WSO/UV mission concept and science goals

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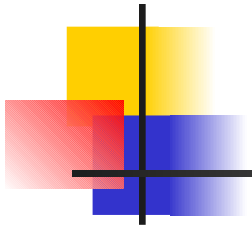
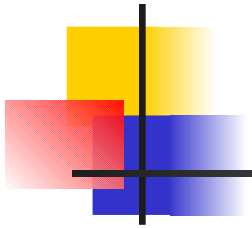


I. WSO/UV mission concept

II. WSO/UV science goals

III. Conclusions



I. WSO/UV mission concept

I.1 T170-M telescope

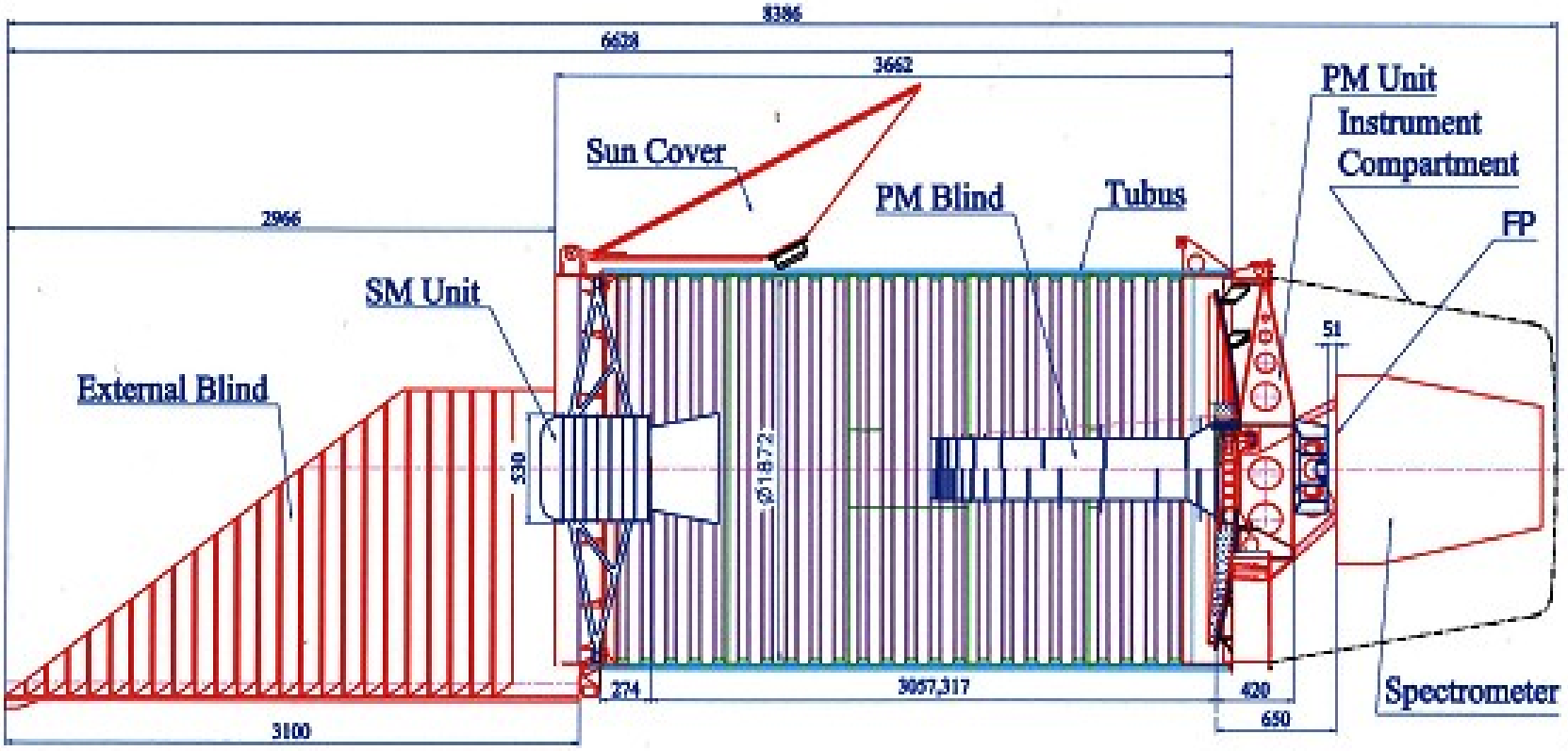
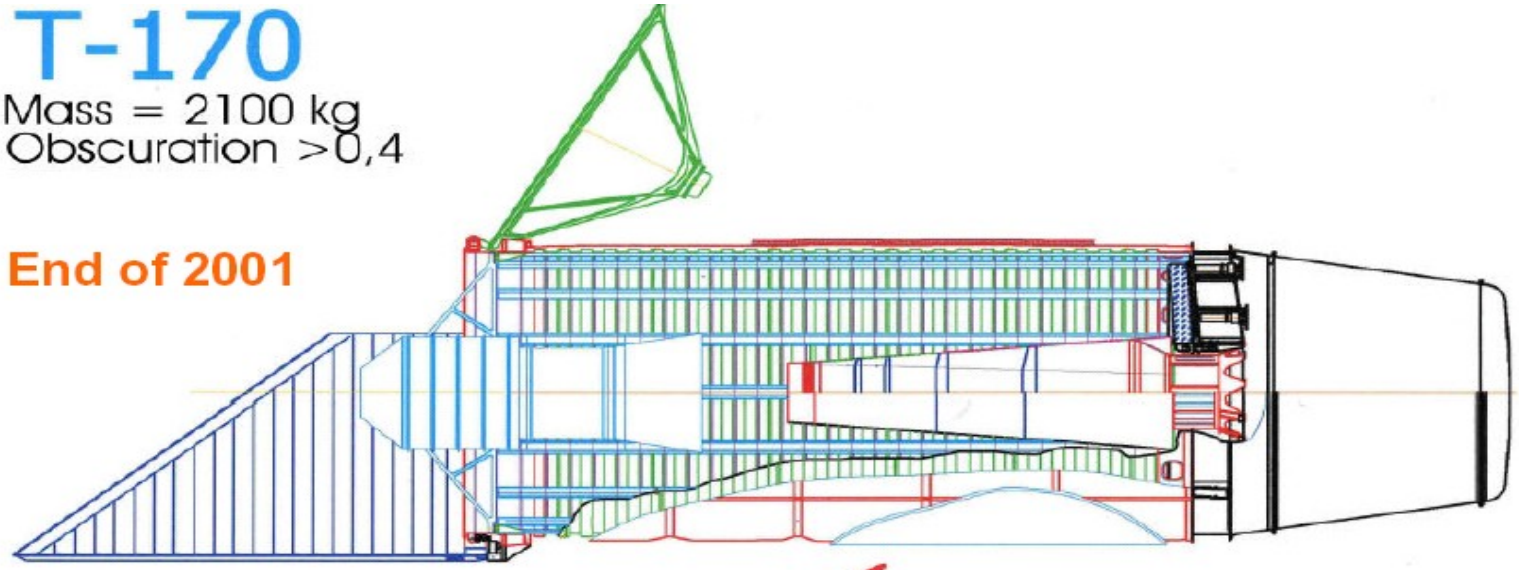


Fig. 1: Schematic diagram of the WSO 1.7-m aperture UV telescope.

