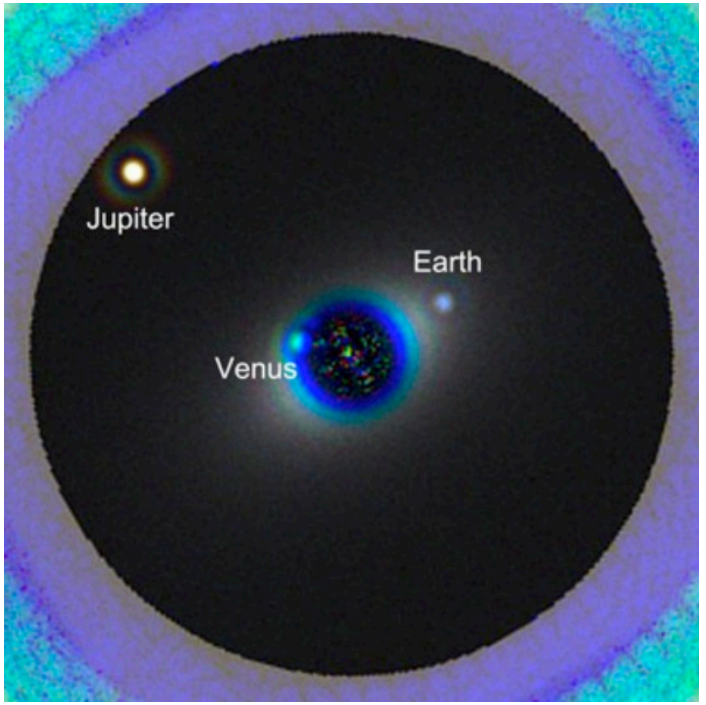
- *Hubble* 1990
- *Compton* GRO 1991
- *Chandra* 1999
- *Spitzer* 2003
- *James Webb* 2021+
- *WFIRST* 2027+
- Next Great Observatory (Large Strategic Science Mission) 2035+:
  - Lynx X-ray Surveyor (50 x CXO)
  - Origins Space Telescope
  - LUVOIR
  - HabEx

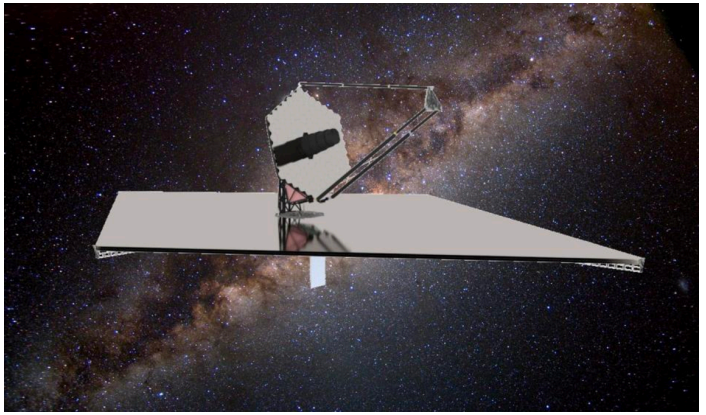




LUVOIR

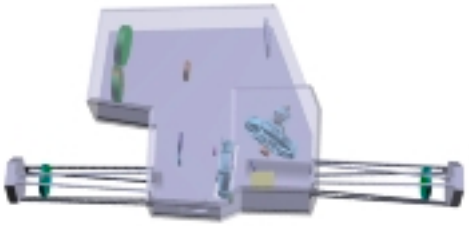
- *Large UltraViolet Optical Infrared surveyor*
- 15 m (A: SLS), 8 m (B)
- **ECLIPS**: Extreme Coronograph for LIving Planetary Systems; 0.20-2.0 μm, 10^{-10} contrast (three channels)
- HDI: High-Definition Imager
- LUMOS: multi-object spectrograph (100 x STIS)
- POLLUX: spectropolarimeter 0.09-0.40 μm, R=120,000 (CNES + 9 ESA countries, inc. Spain)

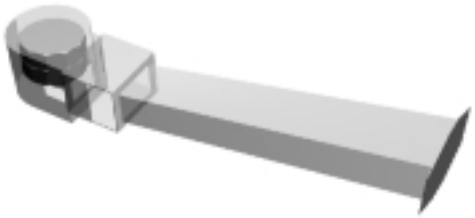


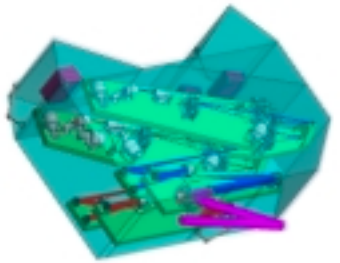


HabEx

- *Habitable Exoplanet Imaging Mission*
- 4 m, 0.115 μm to 1.8 μm
- Workhorse camera (UV-VIS-NIR+grisms), hi-res UV spectrograph, coronograph, starshade
- O_2 0.69,0.76 μm, H_2O 1.13,1.41 μm, O_3
- International STDT members: Prusti (ESA), Quirrenbach (DLR), Mouillet (CNES), Marois (CSA), Tamura (JAXA)







And ESA?

- WFIRST not in official ESA programme
- NASA selects new great observatory in 2020
- "White paper" on a future space telescope for exoplanets (Quirrenbach et al. 2015)…
- Too many exoplanet missions? (JWST, CHEOPS, ARIEL, PLATO)
- NASA+ESA+JAXA+CSA?
- Back to the future? (flotilla of microsatellites…)