

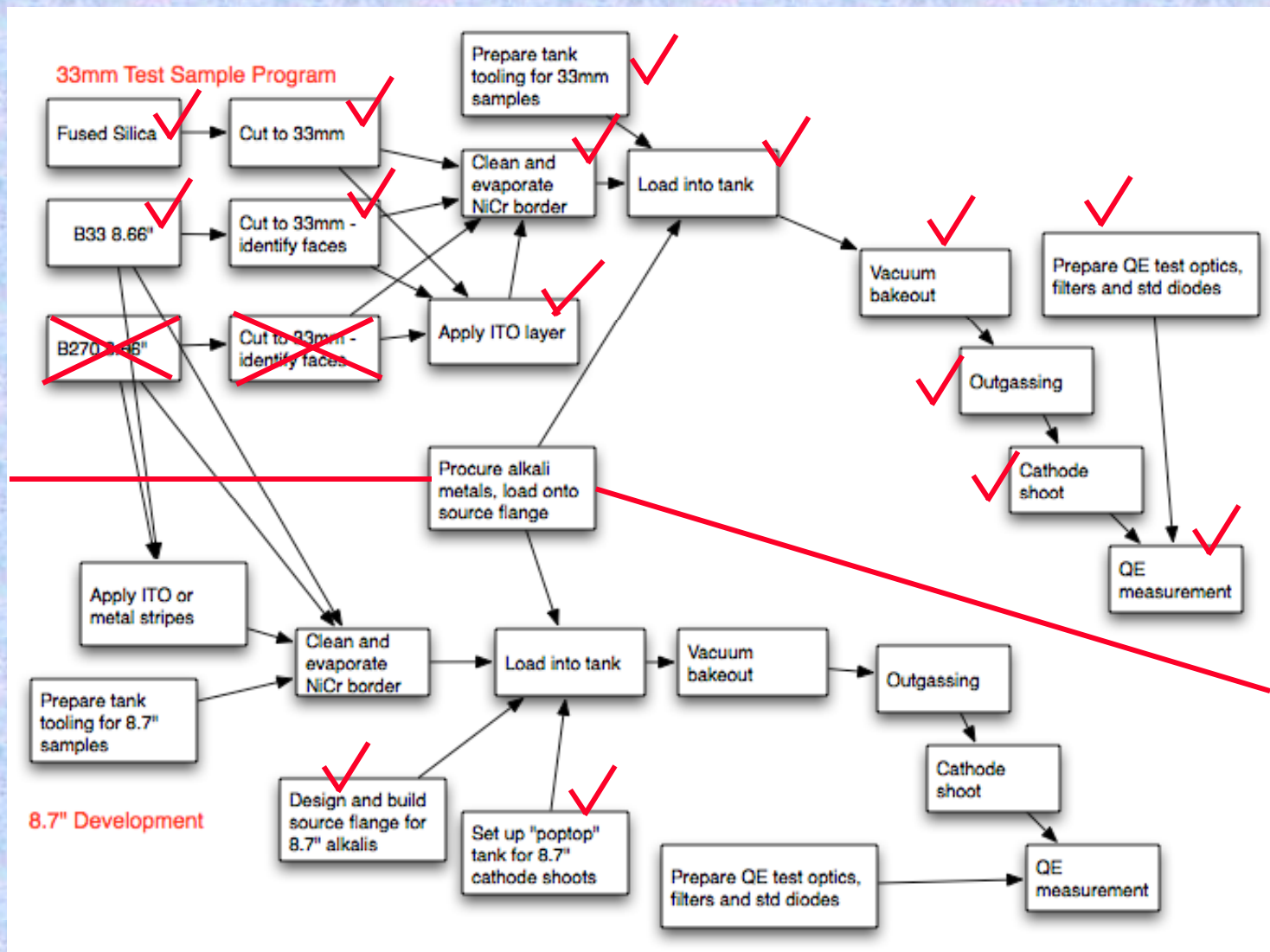


Bialkali Photocathode Development

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Work Flow Program for Bialkali Cathode Development





