

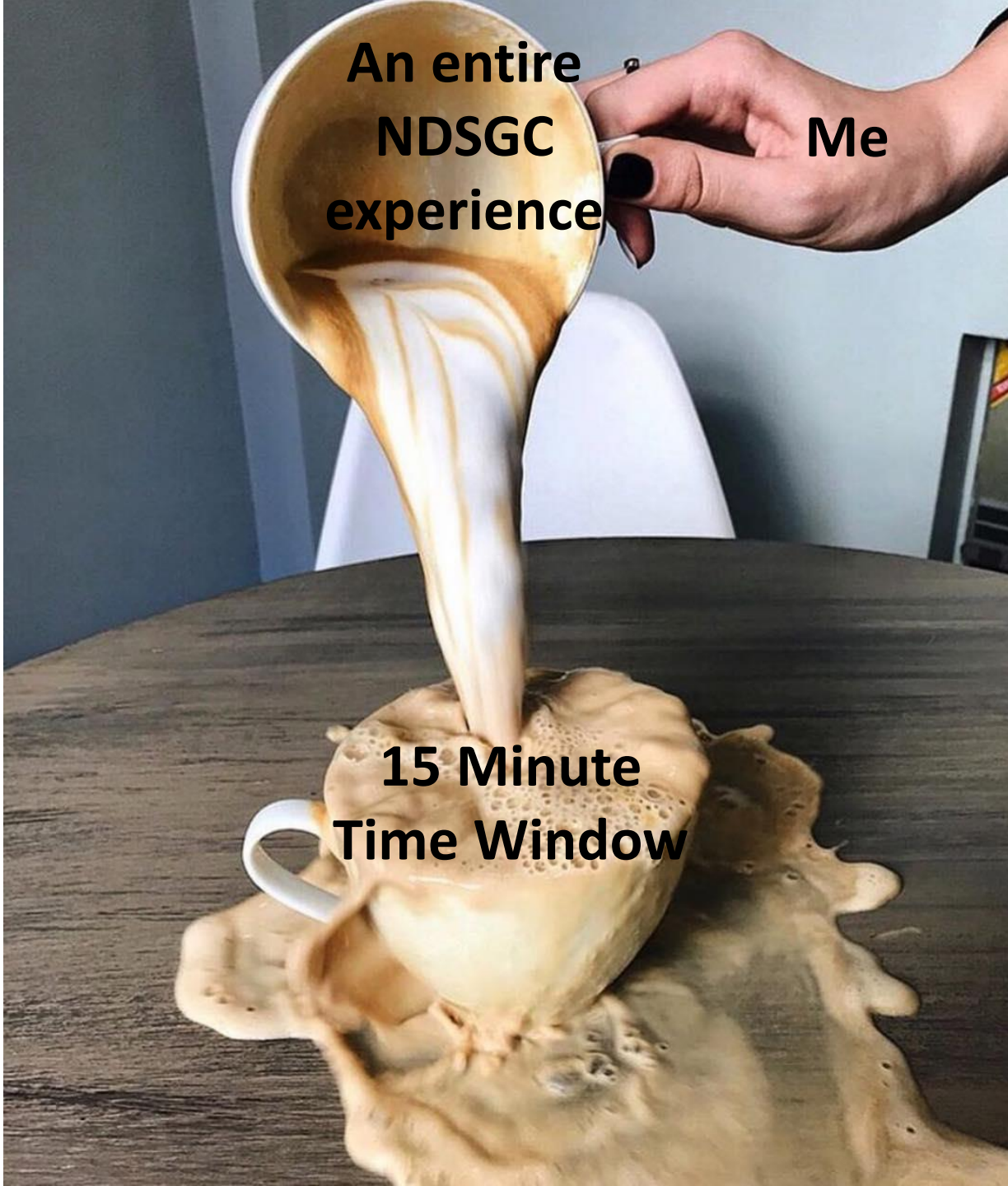
# CO<sub>2</sub> Freezer Project @ Kennedy Space Center

Peter Henson, UND Space Studies Student  
hometown: Carrington, ND  
[peter.henson@ndus.edu](mailto:peter.henson@ndus.edu)

