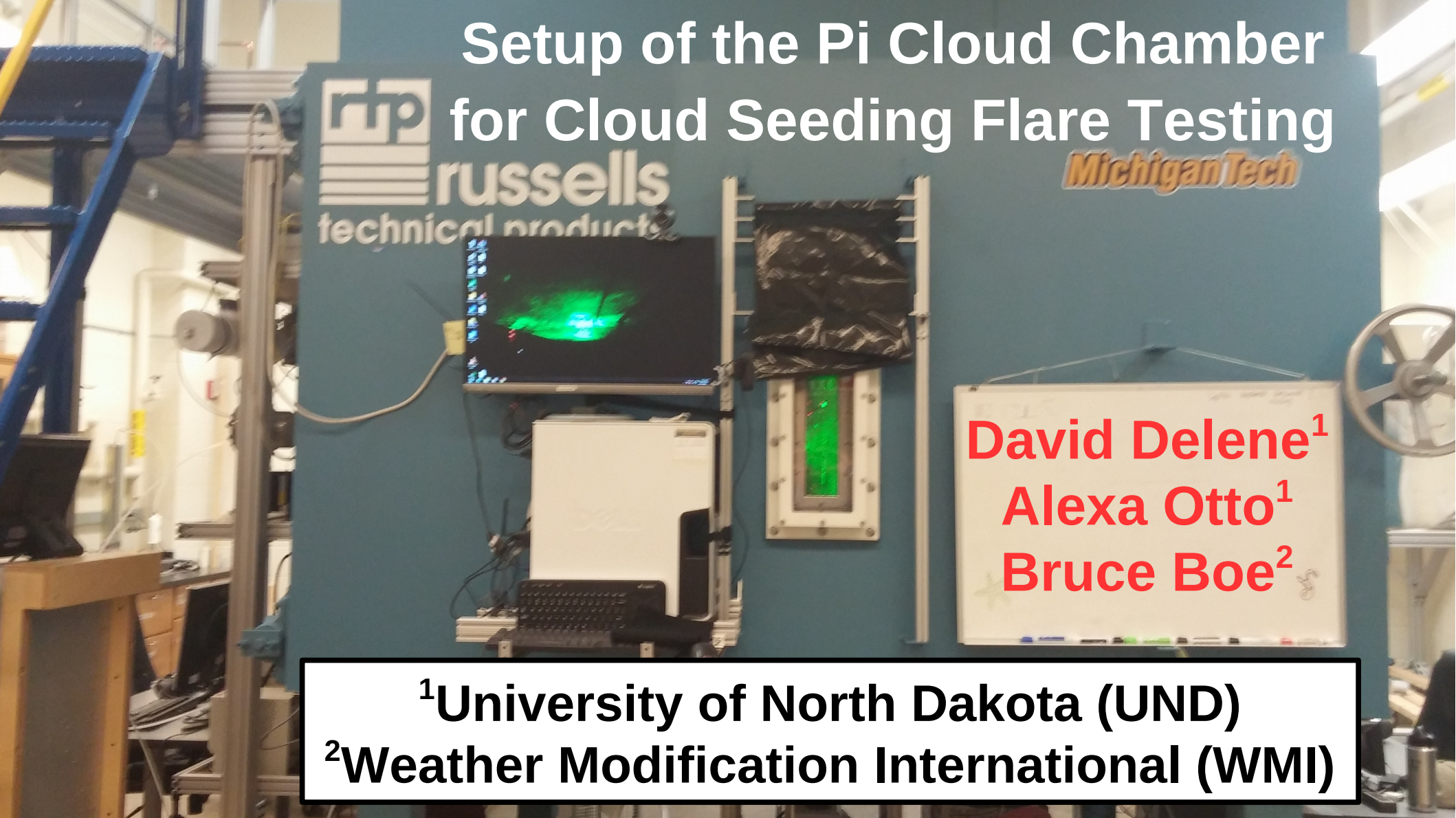
Setup of the Pi Cloud Chamber for Cloud Seeding Flare Testing