Facilities Overview at SSL

SPECIFIC FACILITY

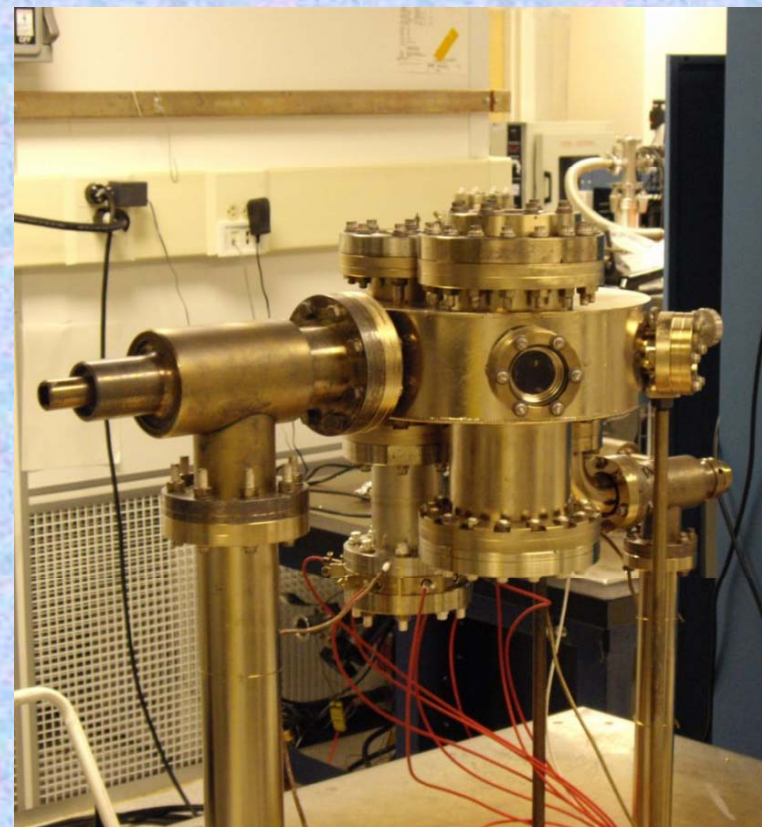
SAMPLE SIZE

LARGE 8.6" SIZE

- | | | |
|----------------------------------|----------------------------|------------------|
| • Precision Wet Cleaning | In Service | In Service |
| • Vacuum Baking | In Service | In Service |
| • N2 & Vacuum Storage | In Service | In Service |
| • Hi-Pot Station | In Service | In Service |
| • Plasma Cleaning | In Service | In commissioning |
| • Helium Leak Checker | In Service | Needs an adapter |
| • Electrode Evaporation | In Service | Ready |
| • 1.2" PC Process Chamber | In Service | N.A. |
| • 8.6" Cathode/seal/test Chamber | Being cleaned/commissioned | |
| • 8.6" Full Process Chamber | Delivery in November | |



Tube Lab, 1.2" sample test/process station.

