

Photocathode Lab & Measurement Infrastructure

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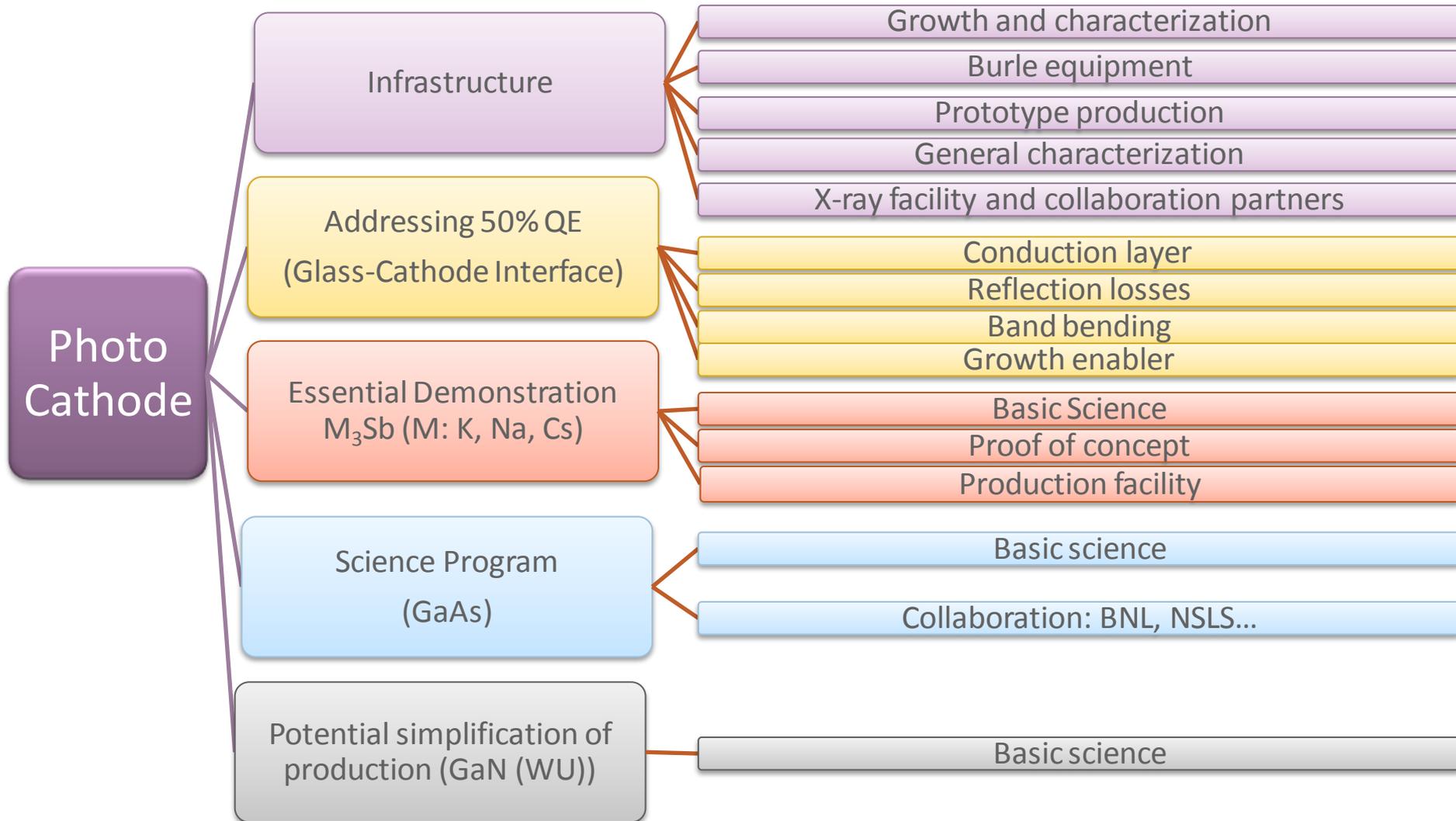
**High Energy Physics Division
Argonne National Laboratory**