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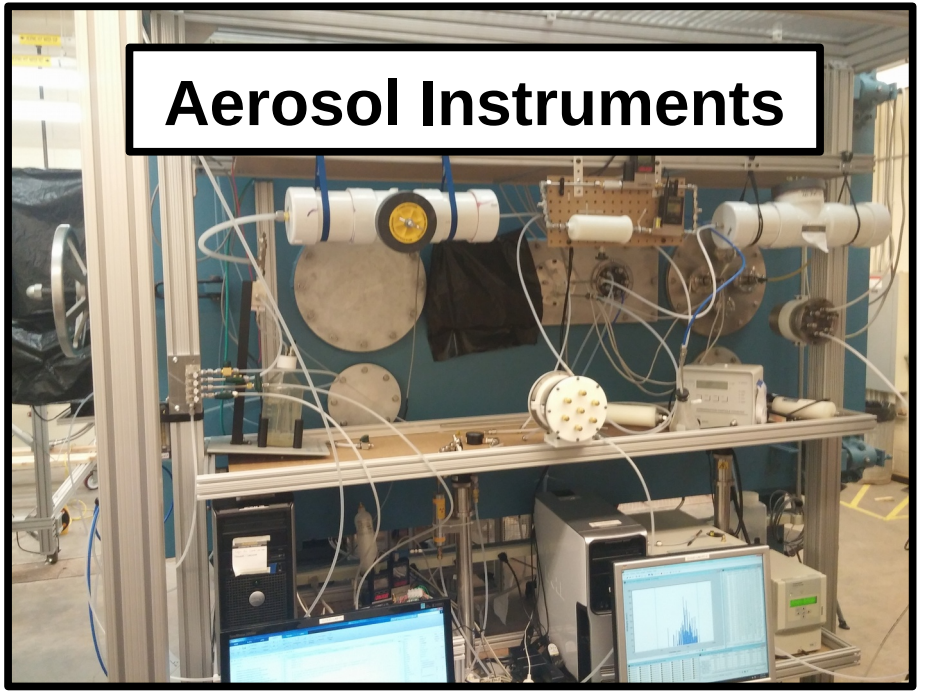
[2]Weather Modification International (WMI)

Objectives

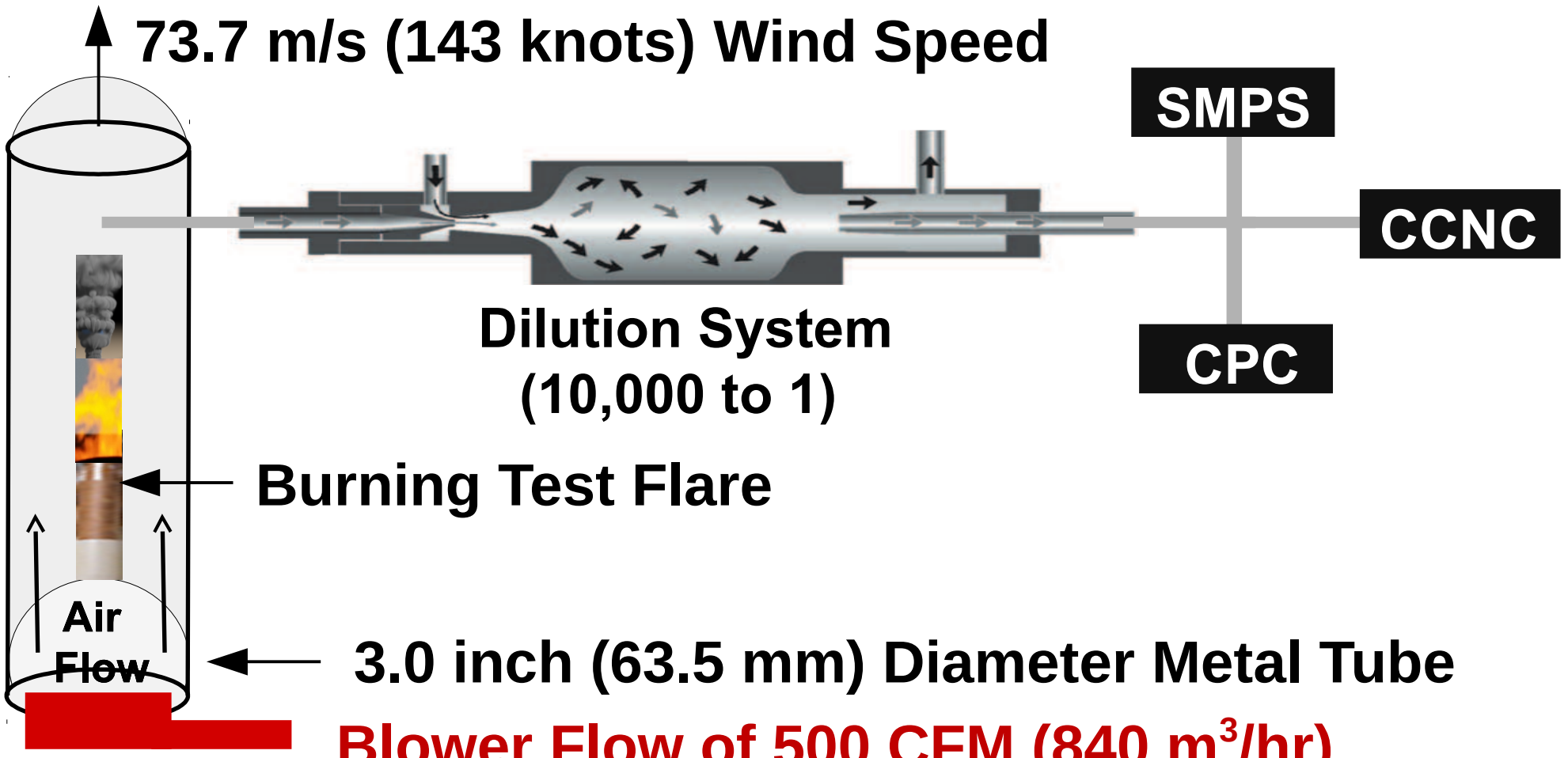
- Develop methods to test clouds seeding flares using existing cloud chambers that are reproducible
- Test Silver Iodide (AgI) flares with the Pi Cloud Chamber at Michigan Technological University (MTU).

