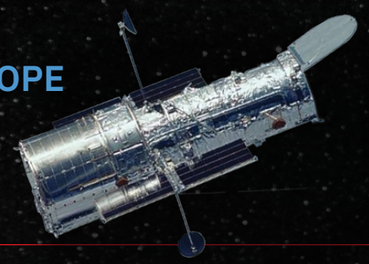
NASA SPACE TELESCOPE IMAGING TECHNOLOGY

L3HARRIS

HUBBLE SPACE TELESCOPE
"THE FORERUNNER"

L3HARRIS ROLE:
Provided fine guidance and focus control systems and 2.4m backup mirror



MISSION

Better understand the age of the universe

FACTS

> Completed more than 1.3 MILLION OBSERVATIONS
> Traveled 4+ BILLION MILES on low Earth orbit
> Discovered that the universe is approximately 13.7 BILLION YEARS OLD

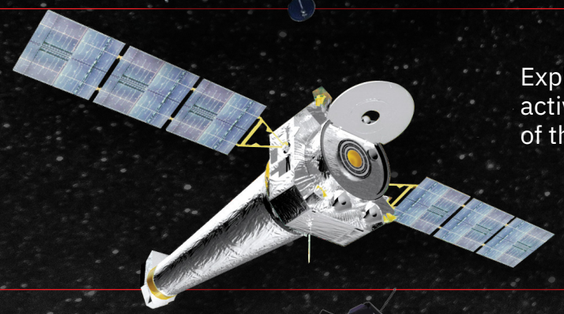
4+ BILLION MILES

ENABLING TECHNOLOGY

> Wide Field and Planetary Camera
> Goddard High Resolution Spectrograph
> High Speed Photometer
> Faint Object Camera & Spectrograph

CHANDRA X-RAY OBSERVATORY
"THE DETECTIVE"

L3HARRIS ROLE:
Designed, integrated and tested imaging system



Explain the structure, activity and evolution of the universe

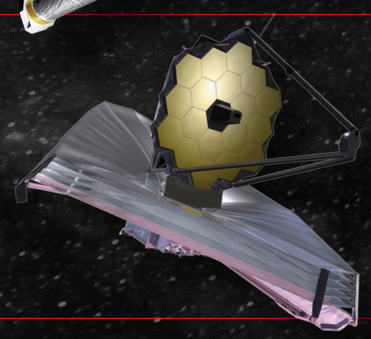
> Uses X-RAY VISION to detect extremely hot, high-energy regions of space
> Flies 200 TIMES HIGHER than Hubble – more than 1/3 of the way to the moon
> Provides data on quasars as they were 10 BILLION YEARS AGO

X-RAY VISION

> High Resolution Camera
> Advanced CCD Imaging Spectrometer
> High Energy Transmission Grating Spectrometer
> Low Energy Transmission Grating Spectrometer

JAMES WEBB SPACE TELESCOPE
"THE HISTORIAN"

L3HARRIS ROLE:
Integrated optical telescope element and Integrated Science Instrument Module, designed and facilitated cryogenic testing



Observe distant events and objects, such as the formation of the first galaxies, stars and planets in the universe

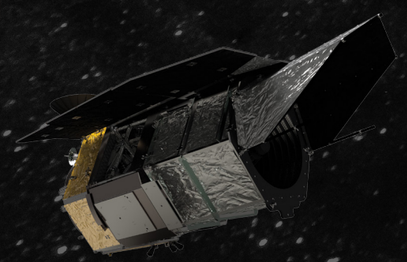
> Will be the MOST POWERFUL space telescope ever
> Will balance between gravity of Earth and sun 940,000 MILES IN SPACE
> 6.5-METER MIRROR made of 18 gold-coated beryllium segments

MOST POWERFUL

> Near-Infrared Camera
> Near-Infrared Spectrograph
> Mid-Infrared Instrument
> Fine Guidance Sensor/Near InfraRed Imager and Slitless Spectrograph

NANCY GRACE ROMAN SPACE TELESCOPE
"THE CARTOGRAPHER"

L3HARRIS ROLE:
Repurpose the telescope to meet mission requirements, develop instrument enabling hardware, integrate and test to validate performance



Uncover information on dark energy, dark matter, exoplanets and infrared astrophysics – some of the most enduring mysteries of the universe

> Will provide images of ICE AND GAS EXOPLANETS around nearby stars
> Expected to observe more than 1 BILLION GALAXIES, 2,000 SUPERNOVAS AND 2,000 EXOPLANETS
> Should uncover MILLIONS OF NEW GALAXIES, many early in development

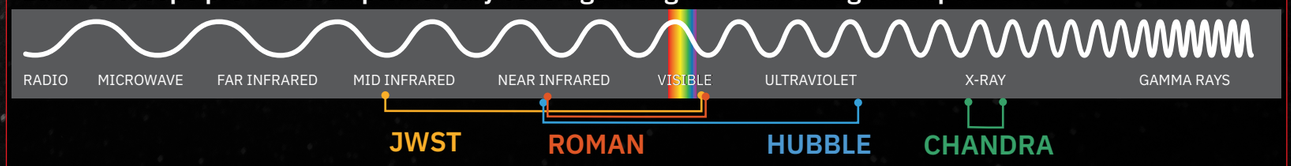
NEW GALAXIES

> Wide Field Instrument
> Coronagraph
> High Stability Thermal Control

	Launch & First Light (yr)	Mirror Size (m)	View Distance (ly)	Field of View	Wavelength
HUBBLE	1990*	2.4	13.4 billion years ago	narrow	long
CHANDRA	1999	0.6 - 1.2	10 billion years ago	narrow	short*
WEBB	2021	6.5*	13.5 billion years ago*	narrow	long
ROMAN	mid-2020s	2.4	13.2 billion years ago	wide*	long

*Distinguishing feature

Each telescope provides complementary coverage along the electromagnetic spectrum



L3Harris.com | #L3Harris