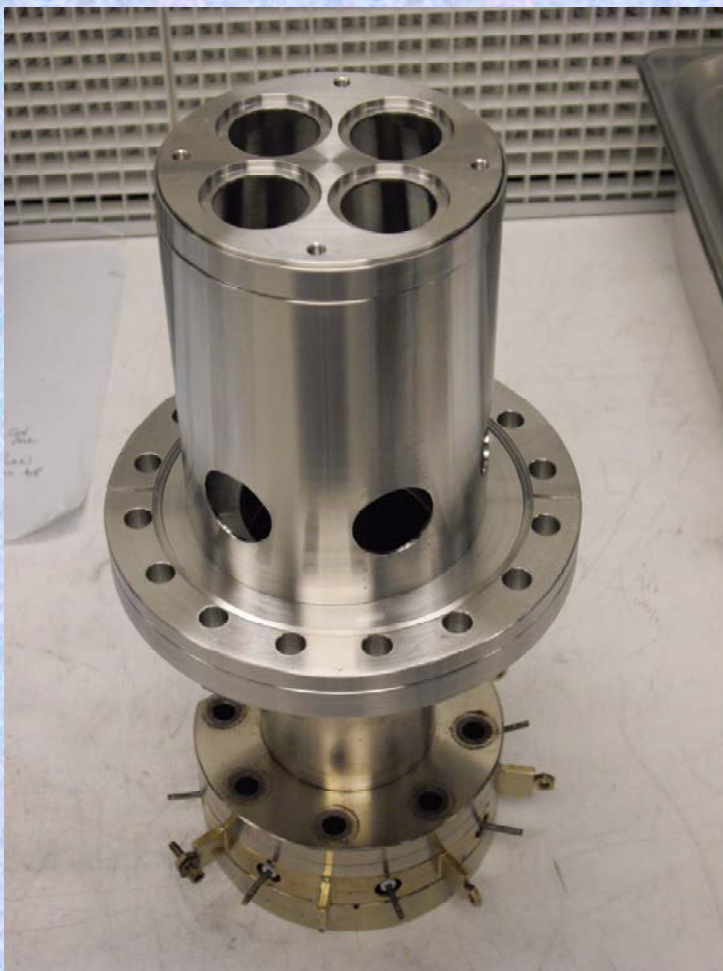


Small tank used to process alkali cathodes (33mm) and tubes of small area. Can take 4-8 samples/run. 3 runs done, #4, #5 planned.

- **Small sample test runs**
- **Substrate material tests**



1.22" Substrate Sample test Bialkali Cathodes.



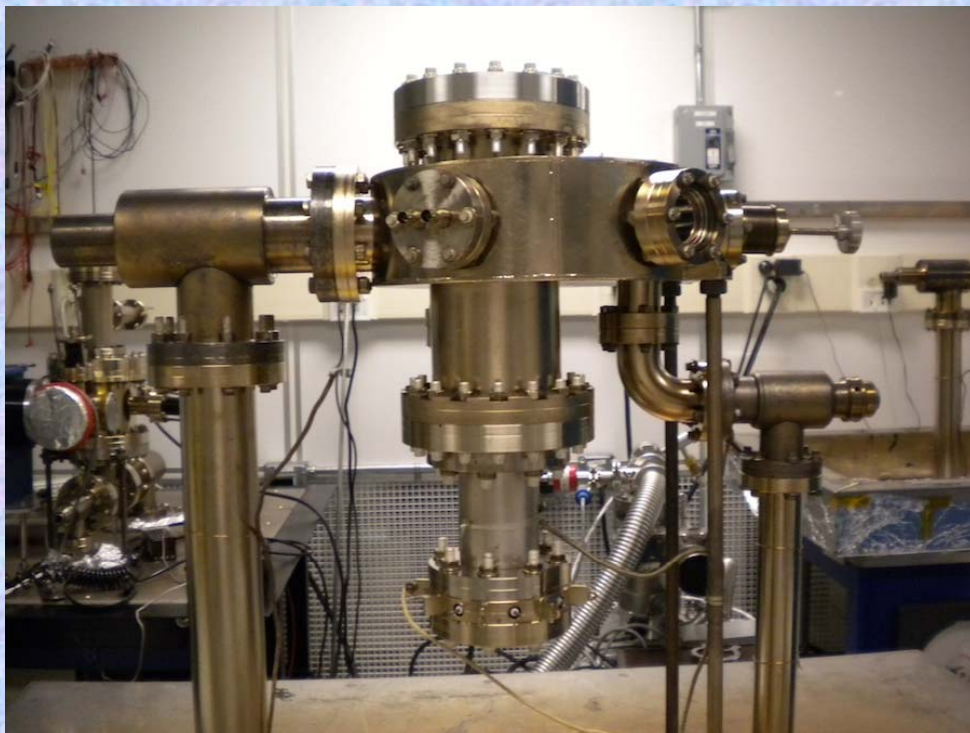
Small sample test runs, 1.22"

- **Substrate material tests**
 - **Fused silica and B33**
 - **ITO and MgO ALD layers**

**New alkali / sample setup used to process Bialkali cathodes (1.22").
Can now deposit 4 simultaneous samples/1 cathode shoot.**



1.22” Substrate Sample test Bialkali Cathodes.



Small tank used to process Bialkali cathodes now modified to deposit 4 simultaneous samples/1 cathode shoot.