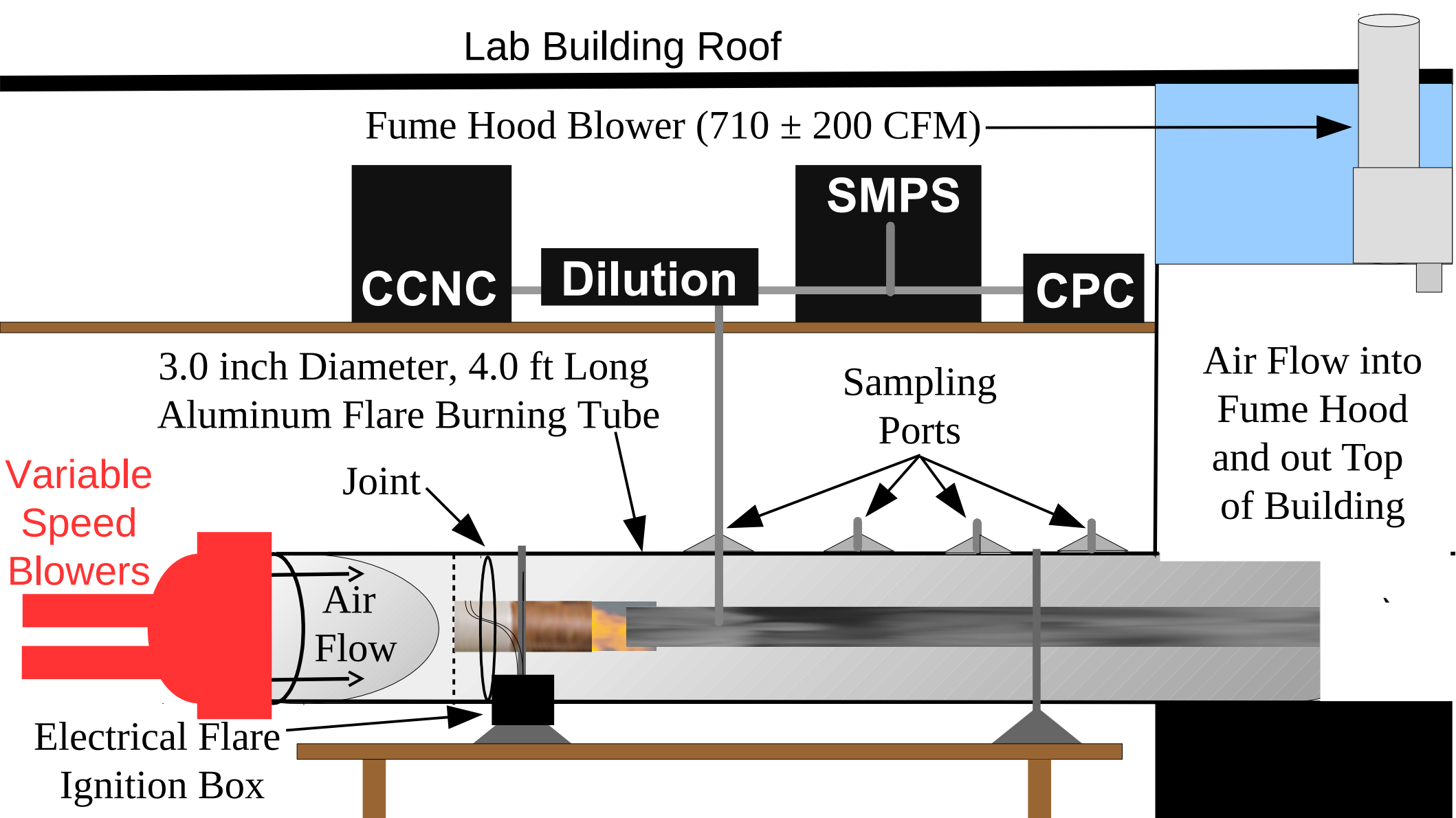
Pi Cloud Chamber Door



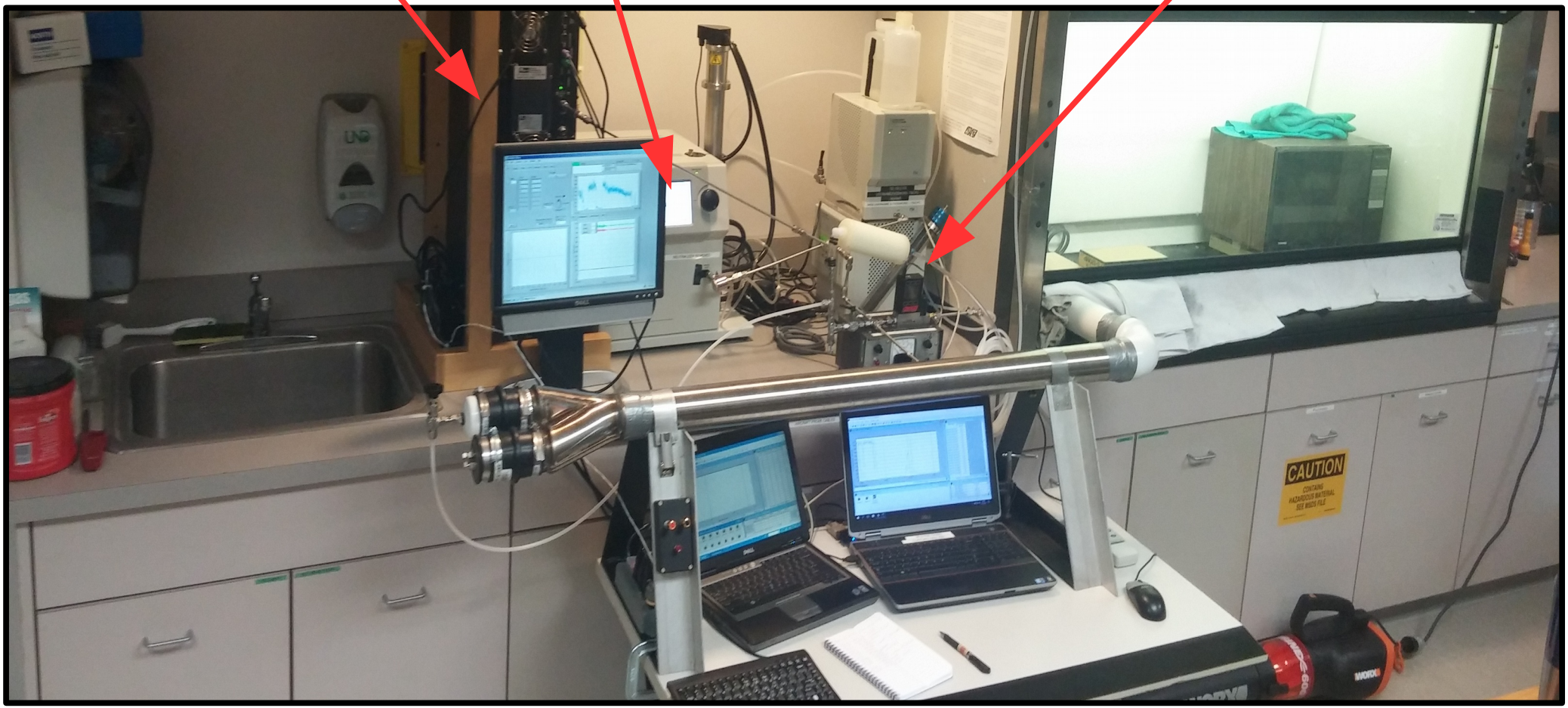
Aerosol Instruments

Initial Design of the Flare Burning System



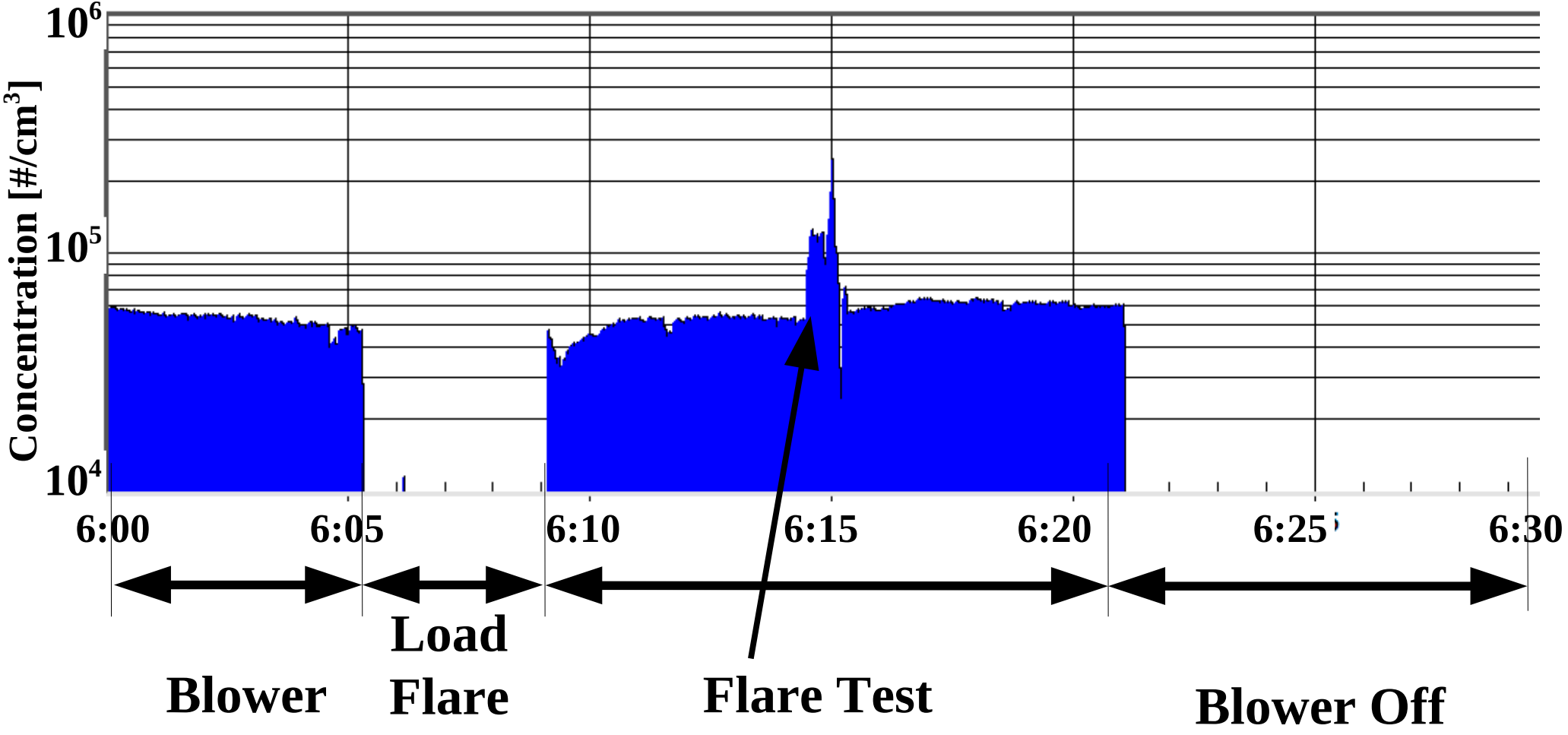

Lab Building Roof
Fume Hood Blower (710 ± 200 CFM)
CCNC
Dilution
SMPS
CPC
3.0 inch Diameter, 4.0 ft Long
Aluminum Flare Burning Tube
Sampling
Ports
Air Flow into
Fume Hood
and out Top
of Building
Variable
Speed
Blowers
Joint
Air
Flow
Electrical Flare
Ignition Box

