Contamination Control & Transportation of UVIT

By

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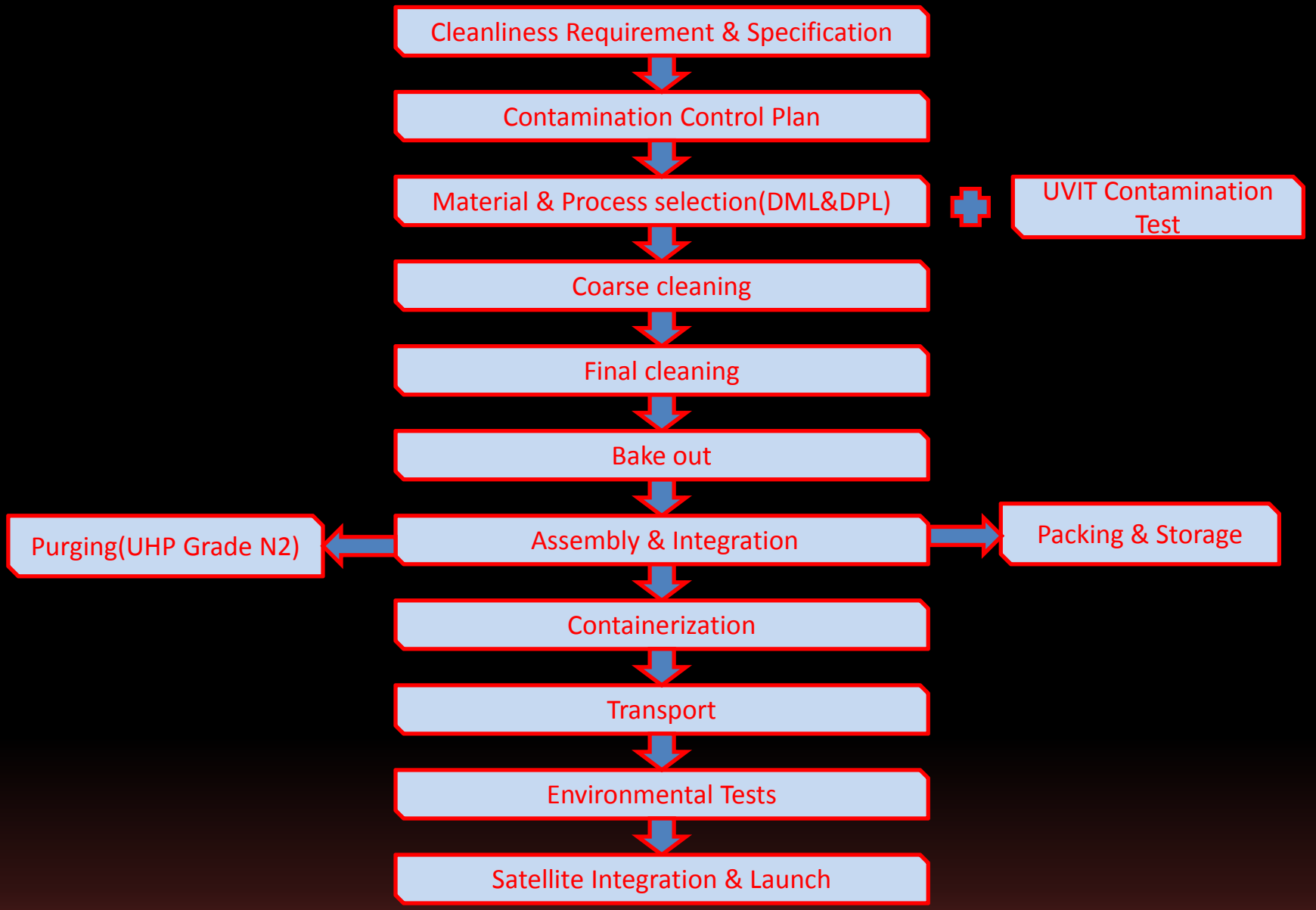
Contamination Control Flow Chart