Small sample test runs, 1.22”

- **Substrate material tests**
- **Fused silica and B33**
- **ITO and MgO ALD layers**



8.6" Photo-Cathode / Seal test Chamber

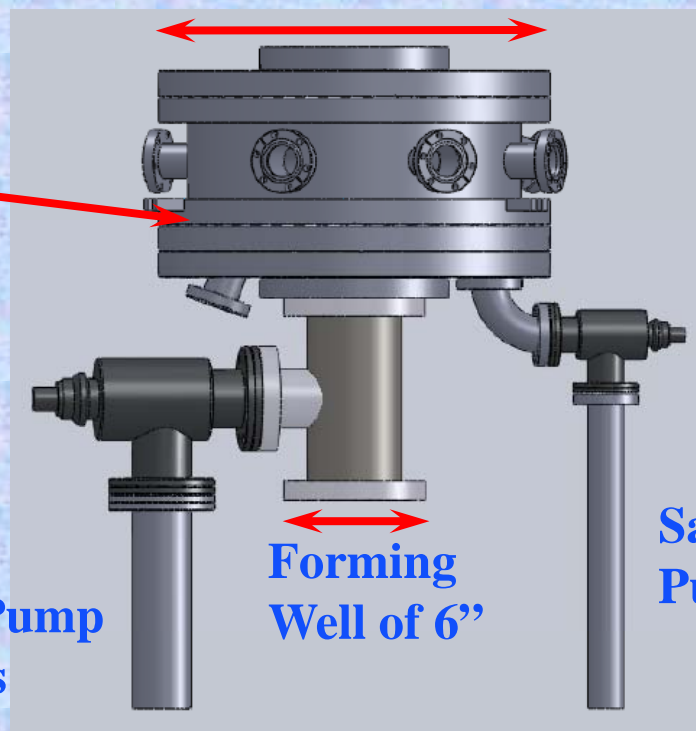


**Larger 16" flange tank,
can take full size windows
(8.7") to test**

- Quantum efficiency**
- QE Uniformity**
- Seal tests**

8.6" Square PC/seal test process chamber with 14" Dia. Capability 16.5" Dia. Chamber on exact same pumping lines and valves as existing chamber