Testing of Flare Burning System at UND



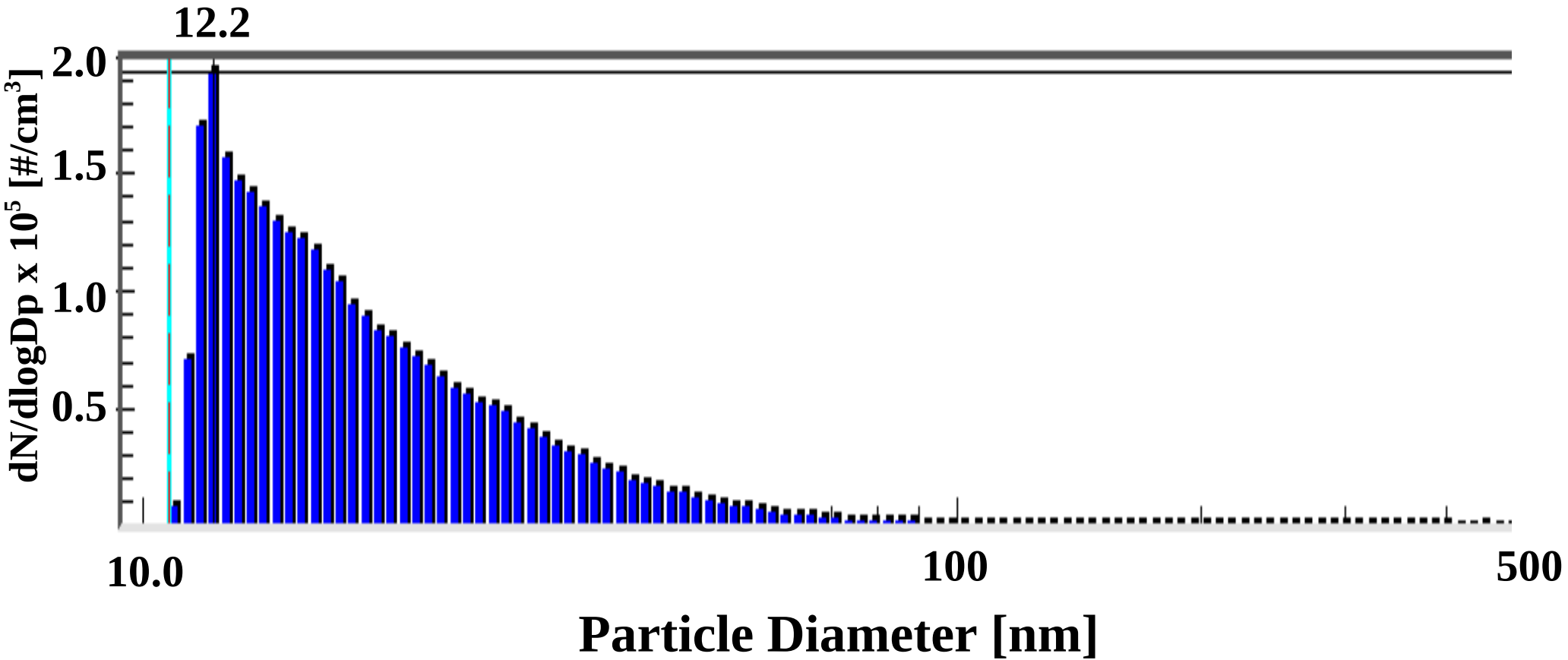
UND Lab Sampling on 10 April 2017

Aerosol (> 10 nm) Time Series (UTC)