Outline

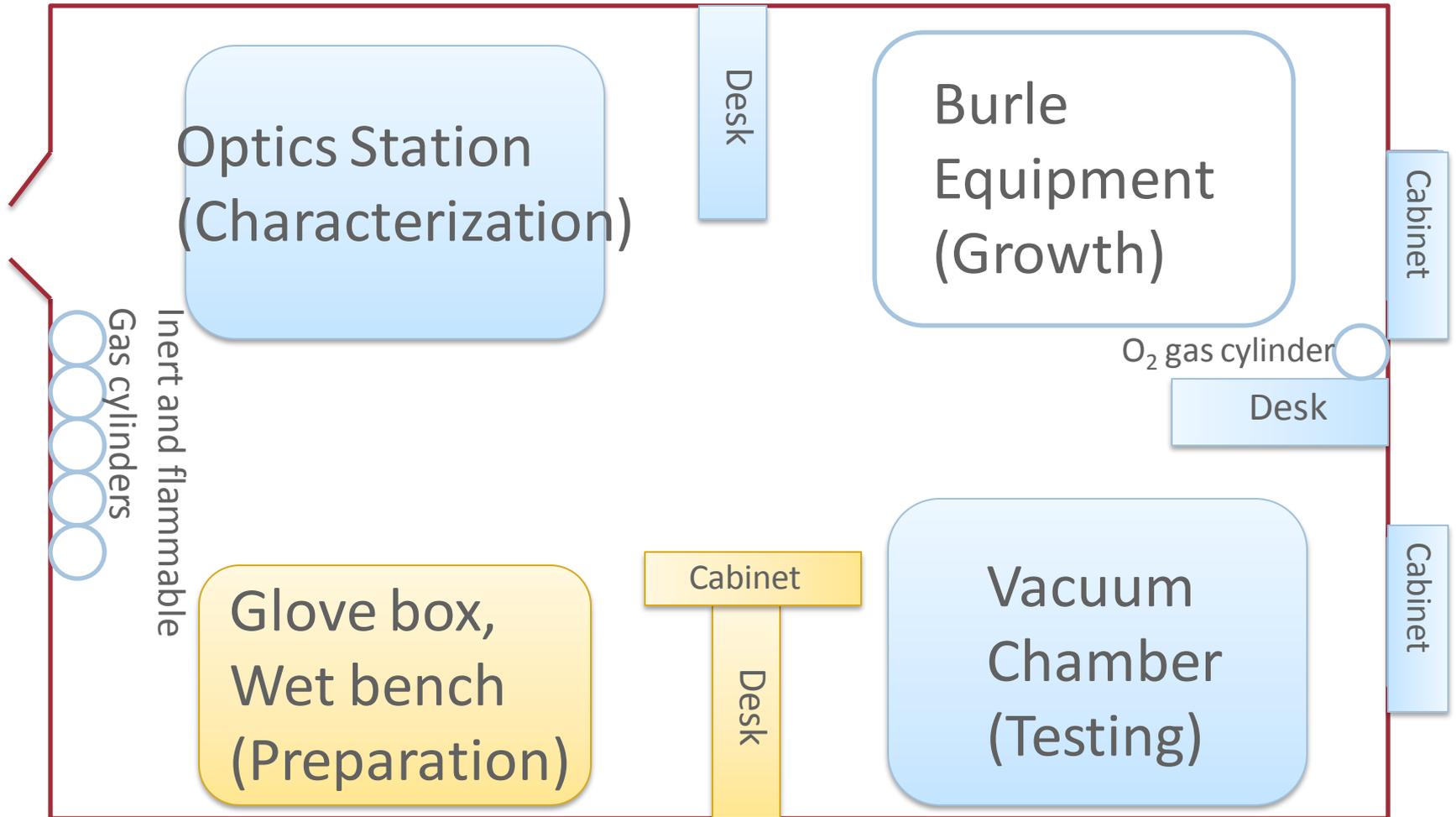
- **The photocathode building blocks at ANL**
- **Plan view of photocathode lab**
- **Absolute QE measurement system**
- **In-situ QE measurement**
- **Other equipments under construction**
- **Conclusion**



The Photocathode Building Blocks at ANL



Photocathode Lab Plan View



Comparison of absolute and in-situ QE measurement

Absolute measurement

Advantage:

Over wide wavelength range: 190-1600nm
Measure absolute $QE(\lambda)$
Measure correlation between absorption and photocurrent
Measure angular distribution of I_R, I_t, I

Disadvantage:

Slow
Only determine the properties for a given λ

Technical details:

Free beam path
Combined with Goniometer

In-situ measurement

Advantage:

Fast: in KHz range
Measure direct QE depending on λ and derivative $\delta QE/\delta \lambda$
Measure different positions

Disadvantage:

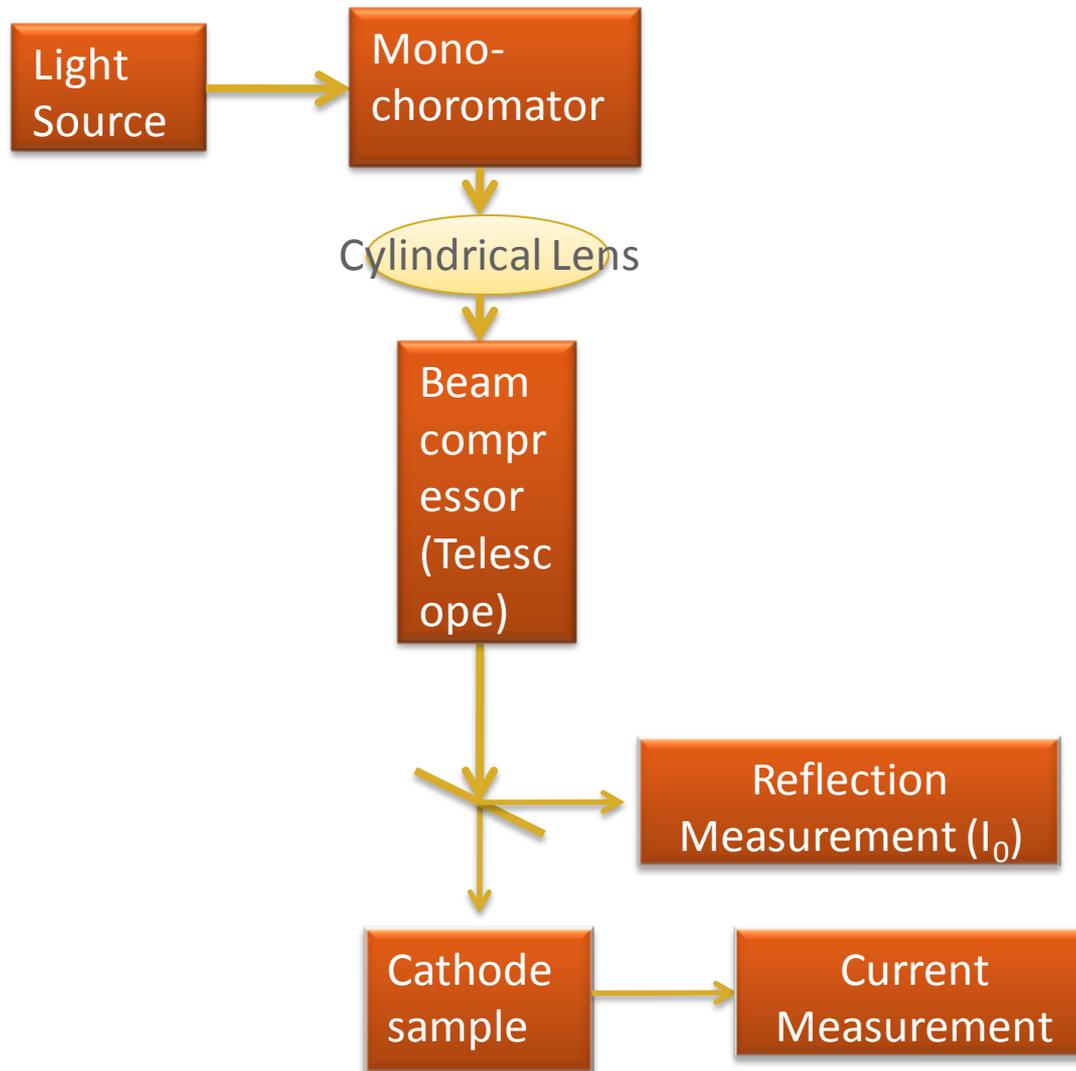
Can only measure 3 wavelengths
Can not measure I_R, I_t
Can not measure angular distribution

Technical details:

Based on fiber optics
Be able to measure photocurrent, and perhaps reflectivity (combined with photodetector)