**16.5" Flange In Fabrication
Chamber Access**



Same All-Metal Valves

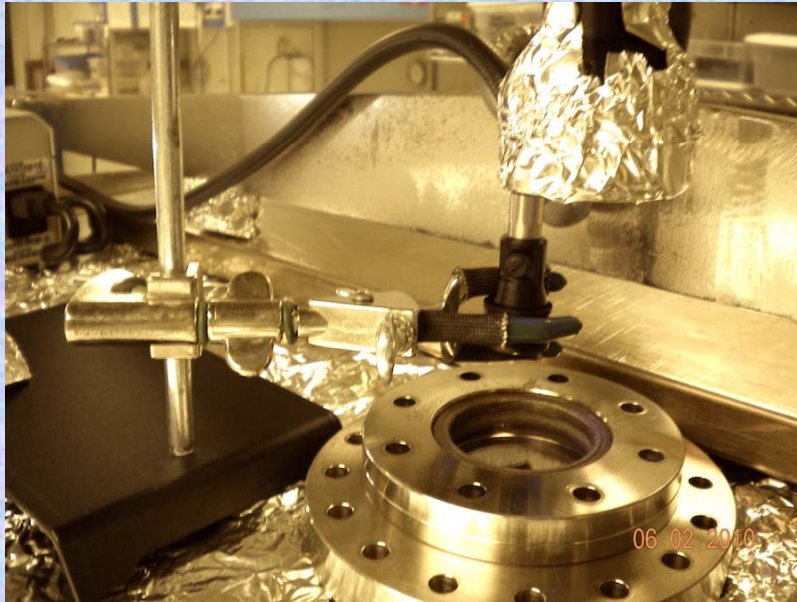
Same Rough Pump Line

Ion Pump Lines

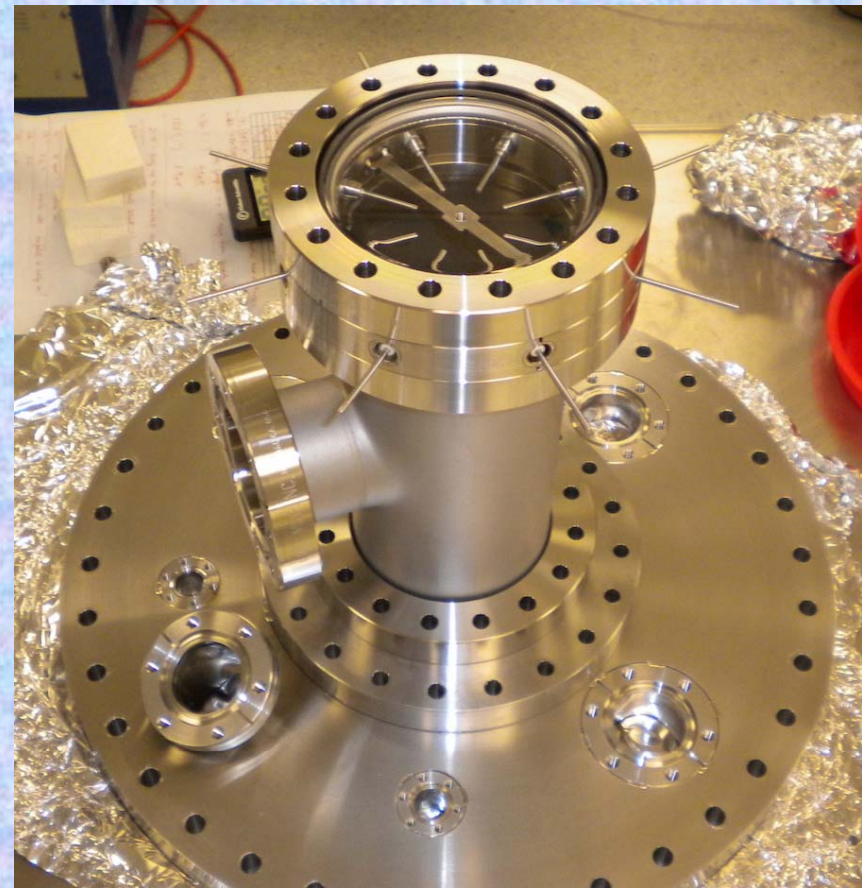
Forming Well of 6"



8.6" Photo-Cathode / Seal test Chamber



New larger alkali sources for 8.6" photocathode test chamber, to test depositions for final use in detector processing tank.

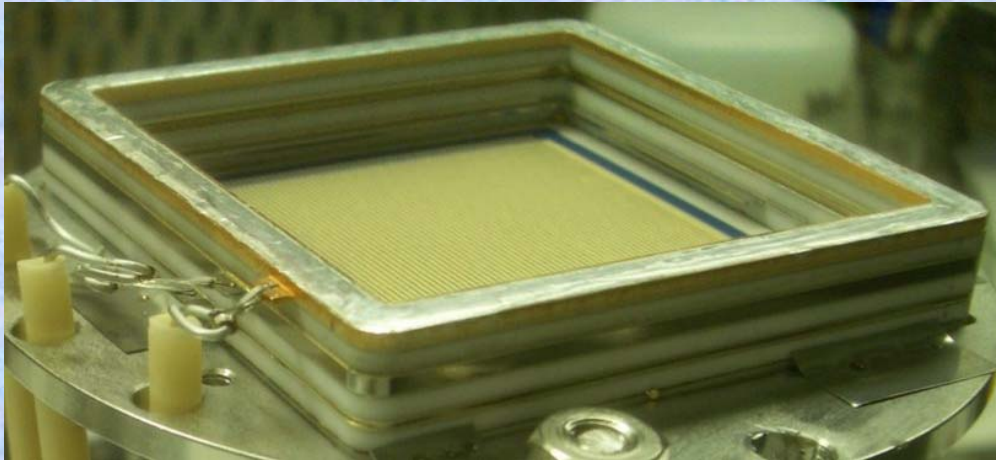


Process light sources

- fiber optic halogen lamp
- multiple interference filters
- UV/blue LEDs
- Full range of narrow band LEDs