Particulate Contamination Levels

Maximum Number of Particles in Air (particles per cubic foot air)					
Class	Particle Size				
	0.1 µm	*0.2 µm*	*0.3 µm*	*0.5 µm*	*5.0 µm*
1	35	7.5	3	**1**	
10	350	75	30	**10**	
100		750	300	**100**	
1,000				**1,000**	7
10,000				**10,000**	70
100,000				**100,000**	700

PFO Standards:	
Class	Standard (mm^2/m^2/24hrs)
100k	225
10k	52
1k	10
100	2

- All the areas are 10 times better than the specifications

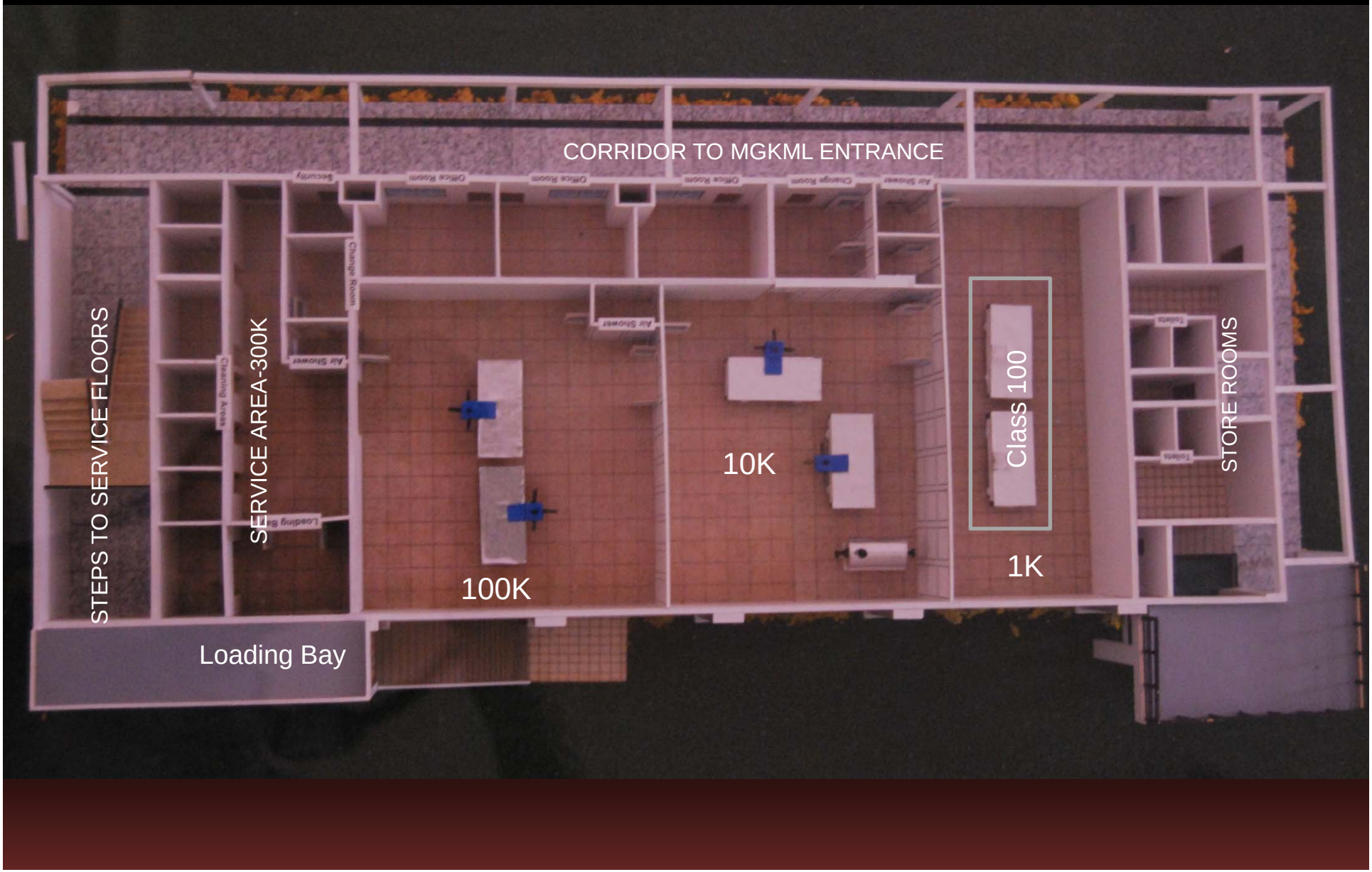
Molecular Contamination Levels

CVCM : 0.1%
TML : 1%

TQCM : 10-100ng/sq cm/hr

Actual Count @100

Cross sectional View of Prof.MGK Menon Space Science Lab



Cleaning……

Various methods are employed to clean contaminated items like

- Vacuum Cleaning
- Solvent Wiping
- Ultrasonic cleaning with soap water
- Ultrasonic Cleaning with Acetone
- IPA Wiping
- Coating