**An entire  
NDSGC  
experience**

**Me**

**15 Minute  
Time Window**



# What I Will Highlight

Background  
of Project

What I  
worked on

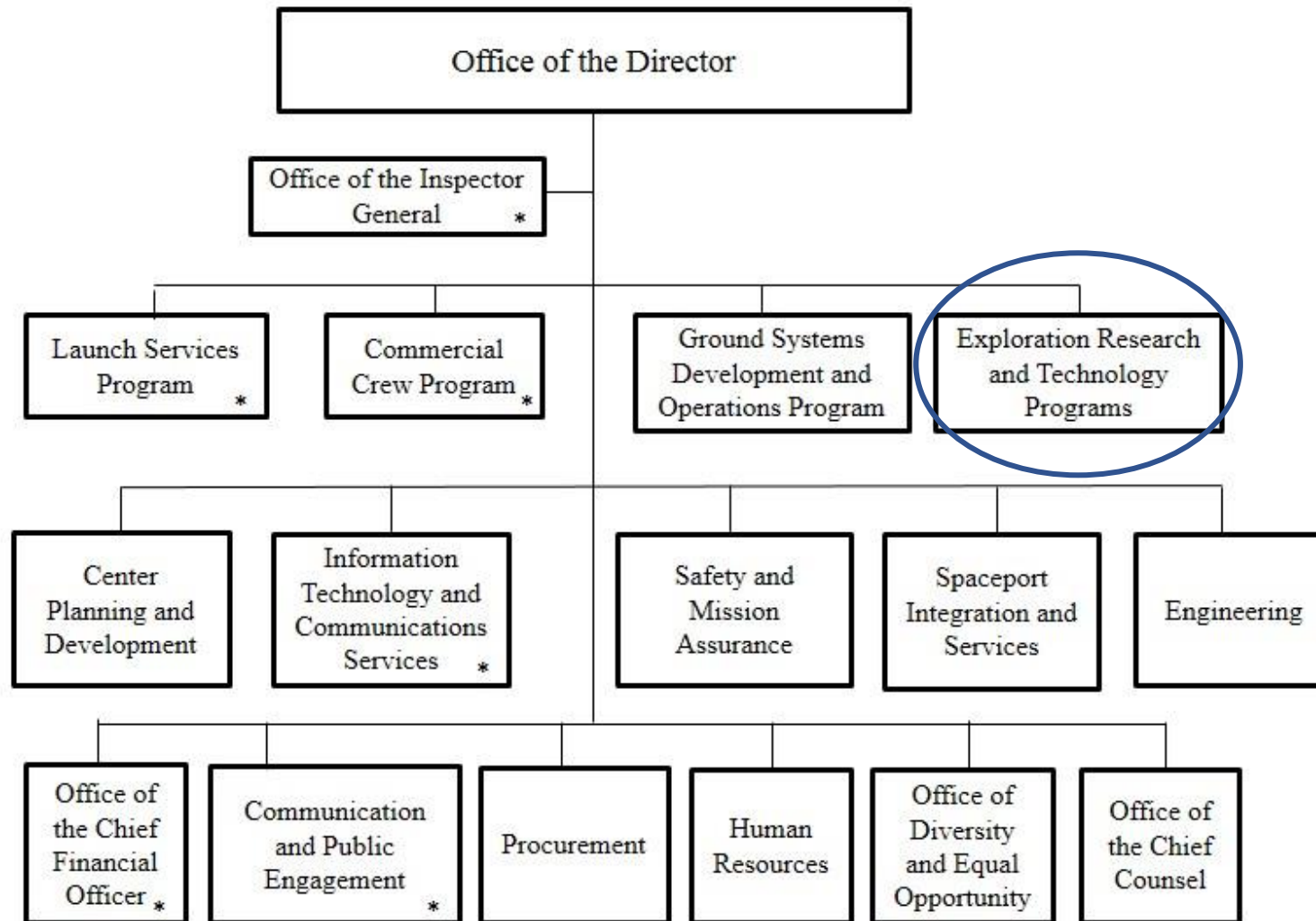
Lessons  
Learned







## New Kennedy Space Center Organization Chart



*\*Center positions that report to respective Agency functional AA/Chief/Director: Inspector General; Manager, Launch Services Program; Manager, Commercial Crew Program; Chief Information Officer, Chief Financial Officer, Principal Legislative Officer, and Principal Public Affairs Officer.*

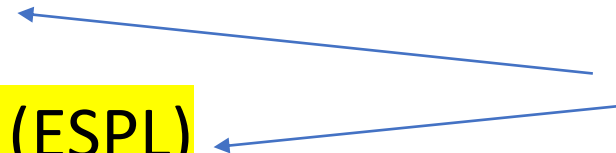
# Labs @

**SWAMP WORKS**  
NASA KENNEDY SPACE CENTER



- Applied Chemistry Lab (ACL)
- Applied Physics Lab (APL)
- Granular Mechanics & Regolith Operations Lab (GMRO)
- Cryogenics Technologies Lab (CTL)
- Electrostatics & Surface Physics Lab (ESPL)
- Corrosion Lab (CL)
- Spaceflight Physical Sciences (SPS) Advanced Materials and Polymer Sciences (AMPS)