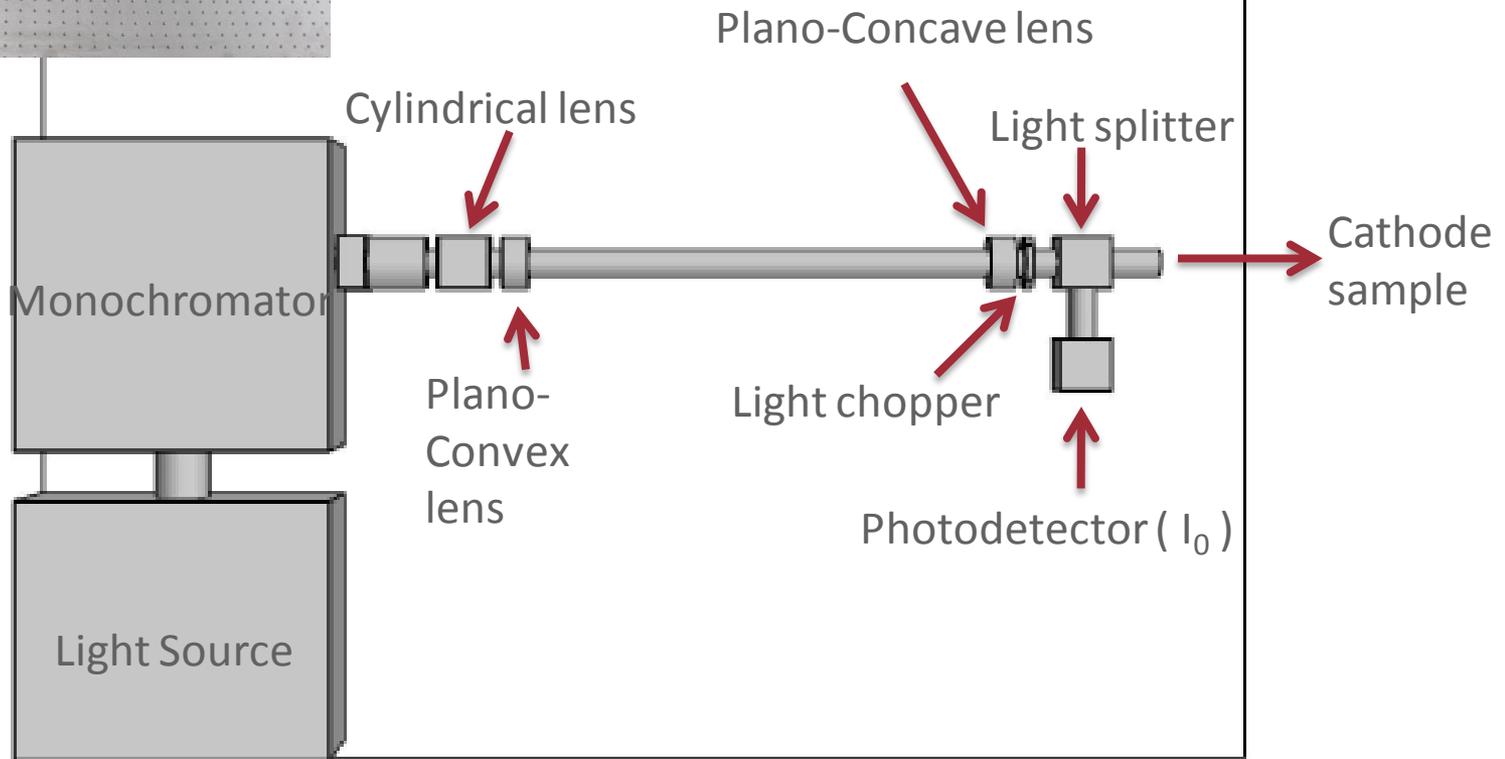
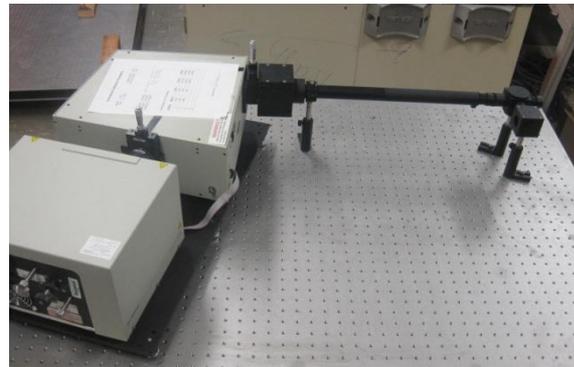


