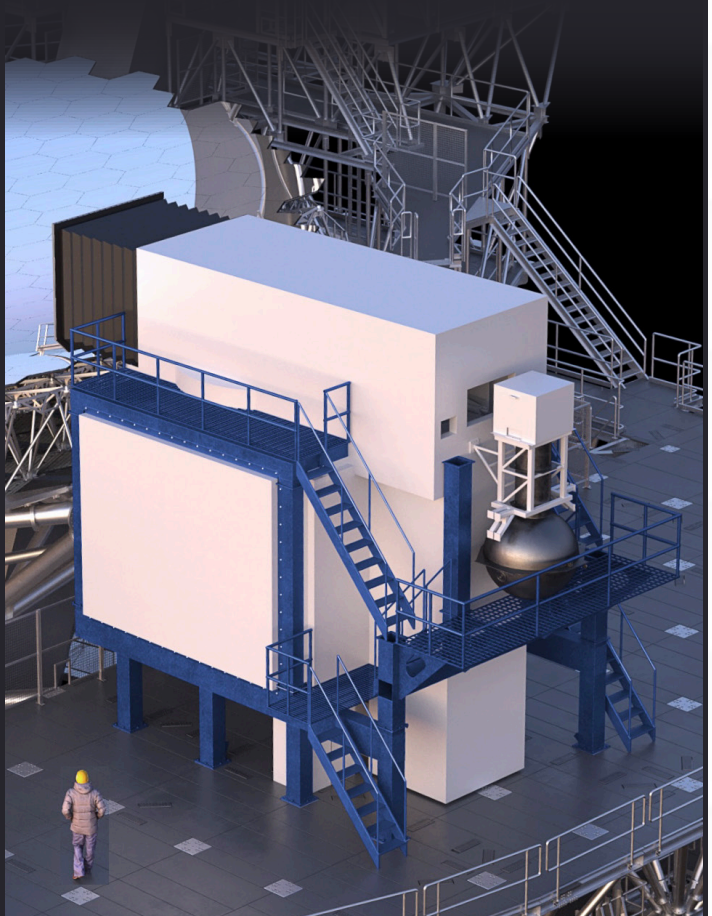
WFOS

TMT's **Wide Field Optical Spectrograph (WFOS)** is an imaging and multi-object spectrograph that will be a workhorse instrument for TMT at first light. It is designed for high throughput operation between 0.3 and 1.0 µm, with a field of view of 8.3'x3'. WFOS will also be equipped with an integral field unit (IFU) with four selectable slit widths between 0.25'' and 1.5'' that will yield fields of view between 20''x4.5'' and 20''x27''.

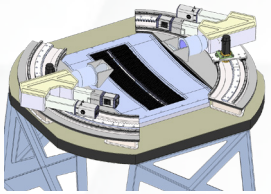
The instrument is seeing limited but compatible with a future ground layer adaptive optics (GLAO) upgrade.

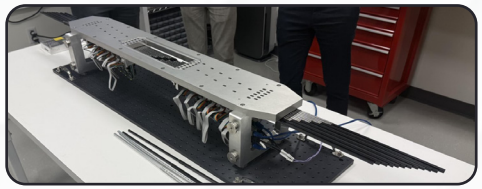


WFOS Design Highlight

WFOS includes a Configurable Slit Unit (CSU) that increases the versatility of the instrument. WFOS can quickly be reconfigured if atmospheric conditions change or a target of opportunity arises. The CSU can create 96x5'' slits, shown below with the instrument guider and wavefront sensors.

A prototype CSU has been tested for the Keck LRIS2 instrument, using the same technology as the WFOS CSU.





WFOS held a successful midterm Preliminary Design Review in 2025.

- Principal Investigator: Chuck Steidel
- Project Scientist: Eric Peng
- Project Engineers: Jason Fucik and Reston Nash
- ITCC Lead: Ramya Sethuram
- NAOJ Lead: Shinobu Ozaki
- Project Manager: Alastair Heptonstall

Learn more about
TMT Instruments

Caltech | NAOJ National Astronomical Observatory of Japan | India TMT Thirty Meter Telescope