T-170

Mass = 2100 kg
Obscuration >0,4

End of 2001

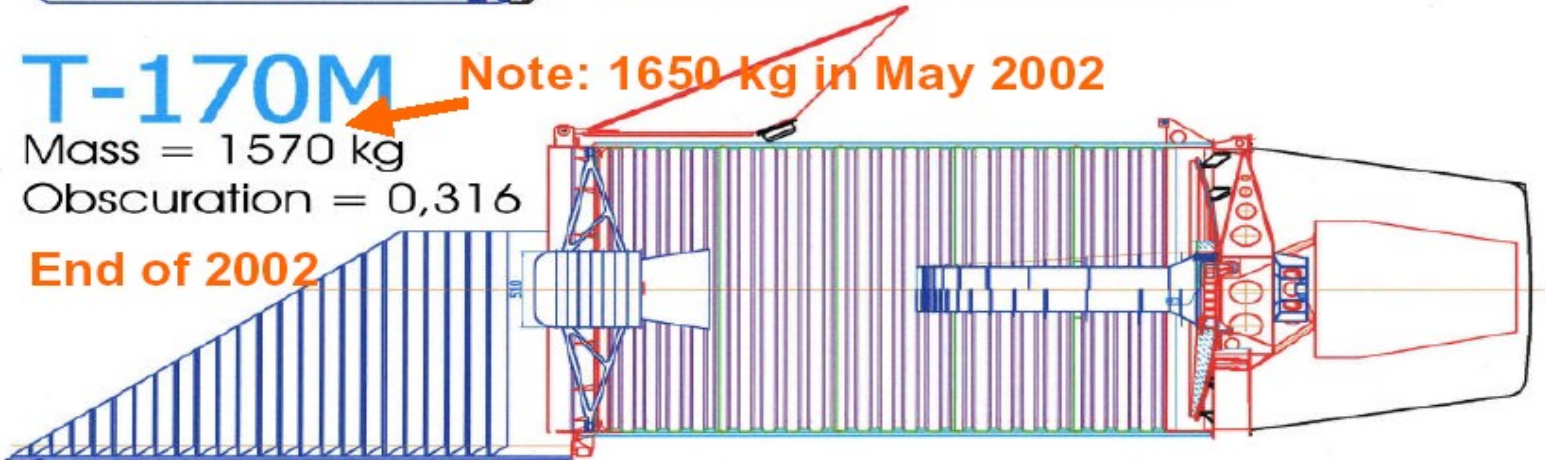


T-170M

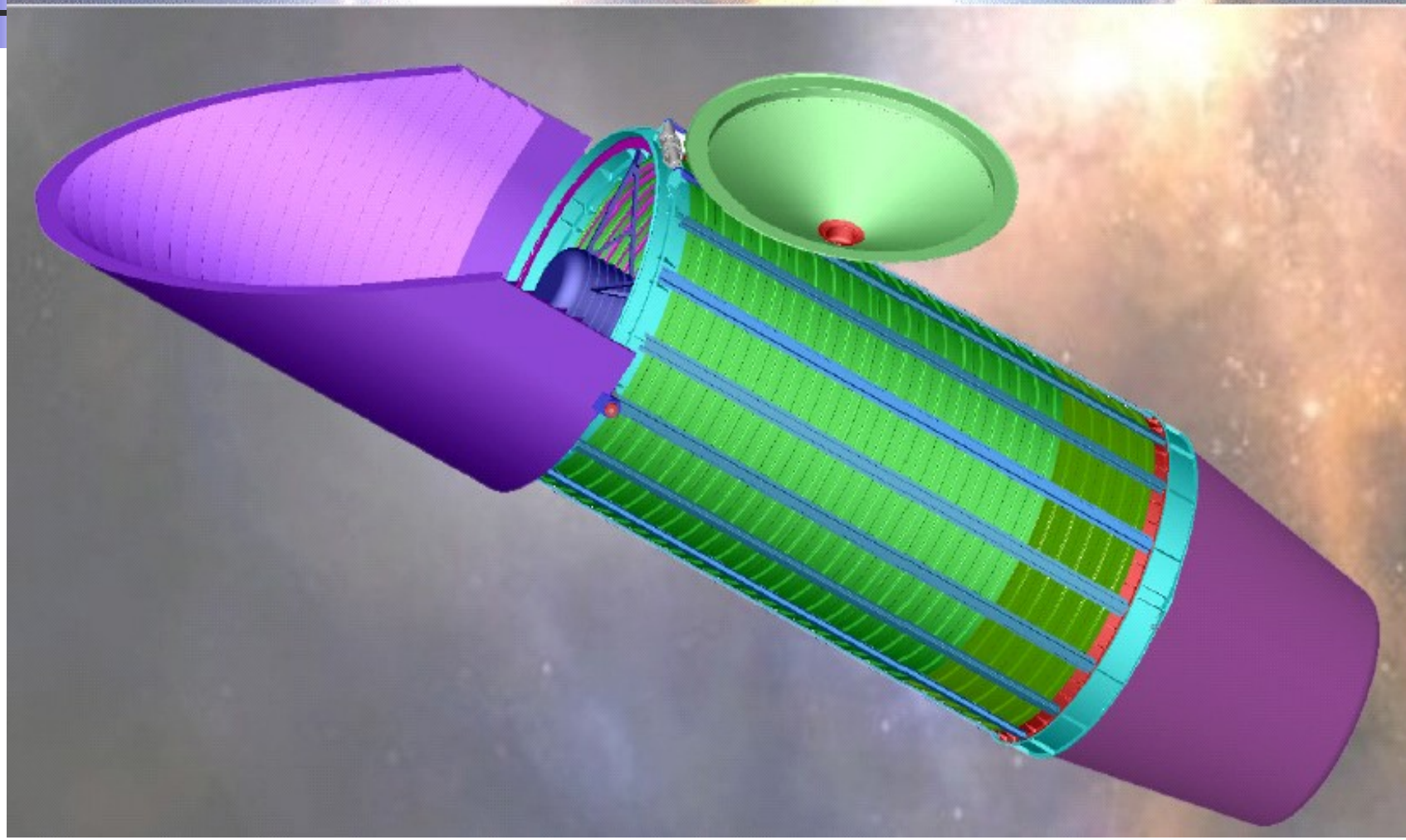
Note: 1650 kg in May 2002

Mass = 1570 kg
Obscuration = 0,316

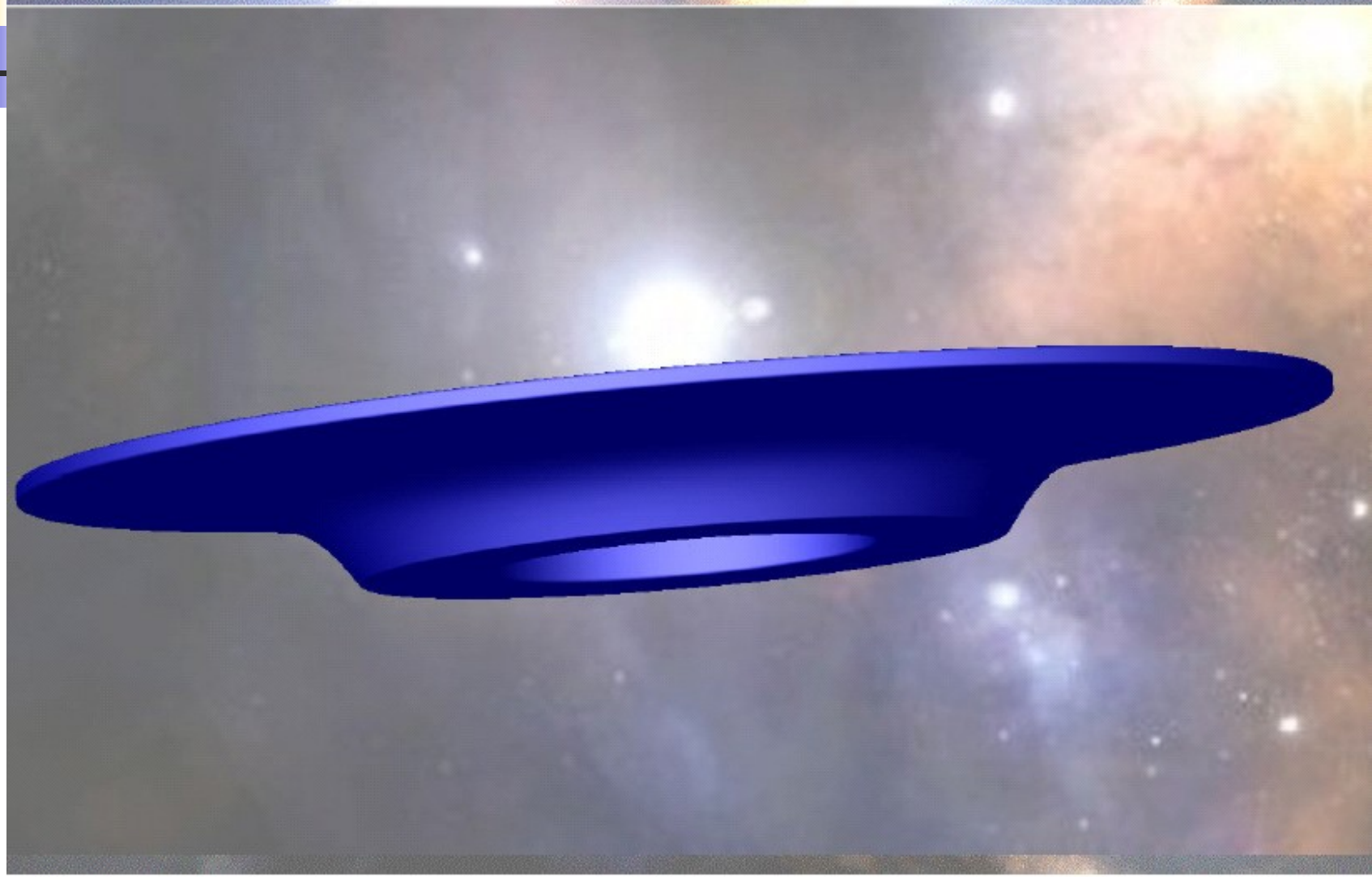
End of 2002



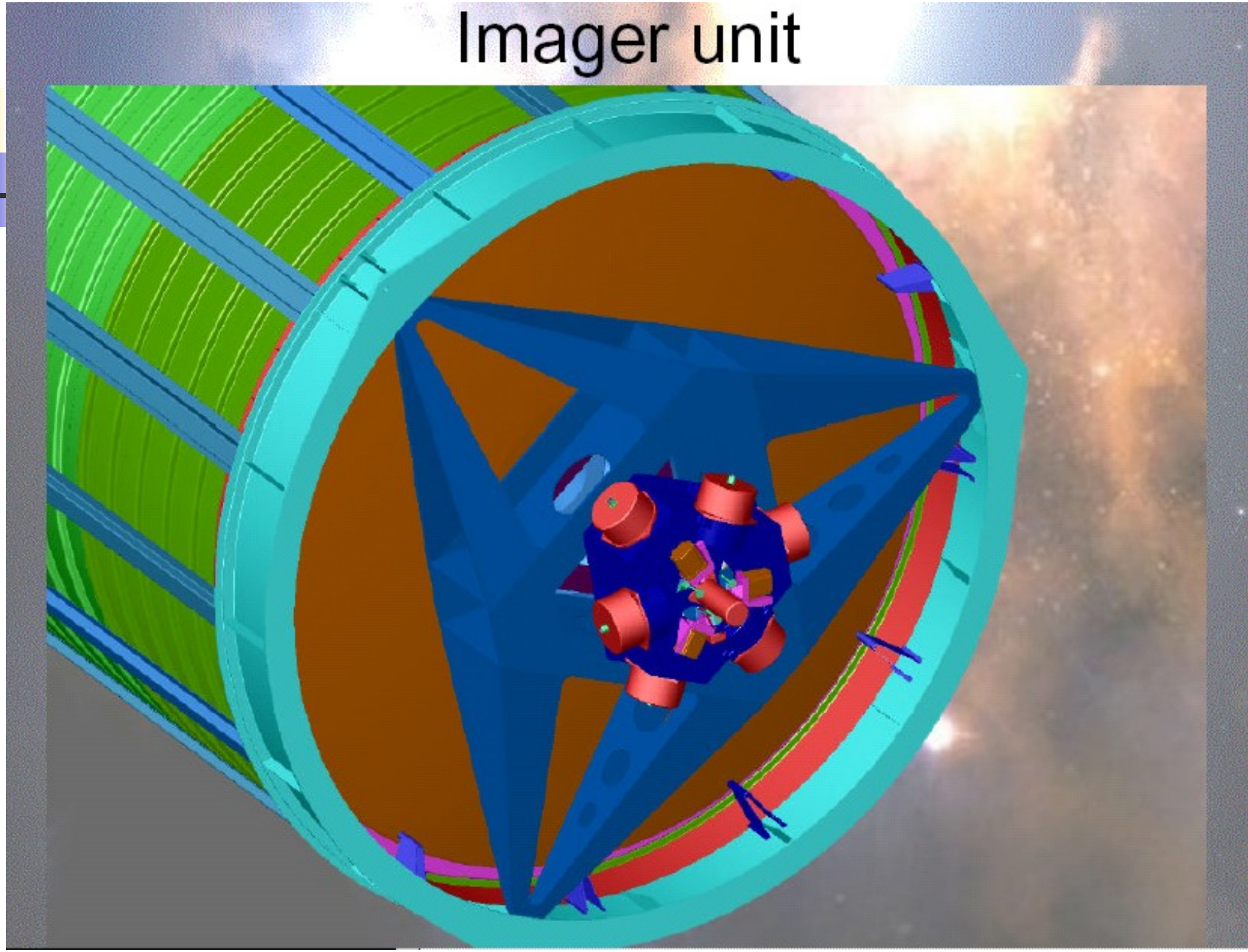
T-170M telescope



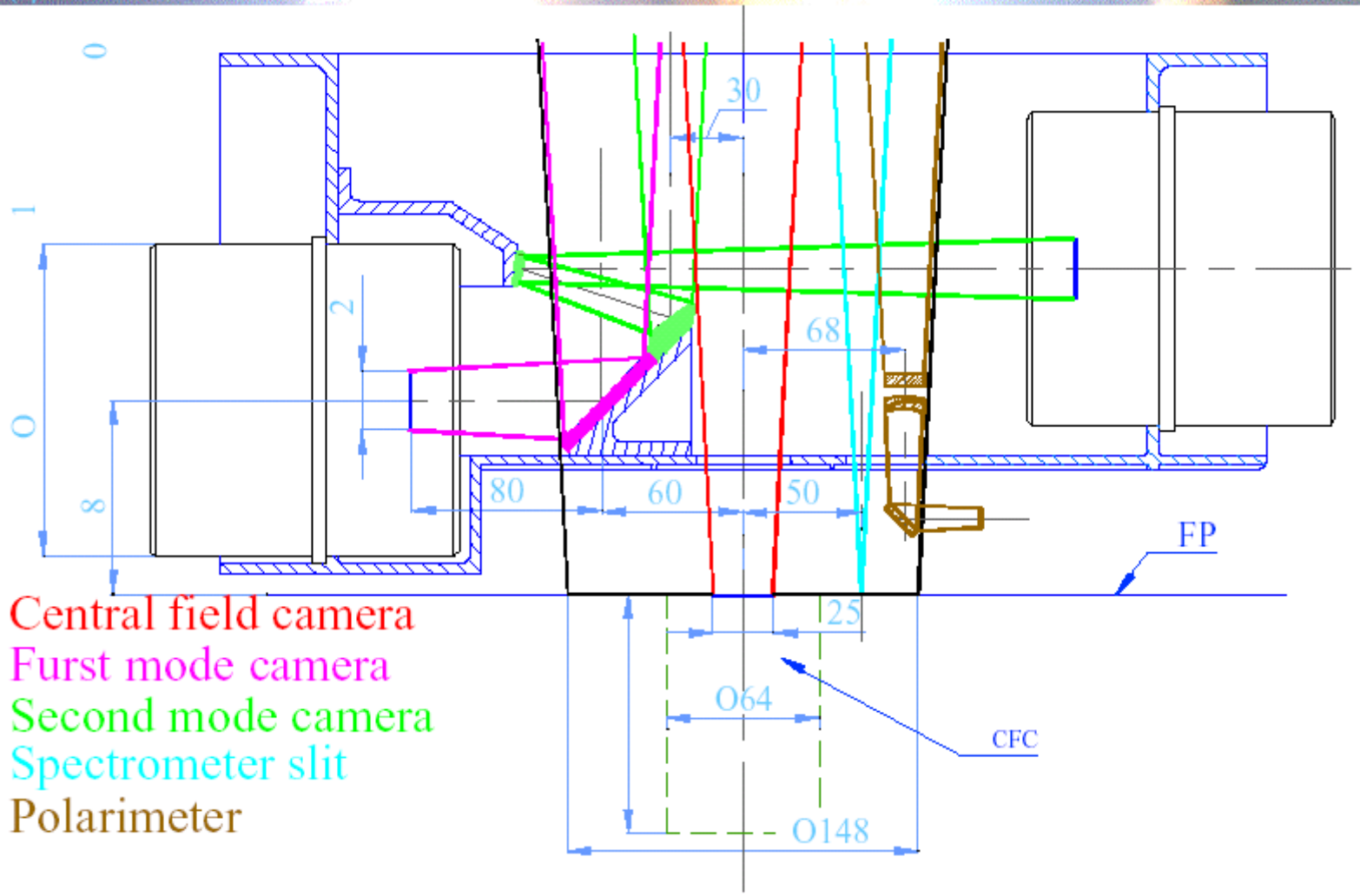
Lightened primary mirror

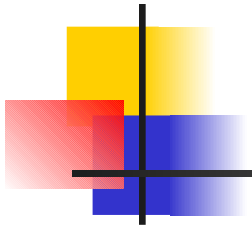


Imager unit



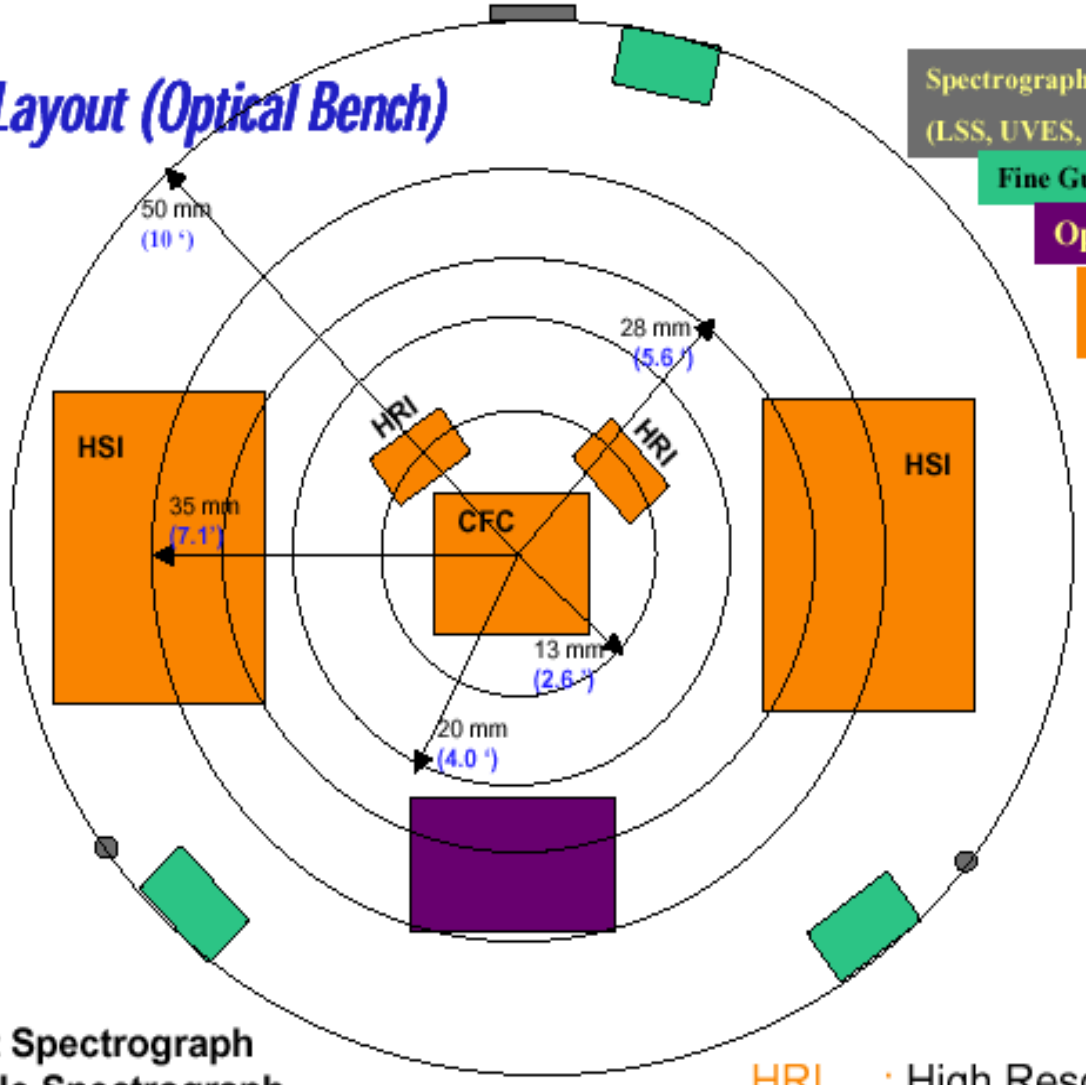