After Black coating all the UVIT mechanical parts are cleaned with Acetone in ultrasonic bath and given two dips in de- ionised water to remove traces of the surfactant. Next, Drying is done in class 100 clean air on a CLEAN table .

After the final cleaning/drying, the part is examined in bright and in black-light (UV) to check for any leftover deposits etc. If any contamination found process need to be repeated till it is certified as clean.

After cleaning all components are baked for 24 hrs at 100◦ C in high vacuum (< 10^-4 mbar); TQCM is used to find the molecular contamination.

Baking Details.....

$$\frac{\Delta f}{\Delta m/A} = \text{Sensitivity of the Crystal}$$

Baking is the last step in cleaning, and after this very great care is taken to avoid all contact with NOT-CLEAN surface of any kind

Handling....

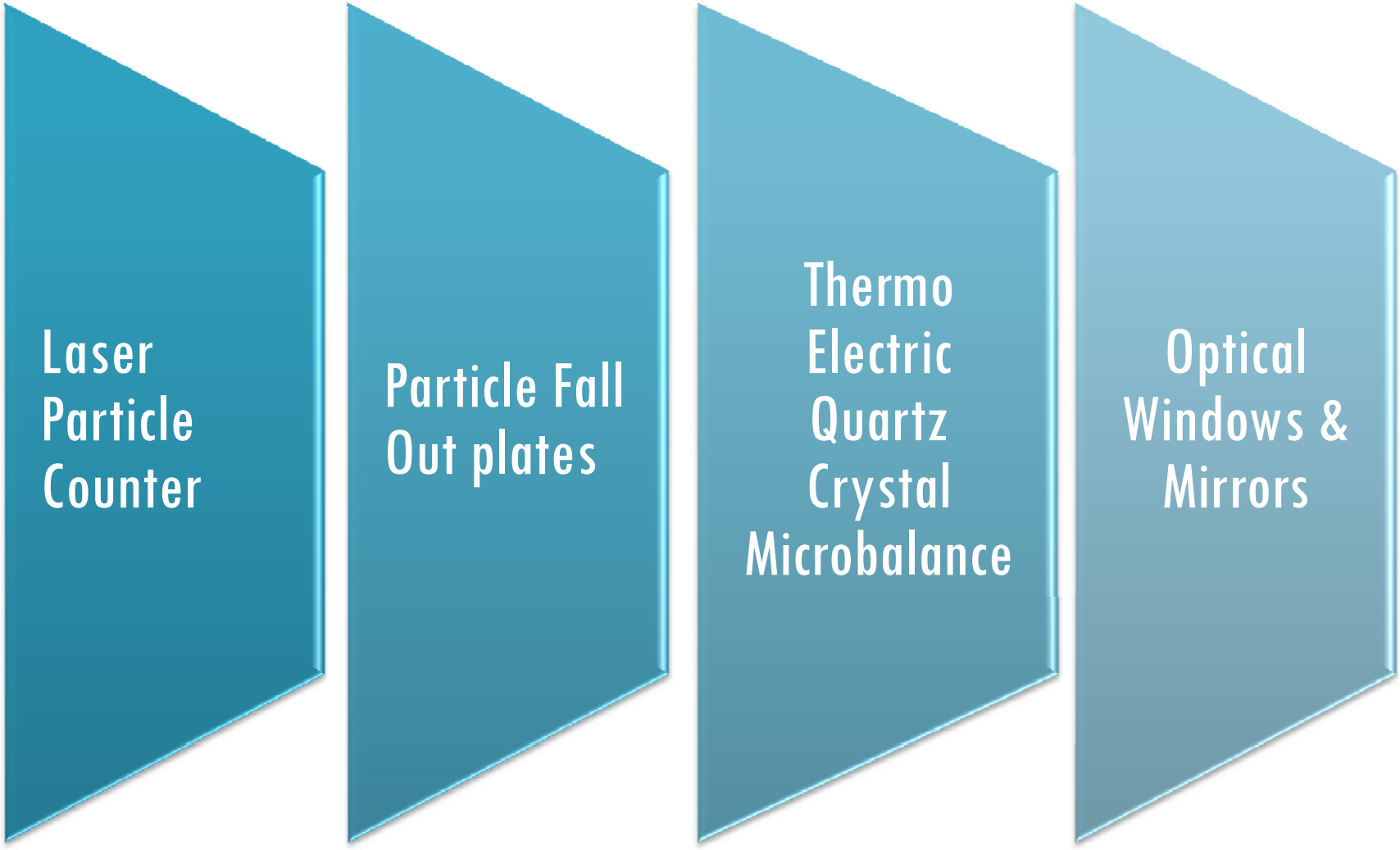
After baking, handling the components with bare hands is prohibited.