Window Seal Development and Cathode Test "Diodes"



3" ceramic body with strip anode, and metal frame with Indium seal

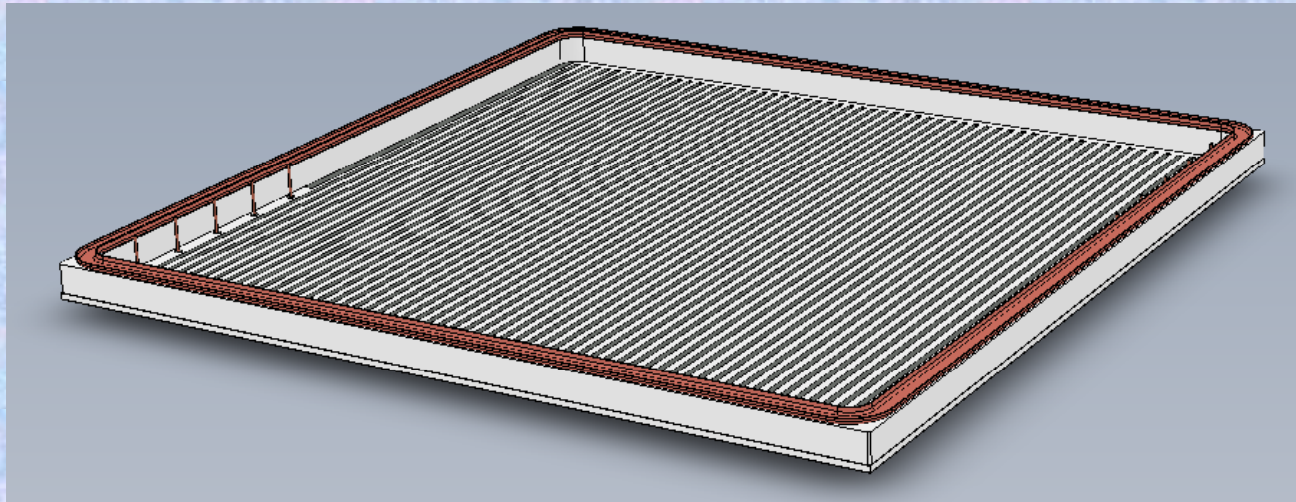
Prior Indium test Examples



3" window test article on metal frame with Indium seal



Window Seal Development and Cathode Test “Diodes”