Absolute QE measurement lay out



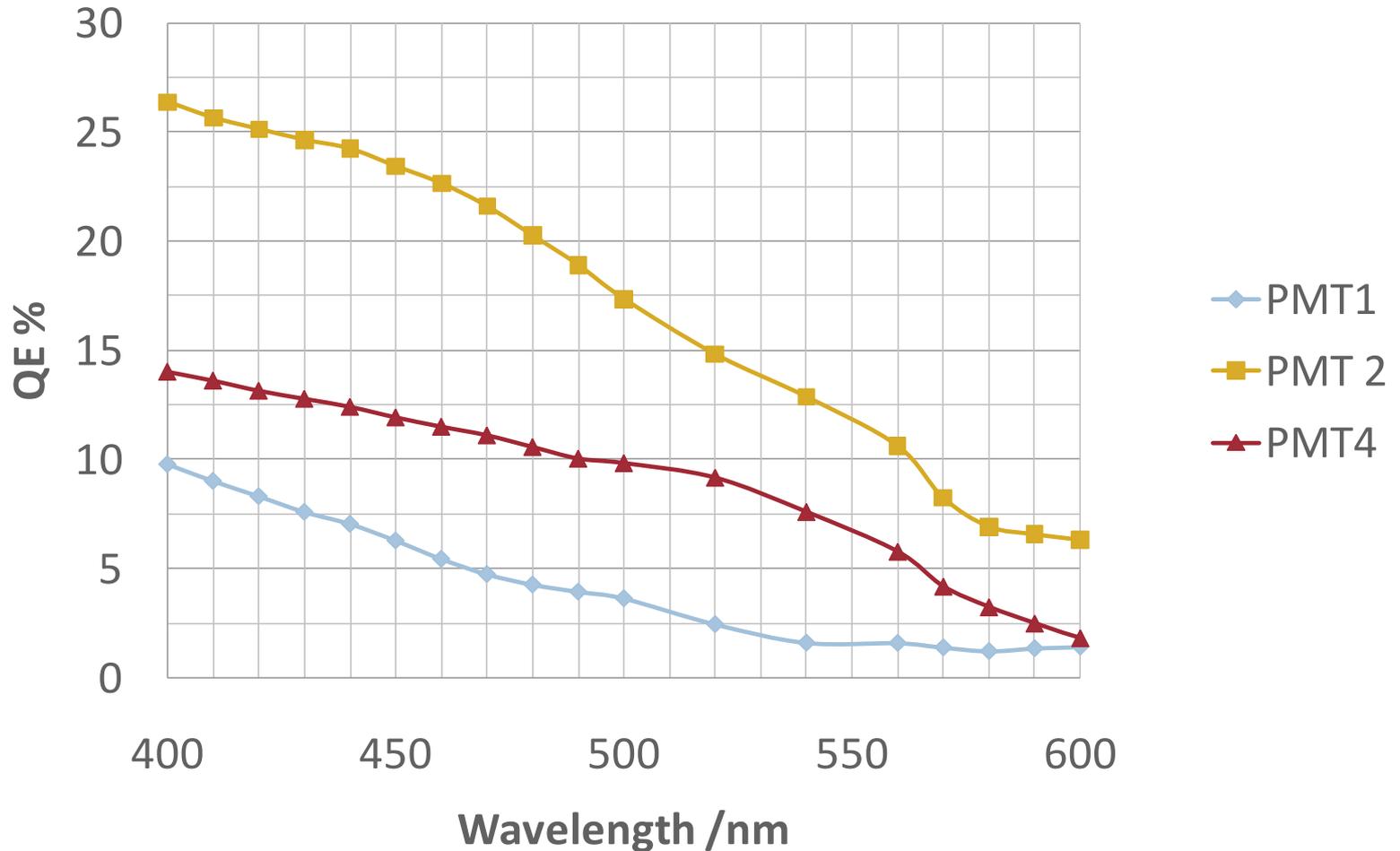
Optical measurement station

- for absolute-measurement



QE of three cathodes

- using absolute QE measurement



