

# Workshop on Transients

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# Transients

- Variety of Transients and short term variability
- Aim to find our strength in a subset of transients
- How to extract maximum scientific outcome in view of upcoming as well as current telescopes.

# Upcoming facilities (Optical/IR/UV)

- James Webb Space Telescope (JWST) - 2018
- Thirty Meter Telescope (TMT), Hawaii- 2020
- Giant Magellan Telescope (GMT), Chile - 2021
- Large Synoptic Survey Telescope (LSST), Chile - 2021
- European Extremely Large Telescope (E-ELT), Chile -2024

# Upcoming facilities- High energy missions

- Advanced Telescope for High Energy Astrophysics (Athena), successor for XMM-Newton- 2028
- Square meter resolution arcsecond X-ray telescope (SMART-X), successor for Chandra -2020s
- Space-based multi-band astronomical Variable Objects Monitor (SVOM- Chinese French mission for GRBs), successor for Swift: Later this decade

# Upcoming facilities - Radio

- u-GMRT
- Square Kilometer Array and precursors
- SKA I 2020
- MeerKAT (0.58-14.5 GHz)
- ASKAP (700-1800 MHz)

# Indian facilities

- AstroSAT
- u-GMRT
- National Large Solar Telescope - Laddakh
- LIGO-India

# Wireless

- Name: ASI2015
- Password: asi@ncra

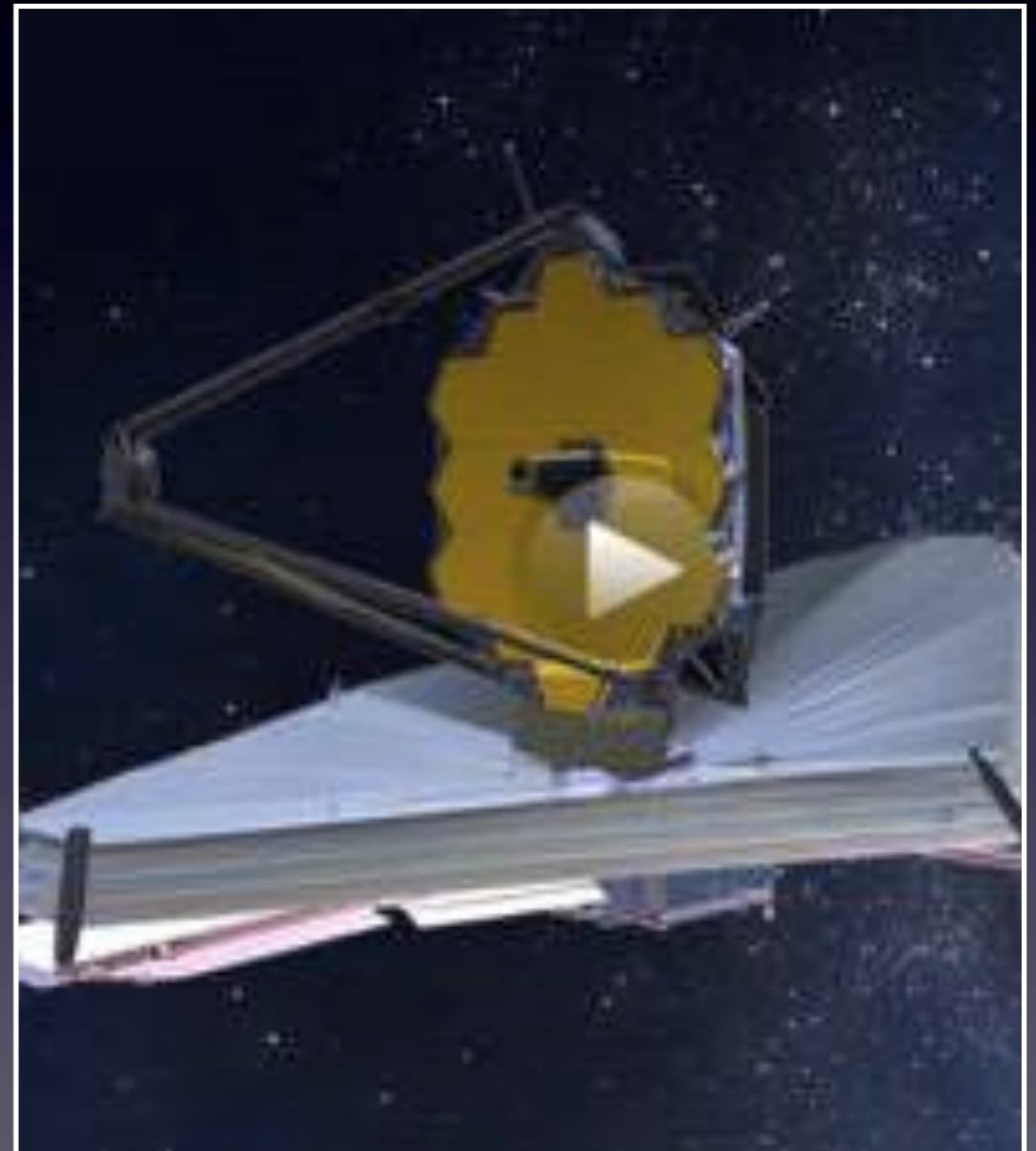
# Upcoming facilities

- IR/Optical missions
- High Energy missions
- Solar missions
- Radio missions



# James Webb Space Telescope (JWST) - 2018

- mid-IR, 6.5m mirror
- See the first light following big bang.
- Formation of first stars and their supernovae
- Afterglow of high-z GRBs



# Thirty Meter Telescope (TMT) - 2020

- Mauna Kea Observatory, Hawaii
- Near-UV till mid-IR
- Segmented mirror reflecting telescope
- 1.44m hexagonal mirrors- 30m diameter