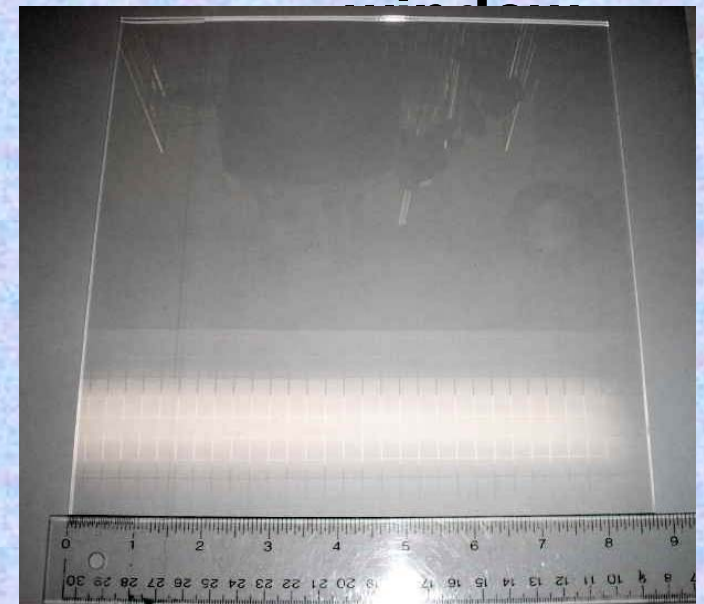


8.7” B33

8.7” ceramic body with strip anode, and Cu frame with Indium seal

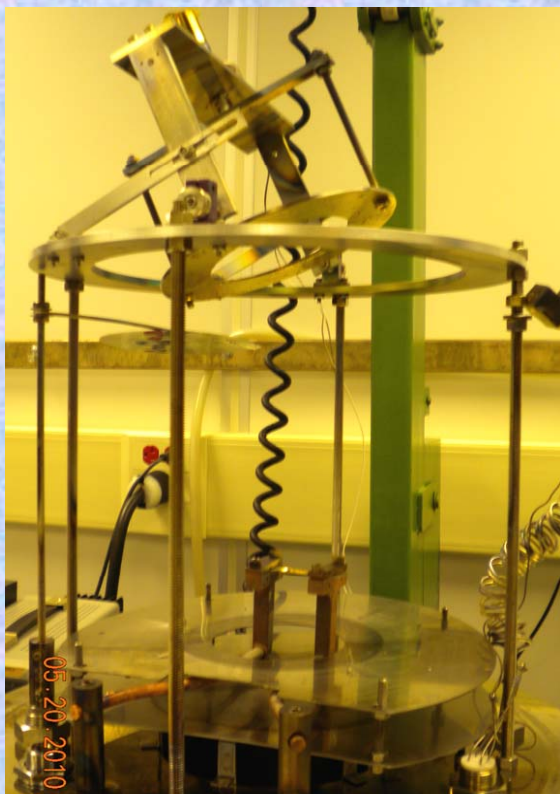
**Ceramic frame and Cu well arriving in a few weeks
Braze them, use this partial assembly for In seal tests**