Focal Plane optical design





I.2 Terminal instruments

Focal plane Layout (Optical Bench)



Spectrograph Apertures (100 µm)
(LSS, UVES, VUVES,)

Fine Guidance System (FGS)

Optical Camera (OI)

UV Cameras
(HRI, HSI, CFC)

LSS : **Long Slit Spectrograph**
UVES : **UV Echelle Spectrograph**
VUVES: **Vacuum Echelle Spectrograph**
OI : Optical Imager

HRI : High Resolution Imager
HSI : High sensitivity Imager
CFC : Central Field Camera

Characteristics of the terminals

The WSO mission as defined to date, has the following characteristics:

Three UV spectrometers cover range 110-340 nm(to be contributed by Germany) with R~50,000 and offer long-slit (0.08x5mm) capability with R ~1,000(China);

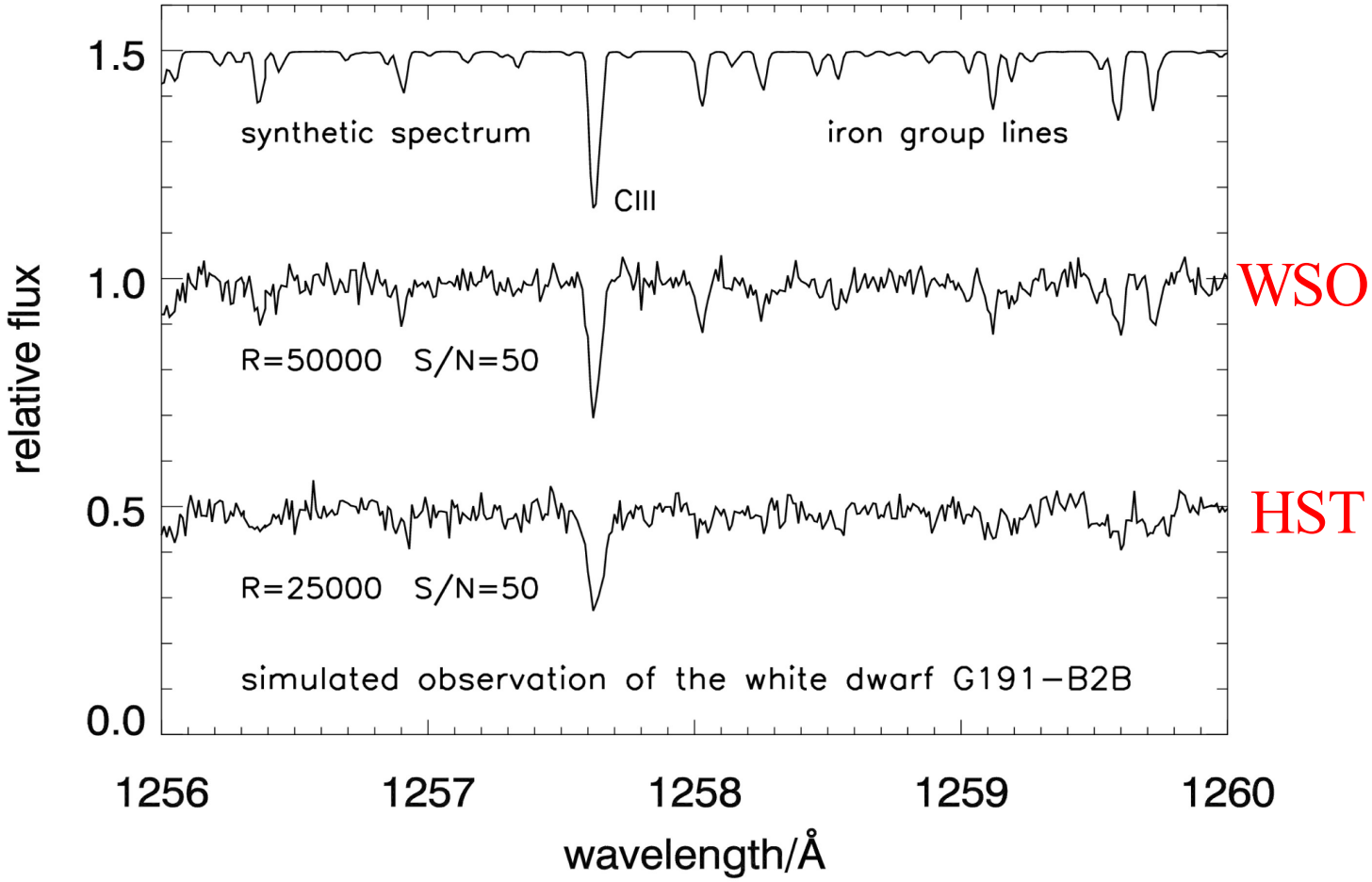
Imaging Wavelength: range 115-340 nm with a quality of 0.1-0.3 arc-seconds (under development in Italy); two imagers in the UV, one for maximum spectral resolution and the other for maximum sensitivity; one imager for the visual domain;