In-situ QE measurement lay out

LED Light Source

Focus lens

Fiber optic system

Collimating lens

Cathode sample

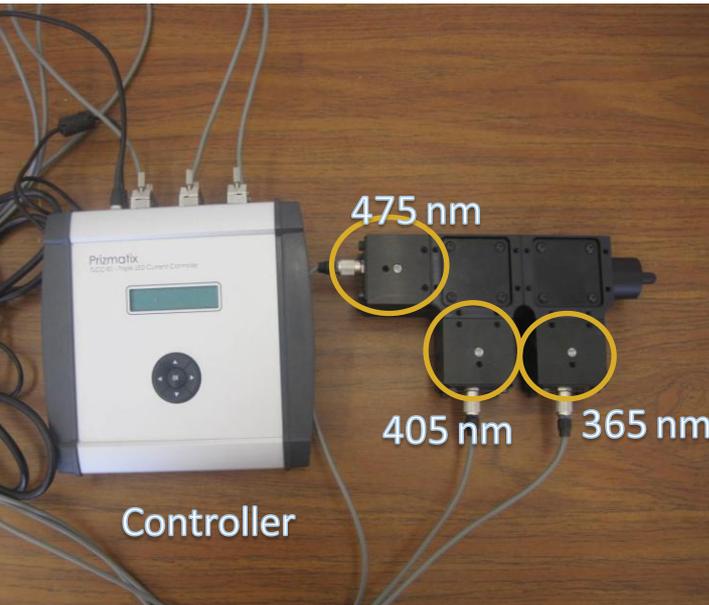
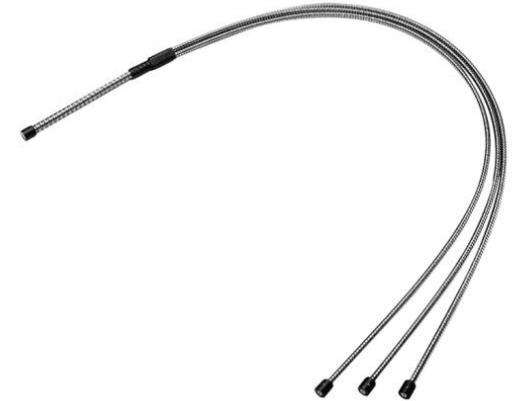
Current Measurement