**Have many 8” B33 windows
Need to analyze surfaces (Sn), deposit ITO
Clean surfaces, deposit electrode/seal border**

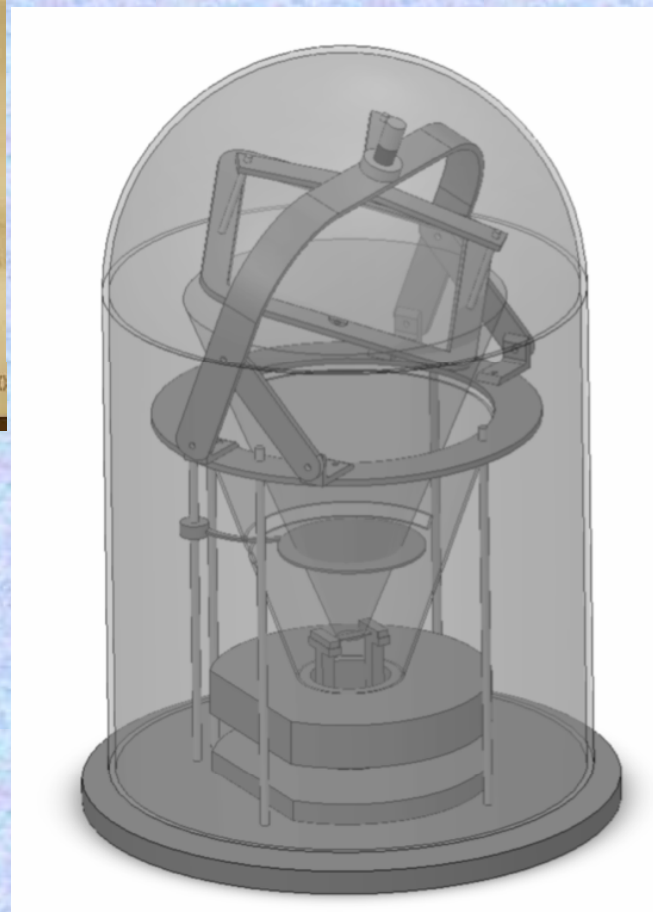




Evaporator design modifications to accommodate 8.7" windows



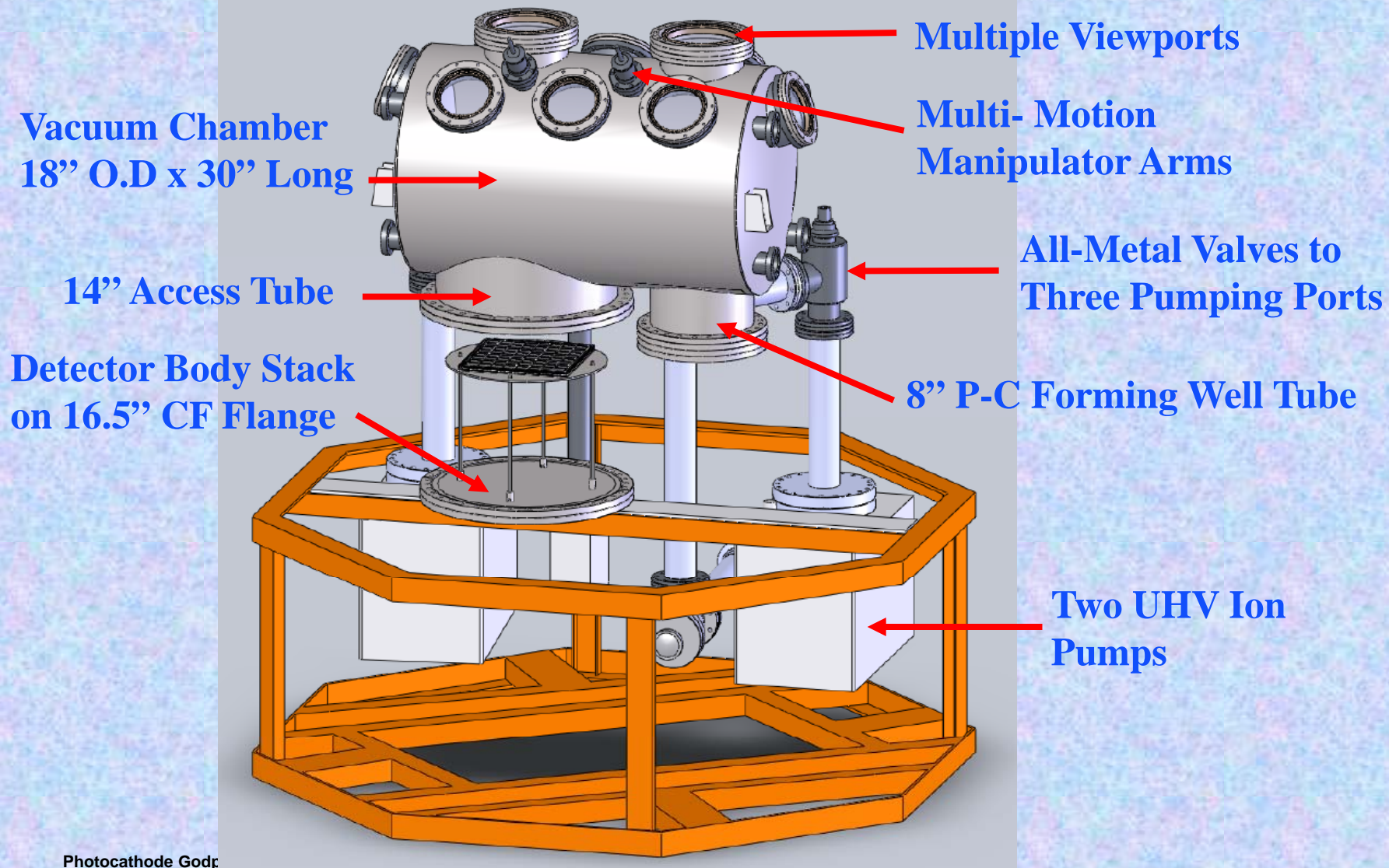
**Current Bell Jar Set-Up w/
Fixturing for 33mm
Sample Evaporations**



Modifications done for NiCr/Cu evaporation tooling for 8.7" windows



Large Process Chamber Design





8" Tube and Cathode Process Tank System

Large window cathode development, 8.66" square

- Fully implement alkali source for large cathode areas
- Commission 8" cathode/window seal process tank
- Develop wet cleaning and plasma cleaning processes
- Establish metalization tests, ITO deposition
- Trial seals on 8.66" "frames"
- Commission large full tube process tank (Nov)
 - Cathode test runs
 - Seal test runs
- Then
- Make LAPD 8" tubes