Courtesy TMT Observatory Corporation

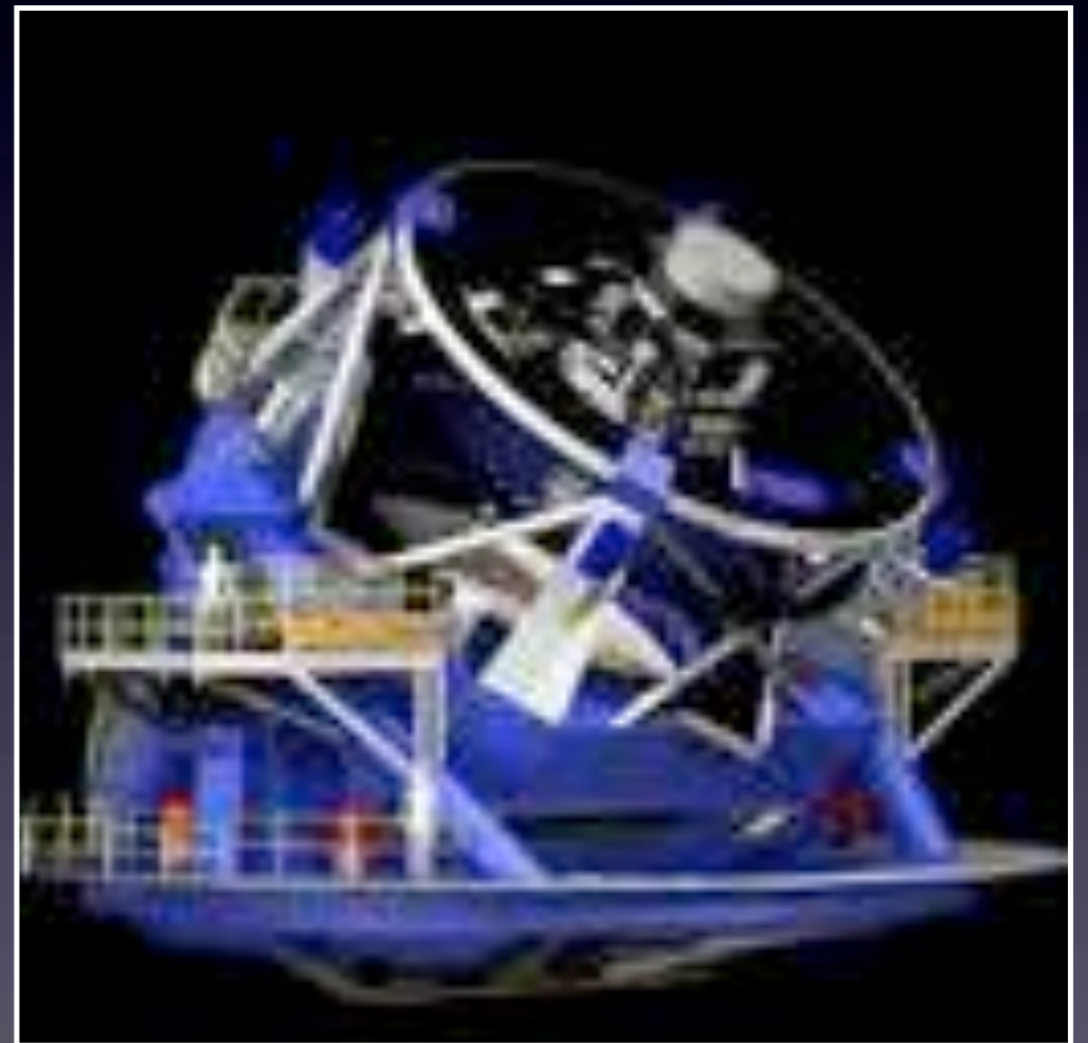
# Giant Magellan Telescope (GMT) - 2021

- Las Campanas Observatory, Chile
- 7 8.4m primary mirrors
- resolution power of 24.5m mirror
- Adaptive optics



# Large Synoptic Survey Telescope (LSST) -

- Wide field survey telescope at El Penon peak, Chile
- Entire sky every few nights
- Meant for transients
- Primary mirror 8.4m, secondary 3.4m and tertiary 5m diameters



# European Extremely Large Telescope (E-ELT)

- In Paranal Observatory, Chile (site of VLT)
- 40-m class optical/NIR telescope
- 39.3m segmented primary mirror, 4.2m secondary
- Atmospheric distortions correction, adaptive optics