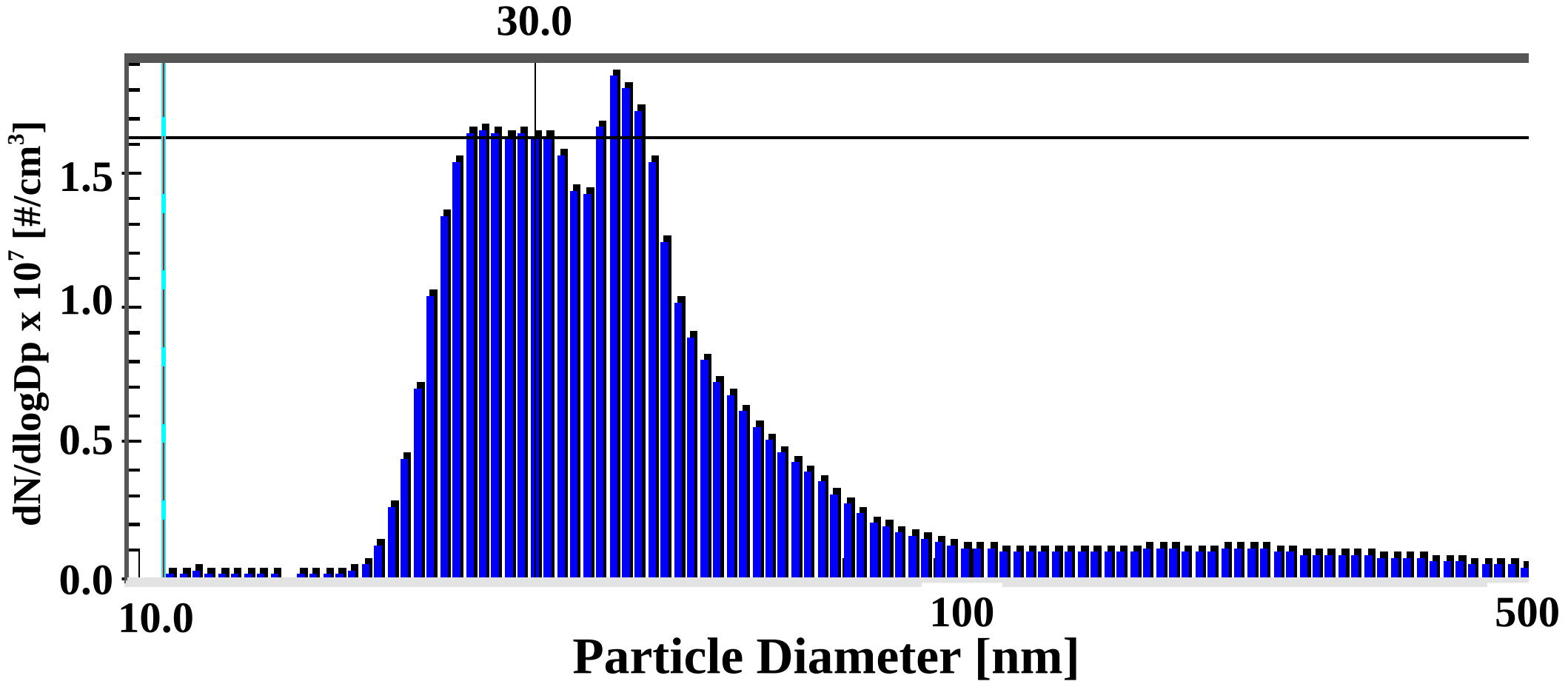
Particle Spectrum of Air Blowers

10 April 2017, 06:12 UTC, Sample 98

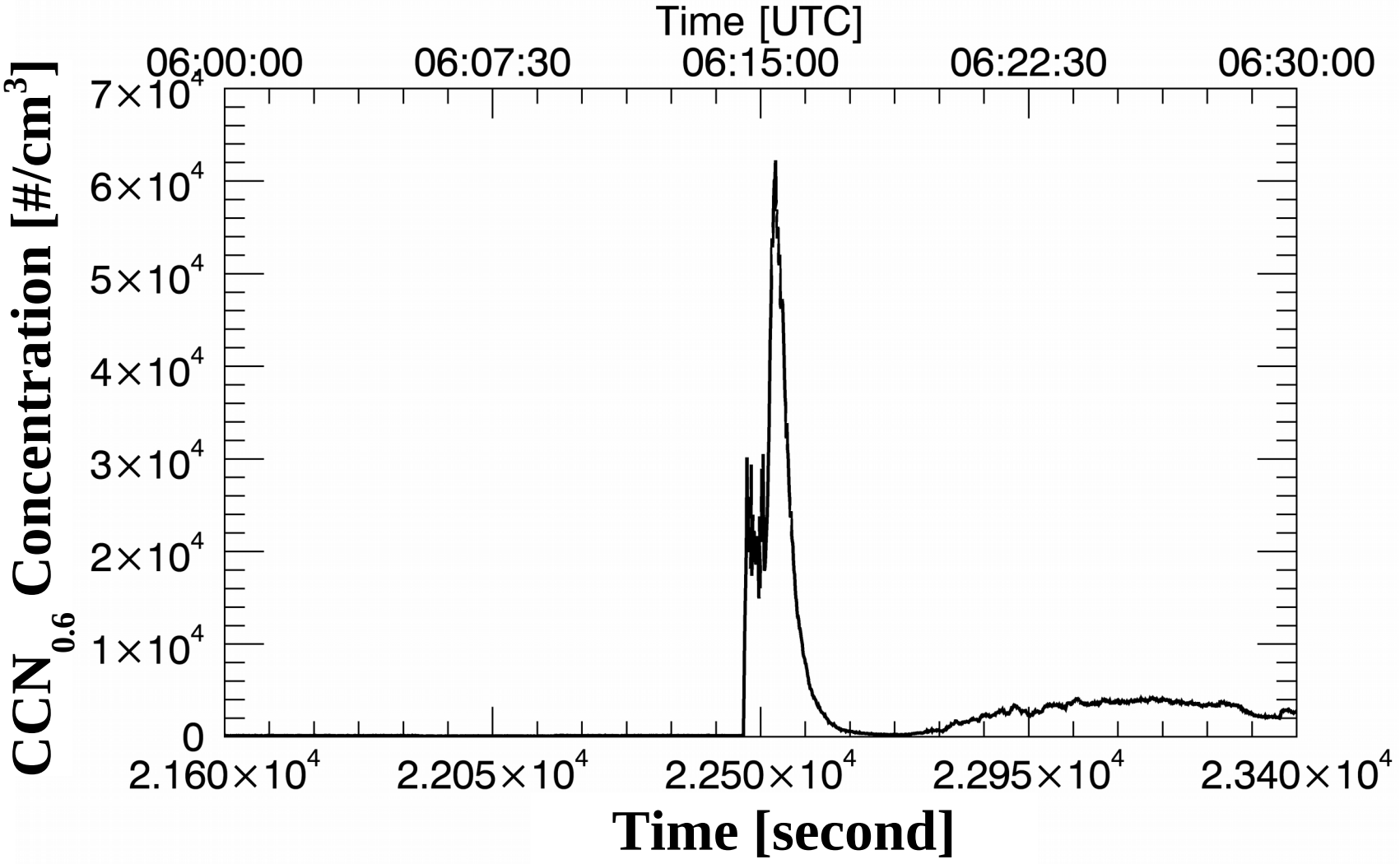


AgI Flare Burning with 100 knot Wind

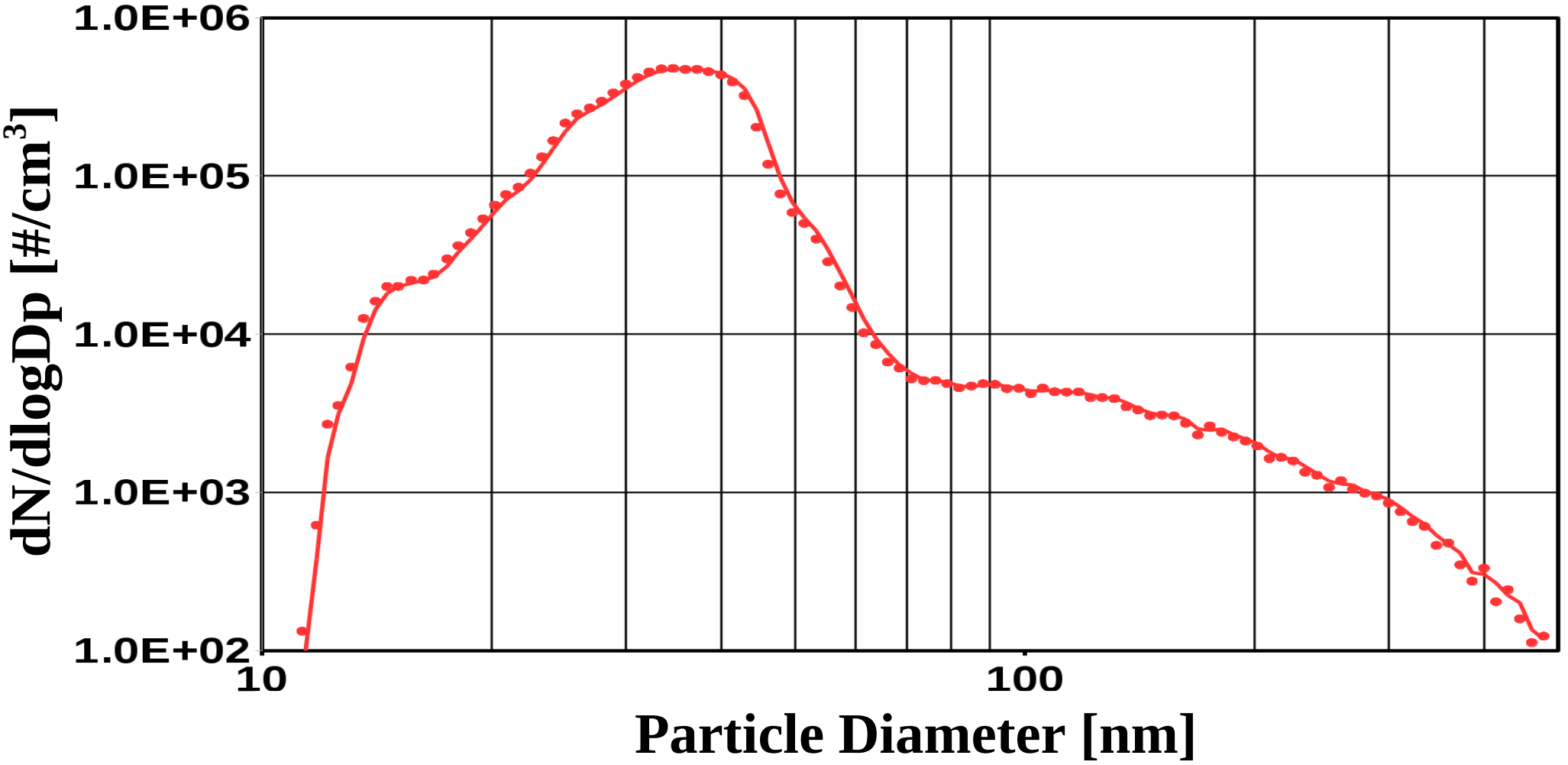
10 April 2017, 06:14 UTC, Sample 99



AgI Flare Test on 10 April 2017



AgI Flare (*Delene and Bow, WMA 2016*)
(4 November 2015, 16:48:48 – 16:51:05 CST)



Conclusion

- AgI flares can be safely sampled in the lab.
- Need an air filter and longer flare burn time.
- AgI are ~25 – 40 nm diameter particles.
- AgI activate as CCN at 0.6 % supersaturation.

Future Work

- Add blower filter system and conduct additional UND lab experiments with dilution system.
- Conduct first series of chamber tests.

UND Aerosol Chamber

MTU Cloud Chamber

Issues to be Resolved

- MTU’s flume hood has too low of flow rate.
- Need a real-time ice measurement system.

Outside Pi Chamber at MTU

- Need to have blower lines that exit outside of the building.
- Need to reserve space for ground generator.
- Ensure people know about the experiment.

Acknowledgements

- Todd Schulz – Build Flare Burning System (WMI)
- Charlie Harper – Produced Special 40 s Flares (ICE)
- Raymond Shaw – Showing the Pi Cloud Chamber (MTU)

Questions, Comments, and Discussion