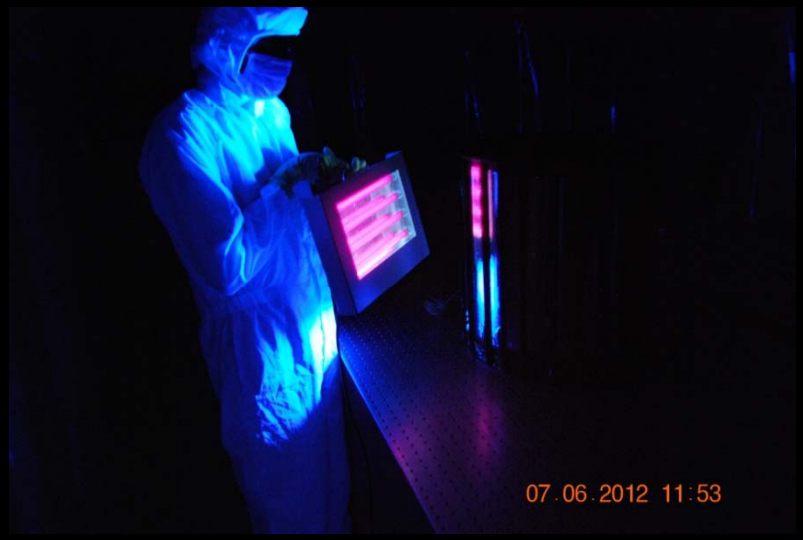
- Coated Components are handled by proper tools & fixtures.
- Sp. Grade IPL is often used to wipe tools, gloves, etc.
- All the fixtures are wiped with Sp. Grade IPA and checked for any contamination using white bright light.

Assembly and integration.....

- Gowning as per clean room class 100 protocol
- Wear PROPER garments – Wear garments PROPERLY
- Washing/Wiping the gloves before any activity
- Only one activity at a time at Class 100
- No. of occupants are restricted to only two in class 100 to reduce the particles

Contamination Monitoring Techniques:





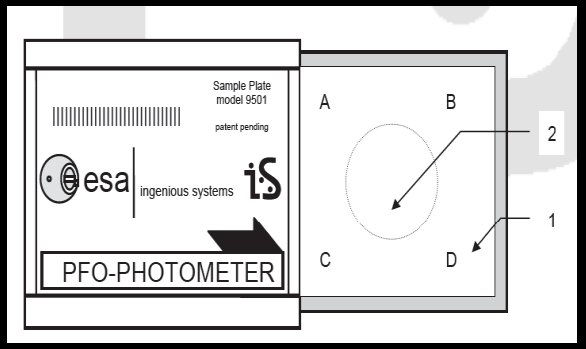
Black Light Inspection

White Light Inspection

Purging with 99.999%Pure GN2 (UHP Grade)