Mission lifetime: 5 years with potential for another 5 years.

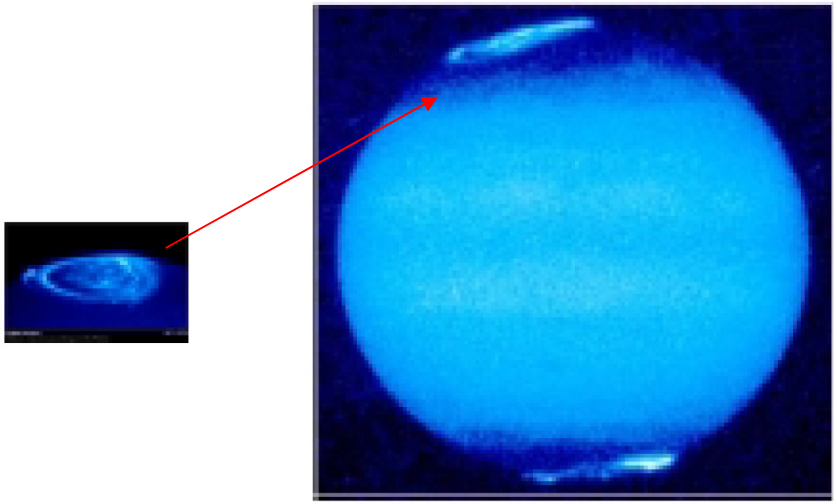
(1) Comparison of UV spectral capability between WSO and HST

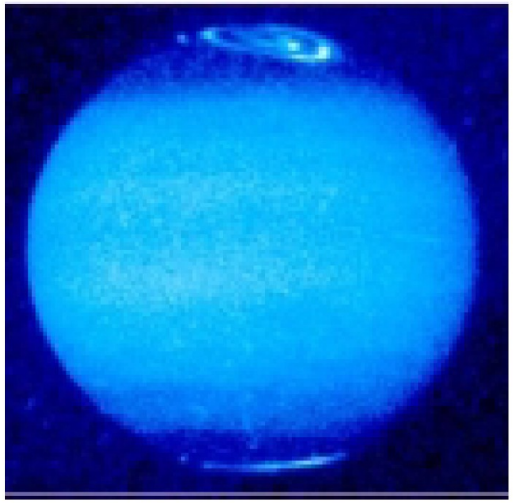
Sample Spectrum: The central spectrum represents as observed with WSO/UV

(The lower spectrum is comparative at HST/COS resolution.)



(2) Comparison of UV image capability between WSO and HST Jupiter





I.3 Orbit option

Launcher Options

Fairing
O 4.0/4.2 m

Static env.
3.65/3.86 m

Fairing
Length
10.5 – 12.0 m

GTO
Capability
5100 kg

LM3-B

T170M in launch Configuration

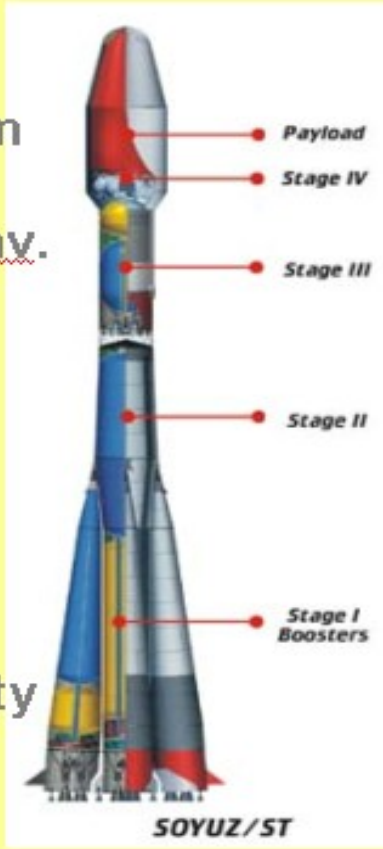
T-170M + Inst. :	1600 kg
Planck S/C :	1000 kg
Total Launch mass	~2600 kg