TMT
THIRTY METER TELESCOPE

WFOS

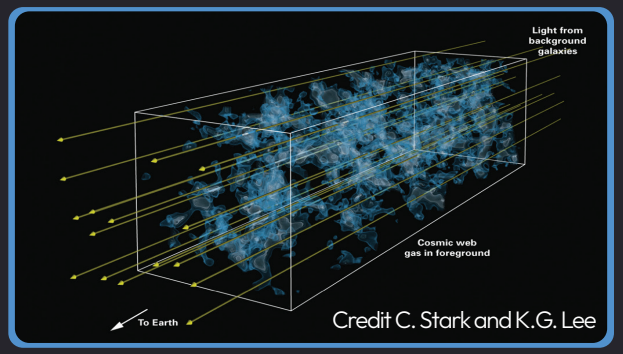
Built for Today's Questions –
And Tomorrow's Discoveries

Canada NRC·CNRC | University of California | Department of Science & Technology, Government of India

NINS National Institutes of Natural Sciences 自然科学研究機構 | Caltech

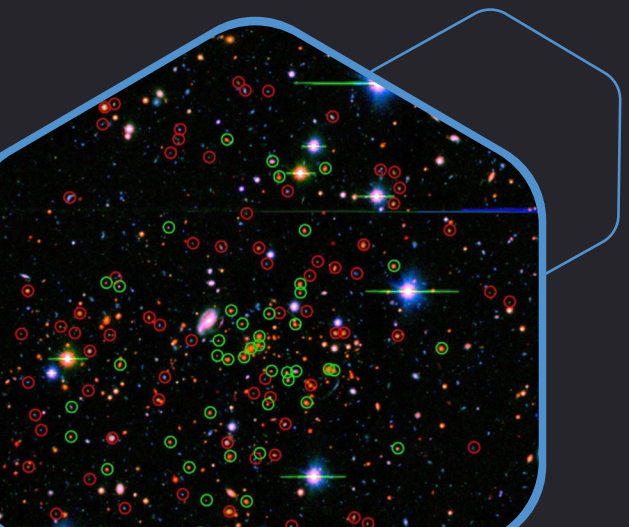
WFOS
Science Highlights

WFOS is designed for a wide array of science, from studying our solar system to observing the faintest, most distant galaxies.



WFOS Science Cases

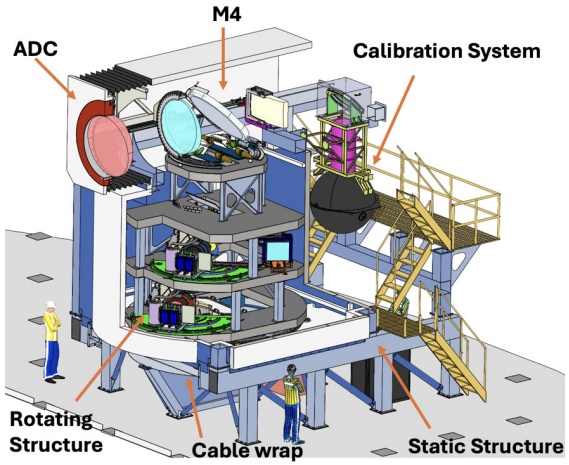
- Tomography of the intergalactic medium
- UV Properties of high-redshift galaxies
- Spectrophotometric study of transient high-energy cataclysmic events
- Study of exoplanet atmospheres
- Optical follow-up of JWST



WFOS Observing Modes

Resolution	Range (µm)	Slit Width
1500	0.31-1.0	0.75”
3500	0.31-0.447 / 0.43-0.567 0.55-0.795 / 0.75-0.995	0.75”
5000	0.33-0.412 / 0.45-0.561 0.55-0.695 / 0.80-0.994	0.75”
4500	0.31-1.0	0.25”
10,500	0.31-0.447 / 0.43-0.567 0.55-0.795 / 0.75-0.995	0.25”
15,000	0.33-0.412 / 0.45-0.561 0.55-0.695 / 0.80-0.994	0.25”

WFOS has a red and blue spectrograph which can be independently configured to deliver different spectral resolutions over different spectral ranges. The slit width also influences the resolution. The above table provides a partial list of configurations showing the range of possibilities.



WFOS
Driving Requirements

Wavelength Coverage	0.31 - 1.0 µm
Multi-Object Spectroscopy	Simultaneously observe >80 targets
Field of View	8.3 x 3 square arcminutes
High Throughput	>45% over the majority of spectral range
Gravity Invariant Design	Minimizes flexure due to changing gravity vector
Fast Reconfiguration	Maximize on-target time. Time to acquire new target <5 minutes