LASER PARTICLE COUNTER

ULTRA VIOLET LAMP



PFO PLATES

REFLECTOMETER SETUP

BAKING CHAMBER SETUP

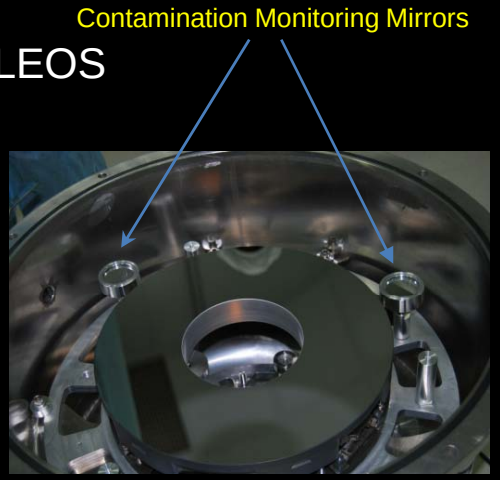
GLASS DESSICATOR SETUP

UVIT MIRRORS CONTAMINATION MONITORING ……..

Each mirror has two witness reflective mirrors – one for periodic measurement and other for cumulative measurement – By LEOS

Each mirror has two witness MgF2 Windows – one for periodic measurement and other for cumulative measurement – By IIA

Apart from this one witness MgF2 window for each telescope – By LEOS



RESULTS

Collimator Primary & Secondary witness mirrors shown
some reduction(130-140 nm range) – But no reduction in MgF2
Primary - ~5% ; Secondary - 5-7%

Detectors:

Witness samples and contamination control were performed during fabrication and test of the detectors prior to delivery. No contamination was measured.

At MGKML during storage each detector had one witness window – No reduction in transmission

Detector Contamination monitoring

Packing, containerization and transportation:

Payload …..

- Covered with multilayer poly bags to minimise the contamination.
- Adequate provision for internal flushing with dry N2 during transport.
- Inlet and outlet valves to control the purging rate
- Contamination witness window in the container during transportation.
- On line Shock watch monitors to find out the impact level during transport.

Small Components……..

- Small clean parts shall be double bagged in airtight envelopes during transportation outside controlled clean areas.
- Bags for contamination sensitive items shall be flushed with dry N2 before sealing
- Only approved materials were procured as bagging material
- Resettable Shock watch monitors & Labels to find out the impact level during transport.

Loading on the inner container base

UVIT Placed inside the inner container

Inner container placed inside the
inner container

Outer Container loaded on the truck
For transport to ISITE

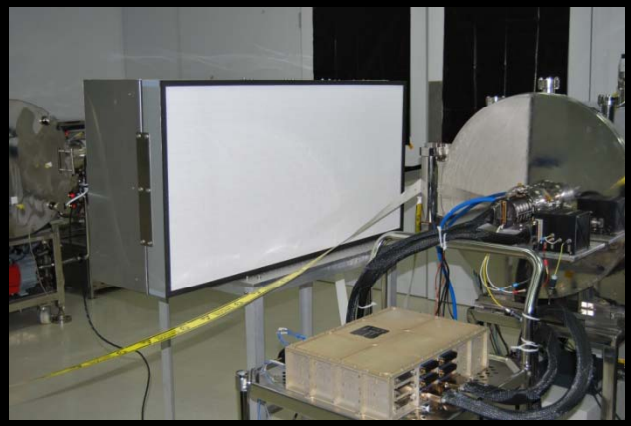
Transportation Accelerations:

- Two resettable shock watch monitors on outer container (5g&10g)
- Two resettable shock watch monitor on inner container (5g&10g)
- Online shock watch monitor – Tri axial Piezoelectric Accelerometer

Five times we have transported the EM payload for various tests

- No accelerations of > 5 g anywhere
- Accelerations on the inner box are < 1 g

During Environmental tests:



- The purging has been implemented at payload level during functional and performance tests at less clean conditions, during and after vibration and TV tests, during all the phases without activities and during storage phases.

- During downtimes when PAYLOAD is not actively being worked on, or for weekends and other non-operational times, It shall be kept covered with black removable poly cover
- During Door deployment test & Optical alignment checks at ISITE/ISAC clean class 100 filters have been used to minimise the contamination effect
- Recurrent cleaning of test facilities has been ensured to minimise particulate contamination.

Class 100 enclosure

False Ceiling

AHU Area

Chiller Yard

Thank you !!!