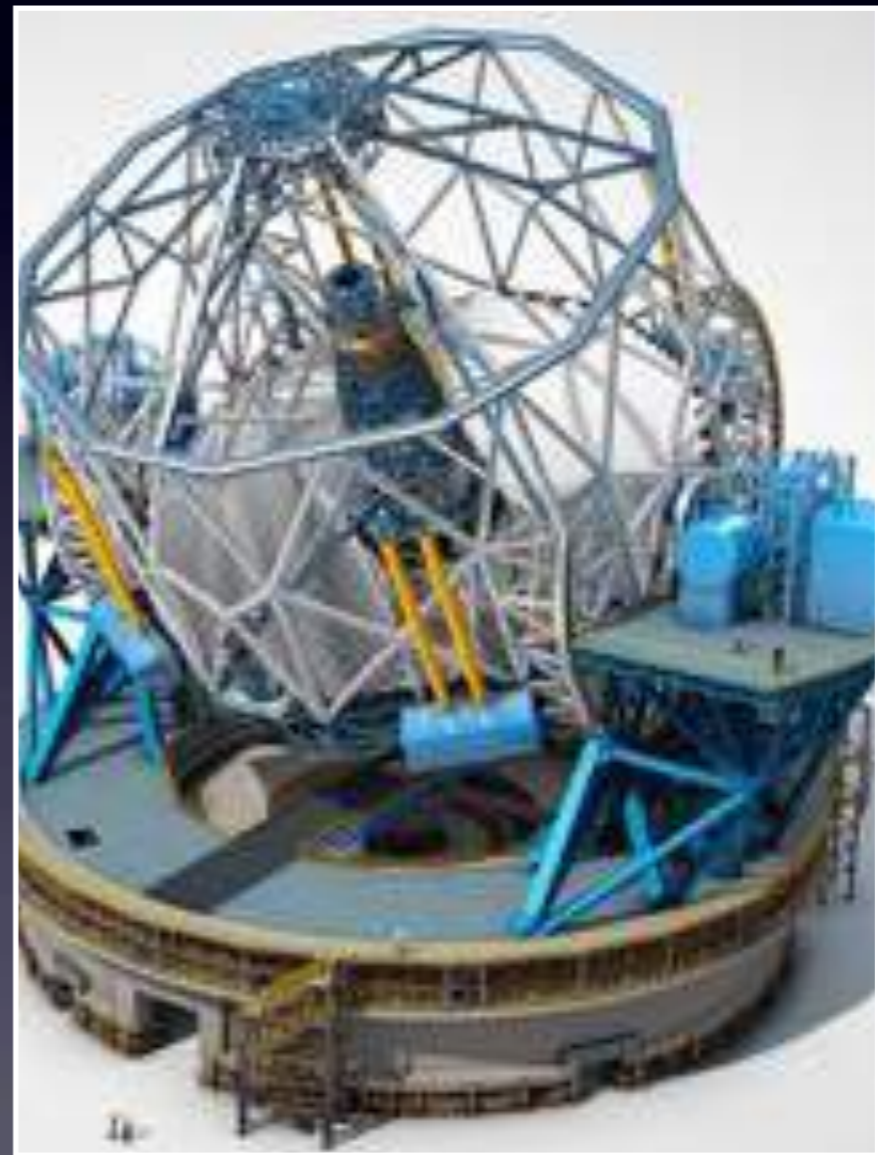


Image Credit: ESO

# Advanced Telescope for High Energy Astrophysics (Athena) - 2028

- International X-ray Observatory
- The largest X-ray telescope ever built
- Successor of XMM-Newton and Chandra
- 100 times more sensitive than Chandra and XMM



# Daniel K. Inouye Solar telescope

- By National Solar observatory in Maui, Hawaii
- Under Construction
- Unprecedented spatial, temporal and spectral resolution

# European Solar Telescope

- ~2020
- 4m class, to be located in Canary Islands, Spain
- Two dimensional spectral information to study magnetic coupling, upper chromosphere and deep photosphere