Fairing
O 4.11 m

Static env.
3.8 m

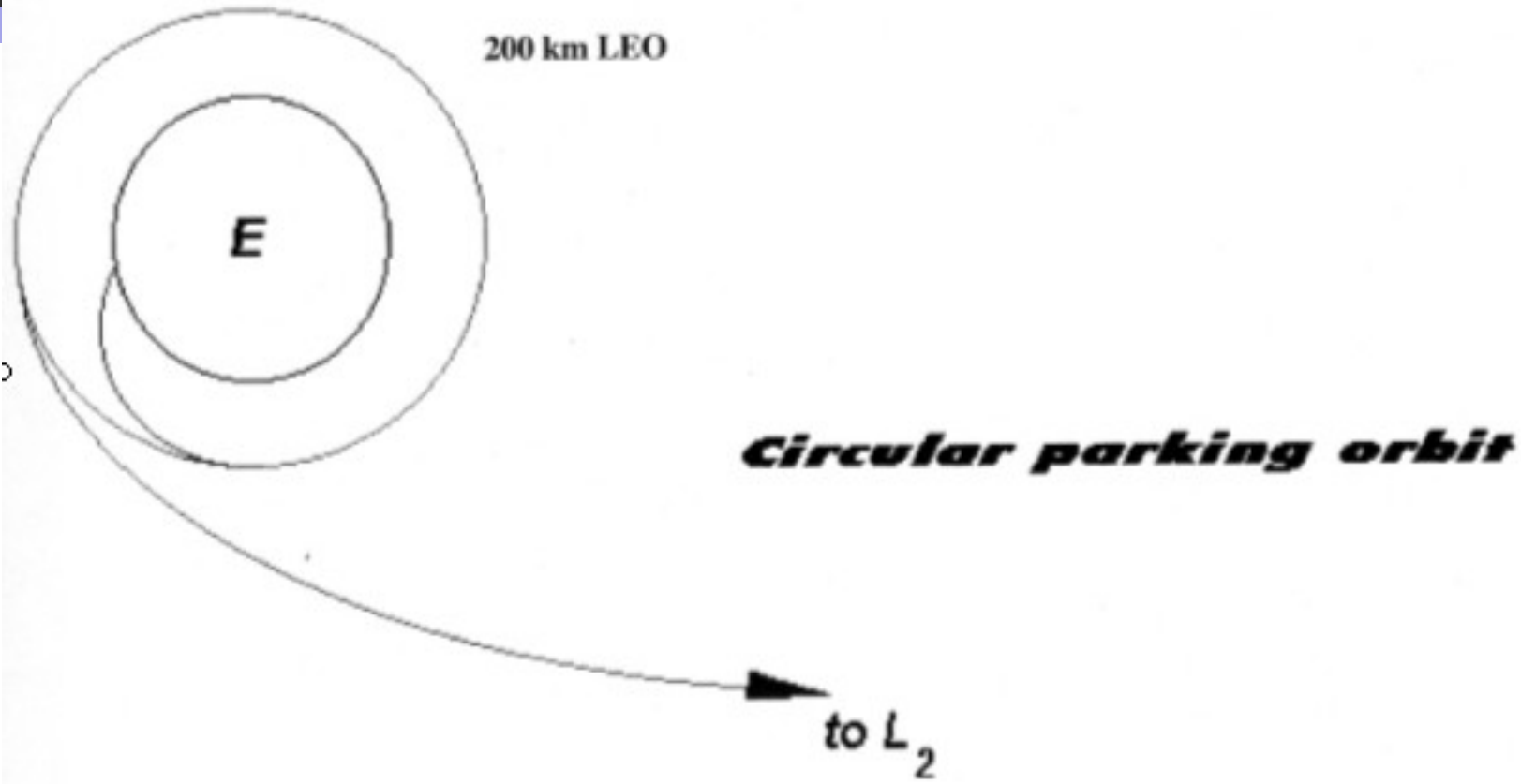
Fairing
Length
9.52 m

L Circ.
Capability
5500 kg



SOYUZ/ST

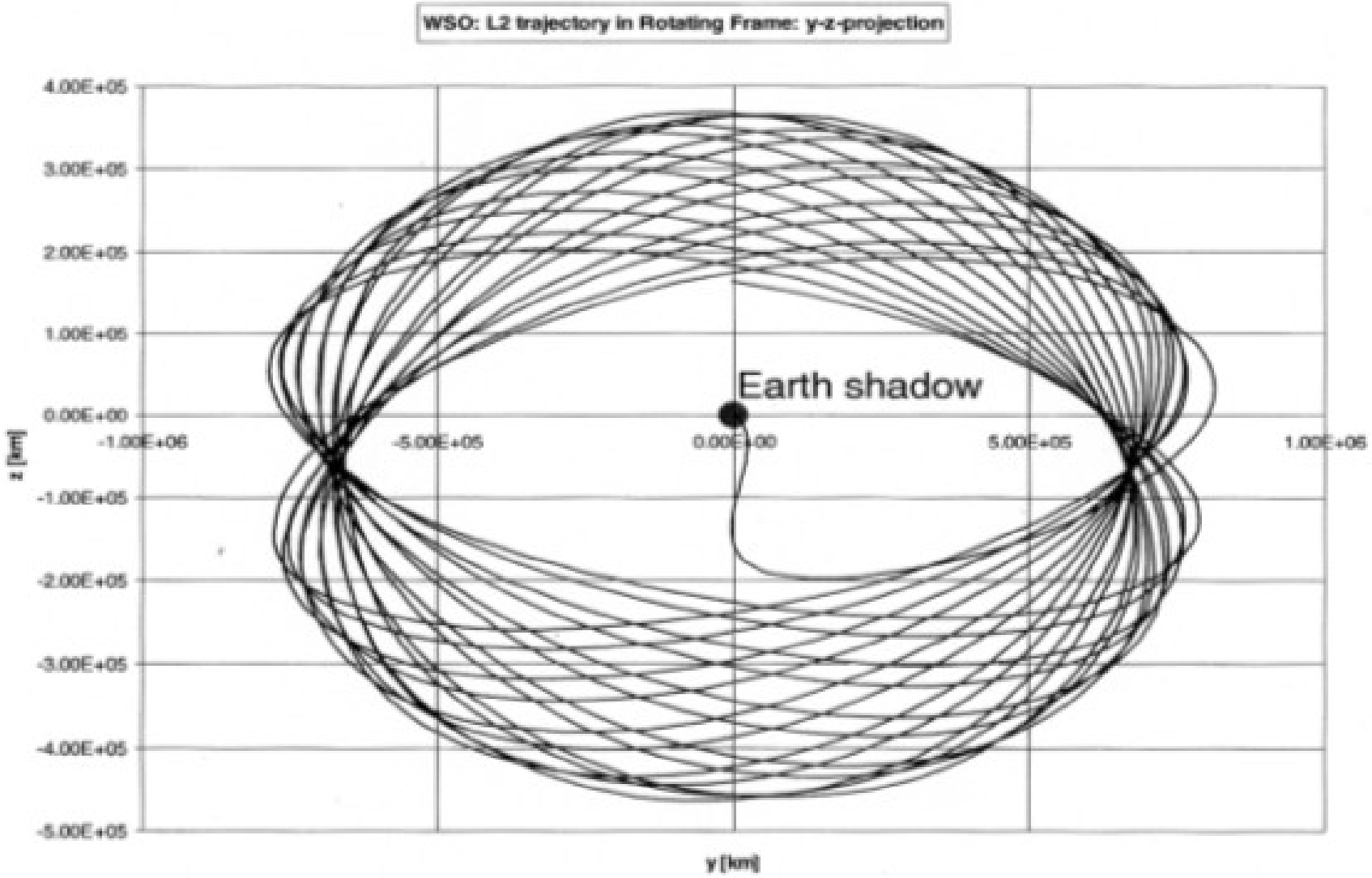
Orbit Option 2
Launch Mode 4

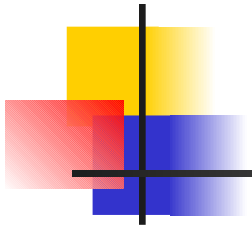


Characteristics of Sun-Earth L2 orbit

The proposed Sun-Earth L2 orbit has a number of characteristics that make it the preferred orbit. The orbit has minimal station-keeping requirements and hence, minimal operations intervention. The spacecraft does not cross the Earth's shadow; therefore there are no eclipses and hence high thermal stability. This orbit also offers a relatively low radiation environment as it is well outside the Van Allen belts.

Mission Analysis: Trajectory (1)





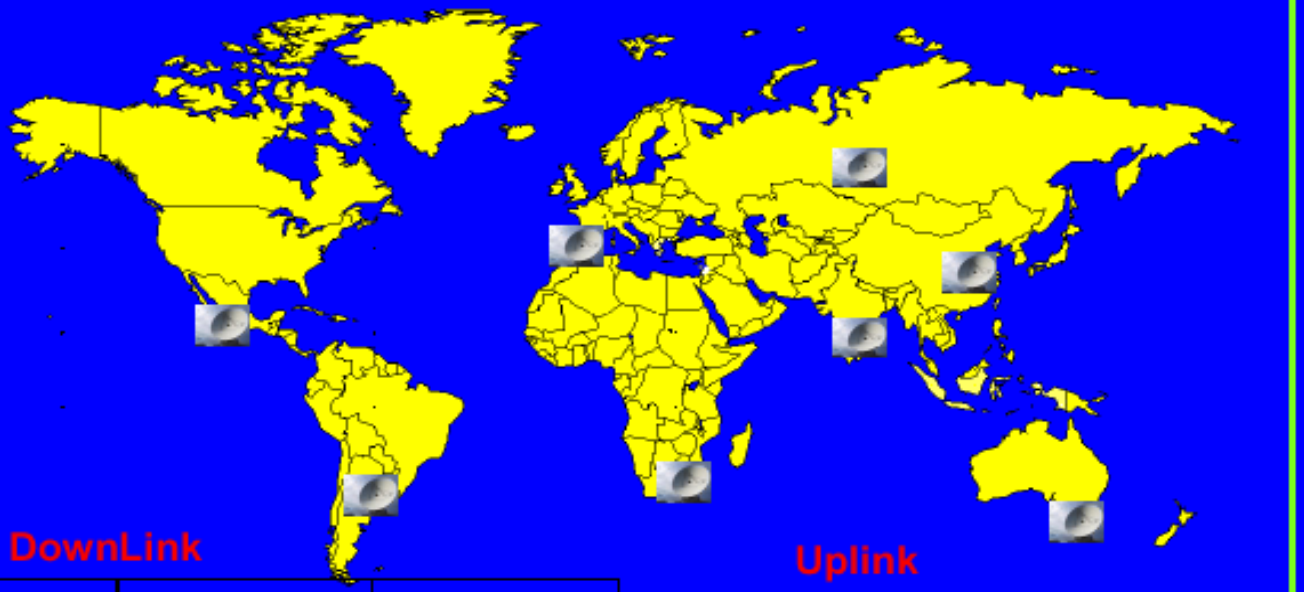
Please see the movie !