475 nm

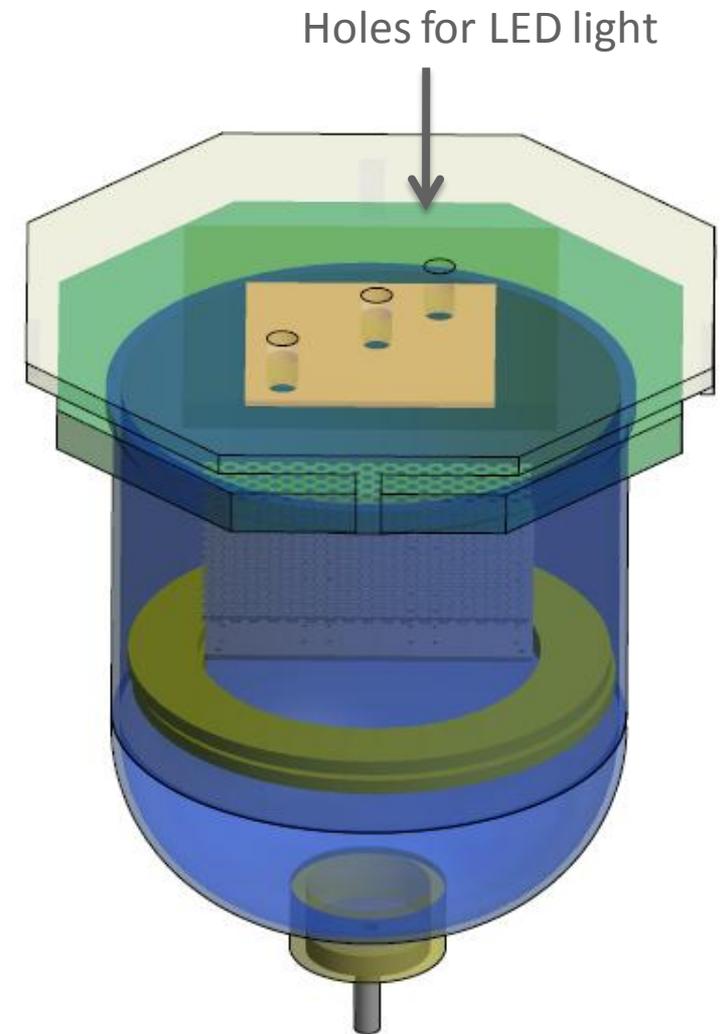
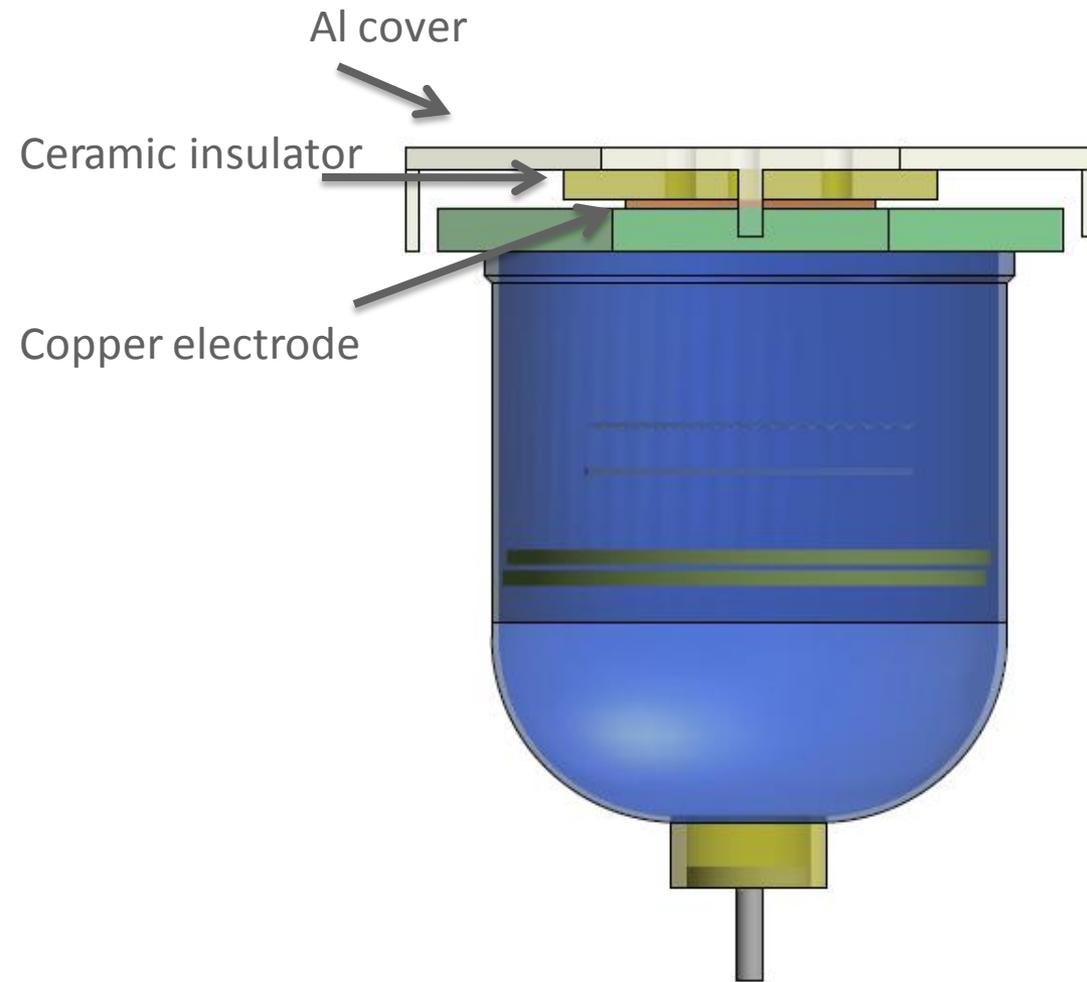
405 nm