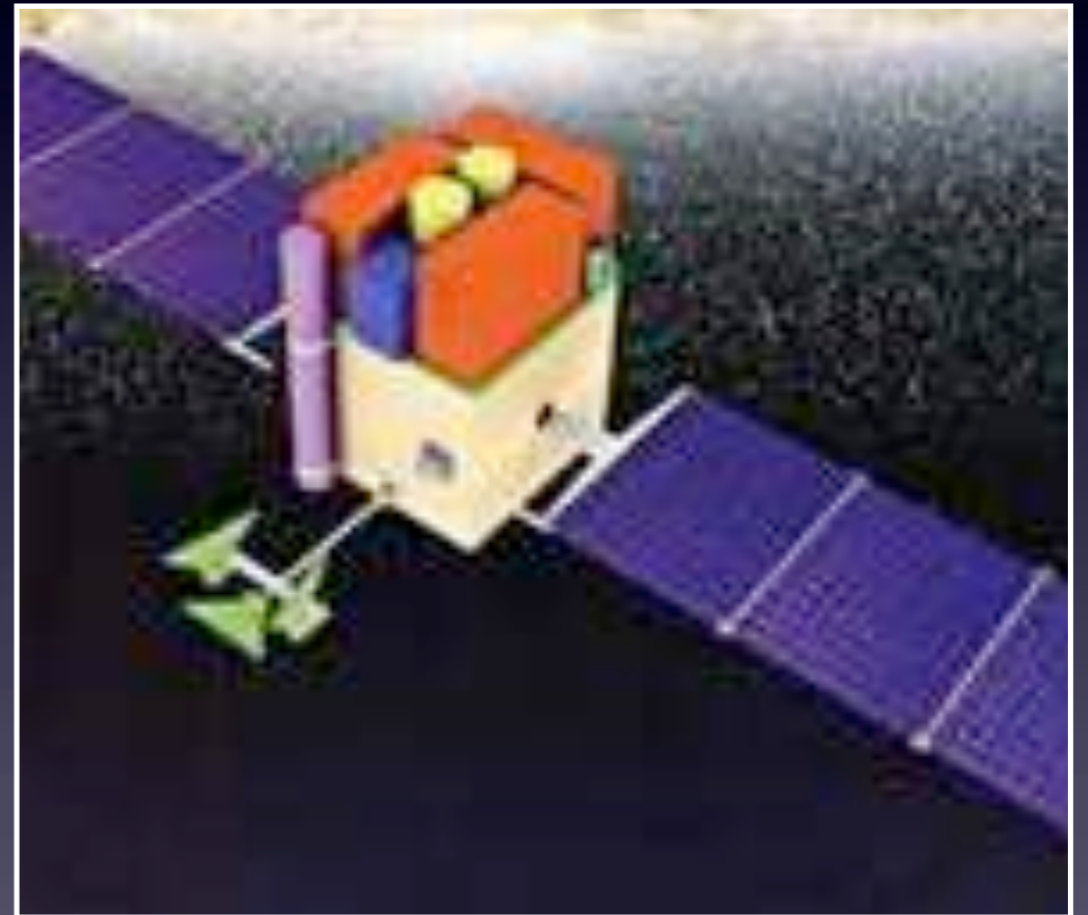
# Square Kilometer Array and precursors

- SKA I 2020
- MeerKAT (0.58-14.5 GHz)
- ASKAP (700-1800 MHz)
- MWA (80-300 MHz)



# AstroSAT - 2015

- Indian multiwavelength Indian space mission (Optical, near-UV, far-UV, soft X-ray, hard X-ray)
- Almost all major Indian Institutes part
- Varied phenomenon, solar, transients, AGN, X-ray variable
- Monitoring sky for new transients etc.



# National Large Solar Telescope - Laddakh

- 2-m class state of the art solar telescope
- IIA, (and ISRO, ARIES, TIFR, IUCAA)
- Look for long term solar variability
- Resolve solar feature upto 0.1''

# LIGO India

- Provide largest baseline
- Very small error box
- Much higher increased chances of detecting gravitational waves



# Gaia - 2013

- Launched in 2013
- Space observatory
- 3D space catalogue
- An area of sky 70 times in 5 years



# (Refurbished) Pan- STARRS

- Surveying the sky on continual basis
- Maui, Hawaii
- Combination of relatively small mirrors with very large digital cameras
- PS2, PS3 and PS4 planned.



# Focusing Optics X-ray Solar Imager (FOXSI)

- Next generation solar hard X-ray telescope.
- To study solar nano-flares in X-rays
- Launched Dec 2012



# SKA pathfinders such as JVLA and uGMRT

- LOFAR (80-240 MHz)
- JVLA (74 MHz-50 GHz)
- u-GMRT (150-1500 MHz)
- APERTIF





# Other radio telescopes

- Atacama Large Millimeter Array, Chile
- Long Wavelength Array, New Mexico (10-88 MHz)
- Five hundred meter aperture spherical telescope (FAST), China (0.3-3 GHz)
- SMART-X (successor of CHandra)
- SVOM (successor of Swift)



Thanks