I.4 Distribution of ground stations

WSO/UV Ground System Plan

WSO/UV Ground Opreations System Planning

TT&C



DownLink

@ 1.8 M-km	Transmission via LGA (-3 dBi gain)	Transmission via HGA (30 dBi gain)
15m antenna (G/T = 38 dB/K)	500 bps (with ranging)	1.5 Mbps (w/o ranging)

Uplink

@ 1.8 M-km	Reception via LGA (-3 dBi gain)	Reception via HGA (30 dBi gain)
15m antenna	40 bps (300W, with rng) 400 bps (2kW, with rng)	4 kbps (with rng)

WSO - UV

Chinese ground station(CGS)

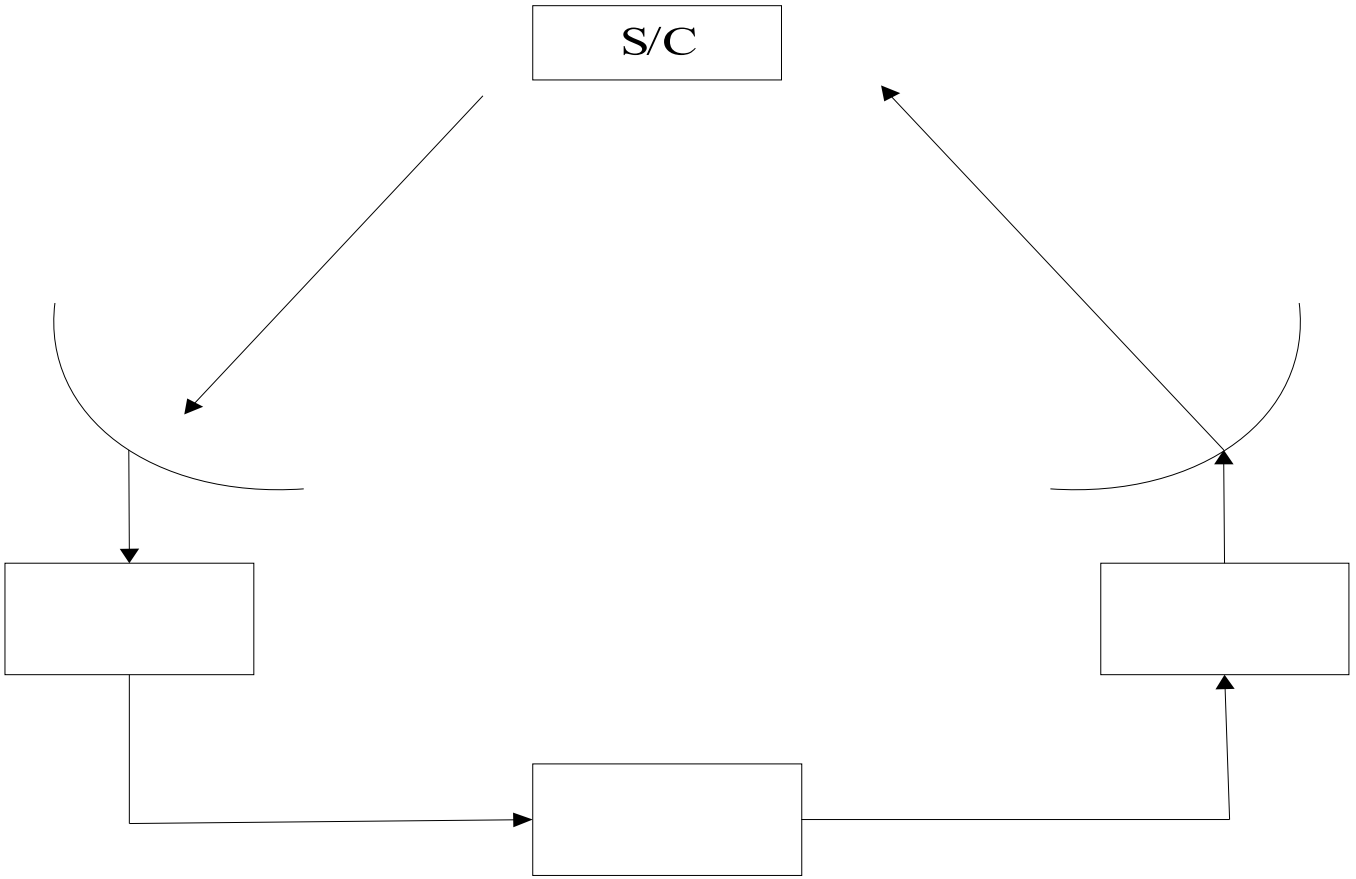


Fig. Relation between **CGS and WSO**

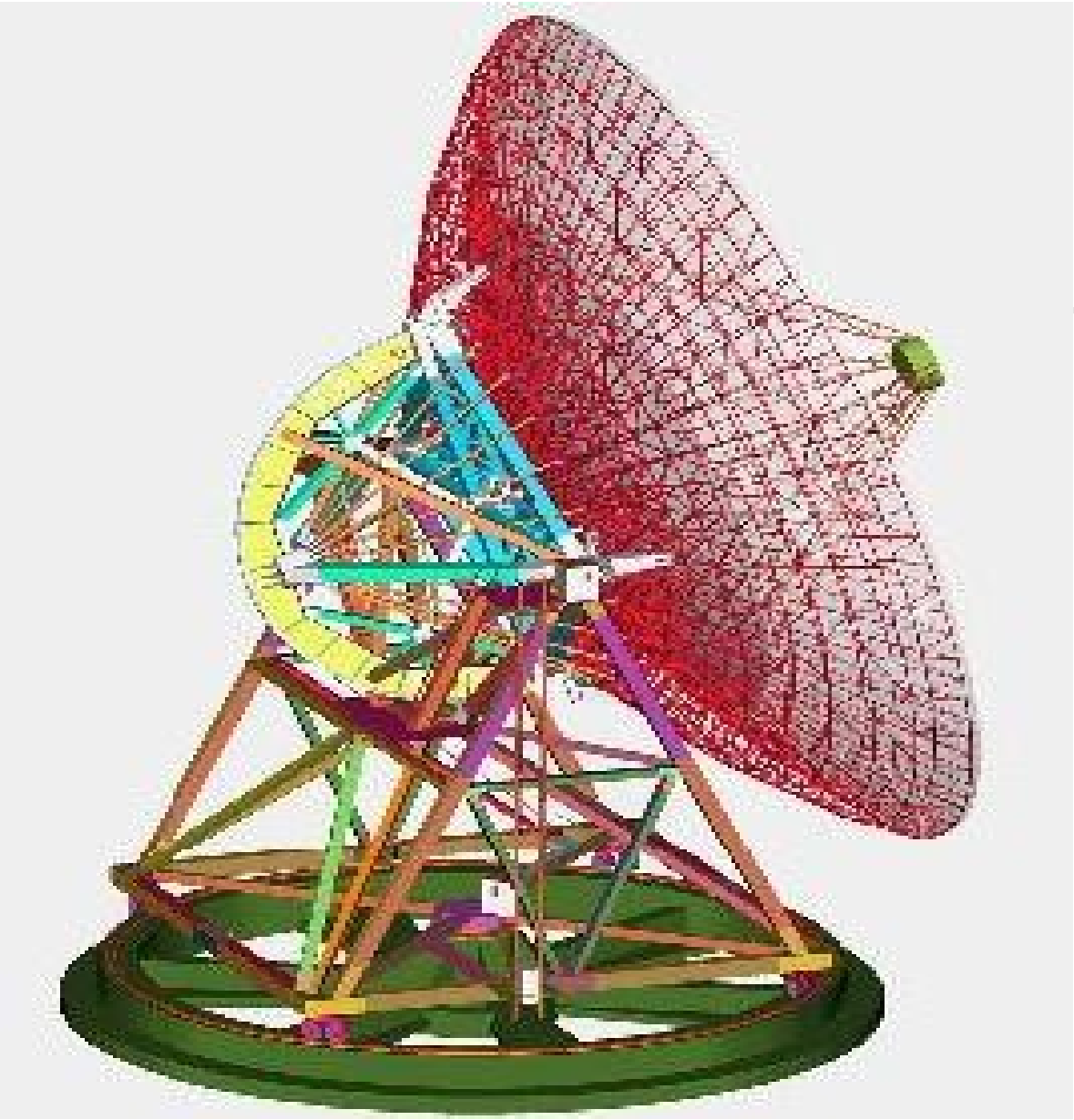
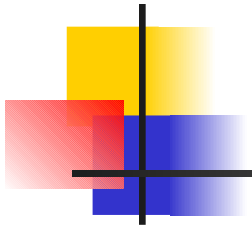


Fig. 50 meter Antenna in Miyun, Beijing



It covers the frequence range between 327MHz—8400MHz including 327MHz, 611MHz, 1665MHz, 2300MHz, 5000MHz and 8400MHz wavelenth bands.