365 nm

Controller



In-situ QE measurement design



Solid cover consists of three components, compatible with the chalice design



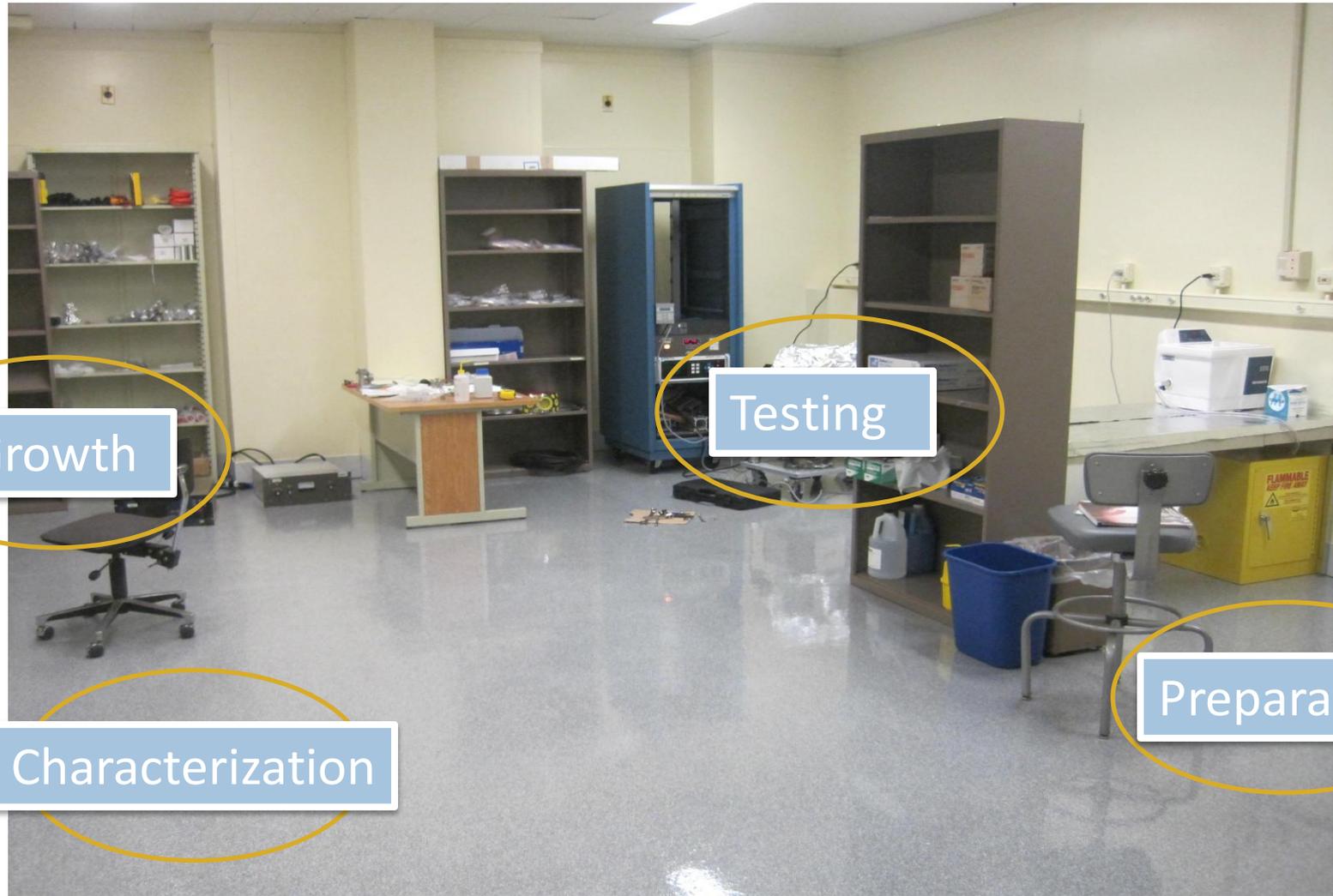
Glove box, wet bench



- Missing tubings were reconnected, glove box is ready for commissioning
- Gas delivery system in the lab is under construction (Dean Walters)



Photocathode Lab



Growth

Testing

Preparation

Characterization



Conclusion

- Both absolute and in-situ QE measurement systems were set up
- Three cathodes were tested with the absolute QE measurement system
- Glove box is ready and the gas delivery system is under construction
- Photocathode lab with preparation, growth and characterization facilities will be built up soon