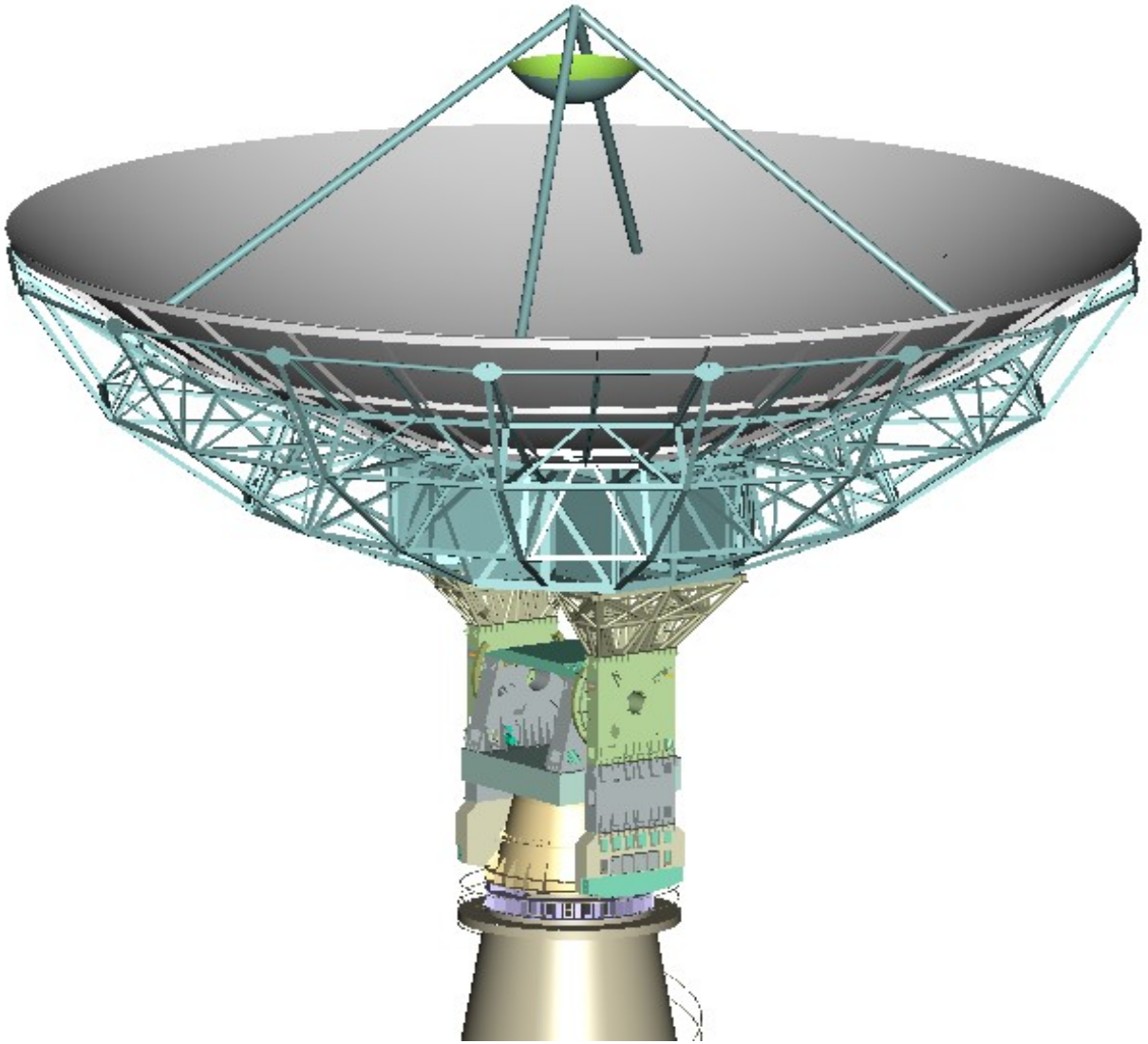
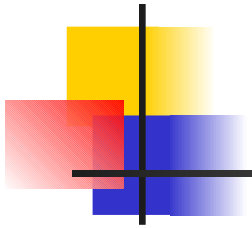
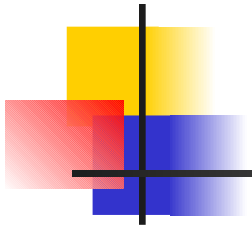


Fig. 40 miter Antenna in Kunming, Yunnan



S band download 2200~2310MHz ;
X band download 8000~8900MHz ;
X band uplink 8000~8900MHz .



II. WSO/UV science goals

The study of the baryonic content of the Universe between Z≤2 ;

The accessibility of observing at high resolution and S/N the absorption lines associated with the Lyαforest, the HeII lines and the lines of OVI will permit to explore the full range of ionized and neutral gas in the redshift range out to Z=2;

High resolution spectroscopy of WSO is suitable to study the accretion physics in young, pre-main sequence (PMS) stars and stellar wind from massive stars;

WSO can considerably improve our understanding of accretion processes onto supermassive black holes in AGNs;

WSO has strong capability to discover unpredictable phenomena on the basis of the GELEX and LAMOST surveys.

Possible subjects for WSO

1. **Stellar science**

Element abundance and fundamental physical processes in the atmosphere of hot stars and white dwarfs;

Stellar wind of massive stars;

Effects of close binary mass exchange and accretion on condensed objects;

Rapidly changing shock phenomena in Young Stellar Objects and the physical mechanisms driving jects in such objects;

Young neutron stars.

2. Galactic astronomy

Posibility of variations in the local D/H ratio, the struvture, composition, and ionization the local interstellar medium(LISM);

Hot gas in the intergalactic medium;

Metal enrichment in galaxies with $0<Z<2$;

Precise estimate of the amount of missing mass in galactic halo;

Providing us an unbiased sample of UV morphology of nearby($Z\leq0.2$).

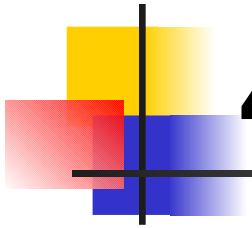
3. AGNs and cosmology

To identify the energy source and probe structures in the UV emission region in weak active galaxies, such as LINER, Sy2, HII region and starburst galaxies, through UV spectral diagnosis and UV image of the center nucleus;

The mass outflows in QSOs and star-forming galaxies can be traces through studing UV absorption lines at low redshift.

WSO can do a real reverbration mapping of BLR, and measure small time lag in the continuum between different bands;

Measuring HeII Gunn-Peterson effect in high Z QSOs to put constraints on the ionization effect and origin of EUV background radiation;



4. Planetary system science

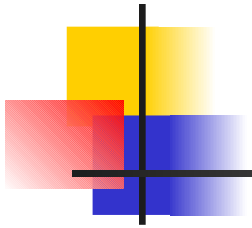
Studies of the gaseous atmospheres of the giant planets in the Solar system;

Diagnosing the ices in the outer Solar system and searching for signatures of molecular species trapped in the surface ices;

Determing the chemical compositions of comets.

III. Conclusions

WSO mission provides UV spectroscopy and imaging that is a singnificant improvement on that now available with **HST** and will be a timly filling a time-gap in access to the UV band, taking UV astronomy forward into the second decade of the **21st** century to build on the legacy of **HST** and the operating **GALEX** UV sky survey.



Thank you !