Labs that I  
worked in





- “Living off the Land”
- Use space resources
- Reducing cost & risk

# ISRU (In Situ Resource Utilization)



# ISPP (In-Situ Propellant Production)

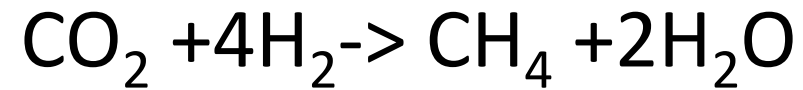
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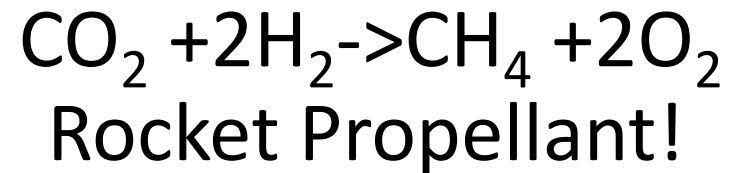
## Electrolysis:



## Sabatier Reaction:



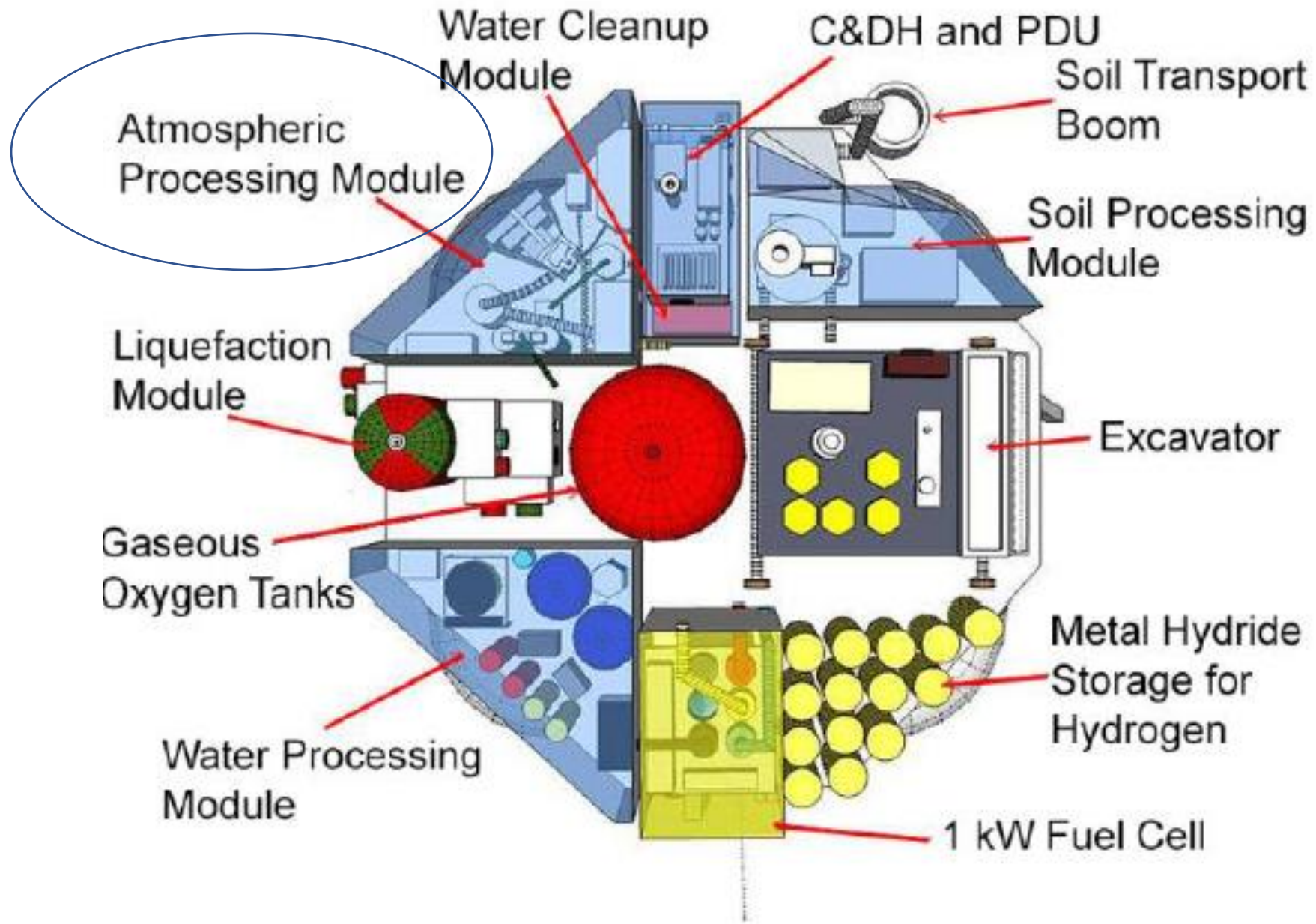
## Net Reaction:





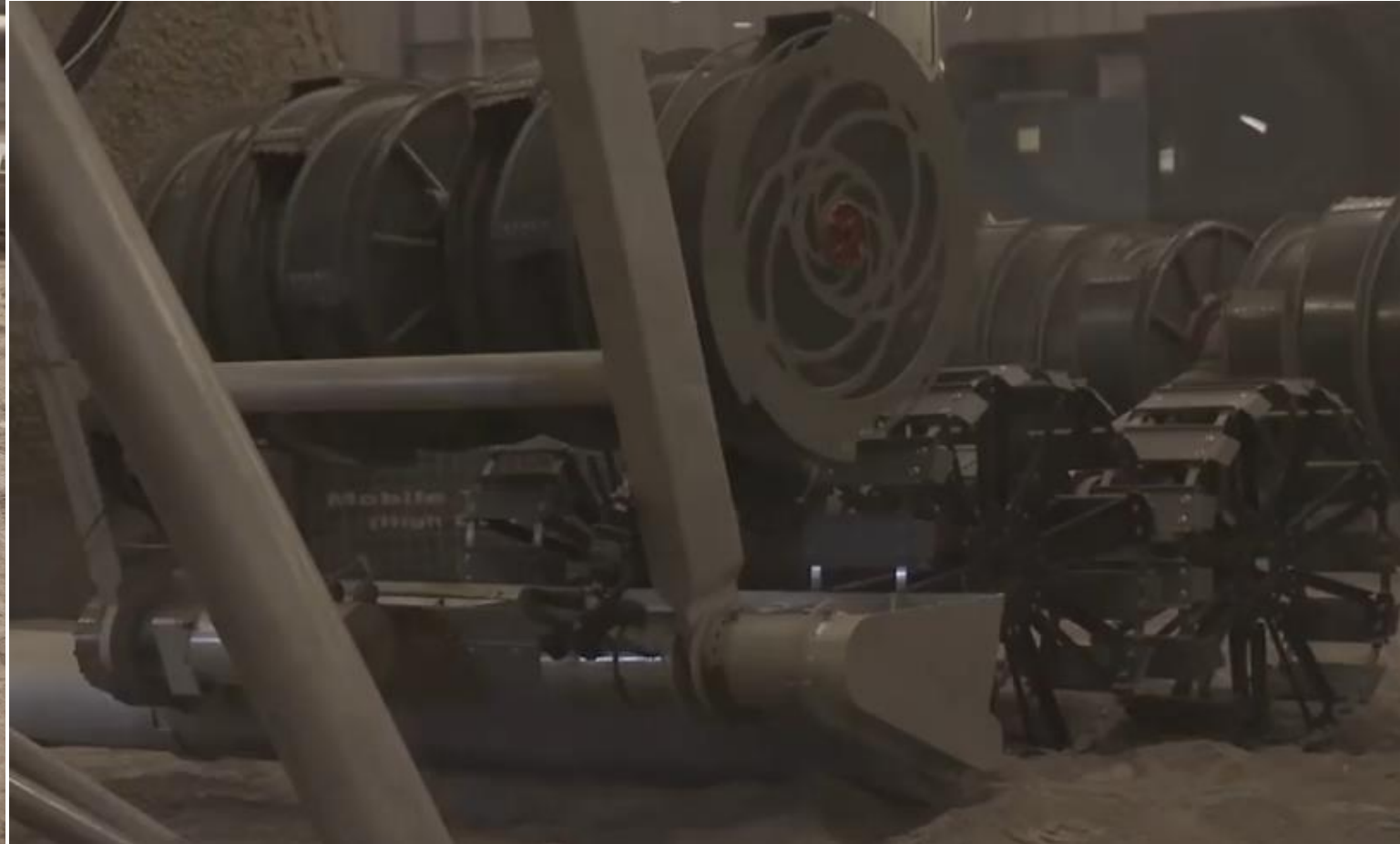
# MARCO POLO (Mars Atmosphere and Regolith Collector/PrOcessor for Lander Operations)







# RASSOR Rover





*Mars Design Reference  
Architecture 5.0 Study*

*Executive Summary*

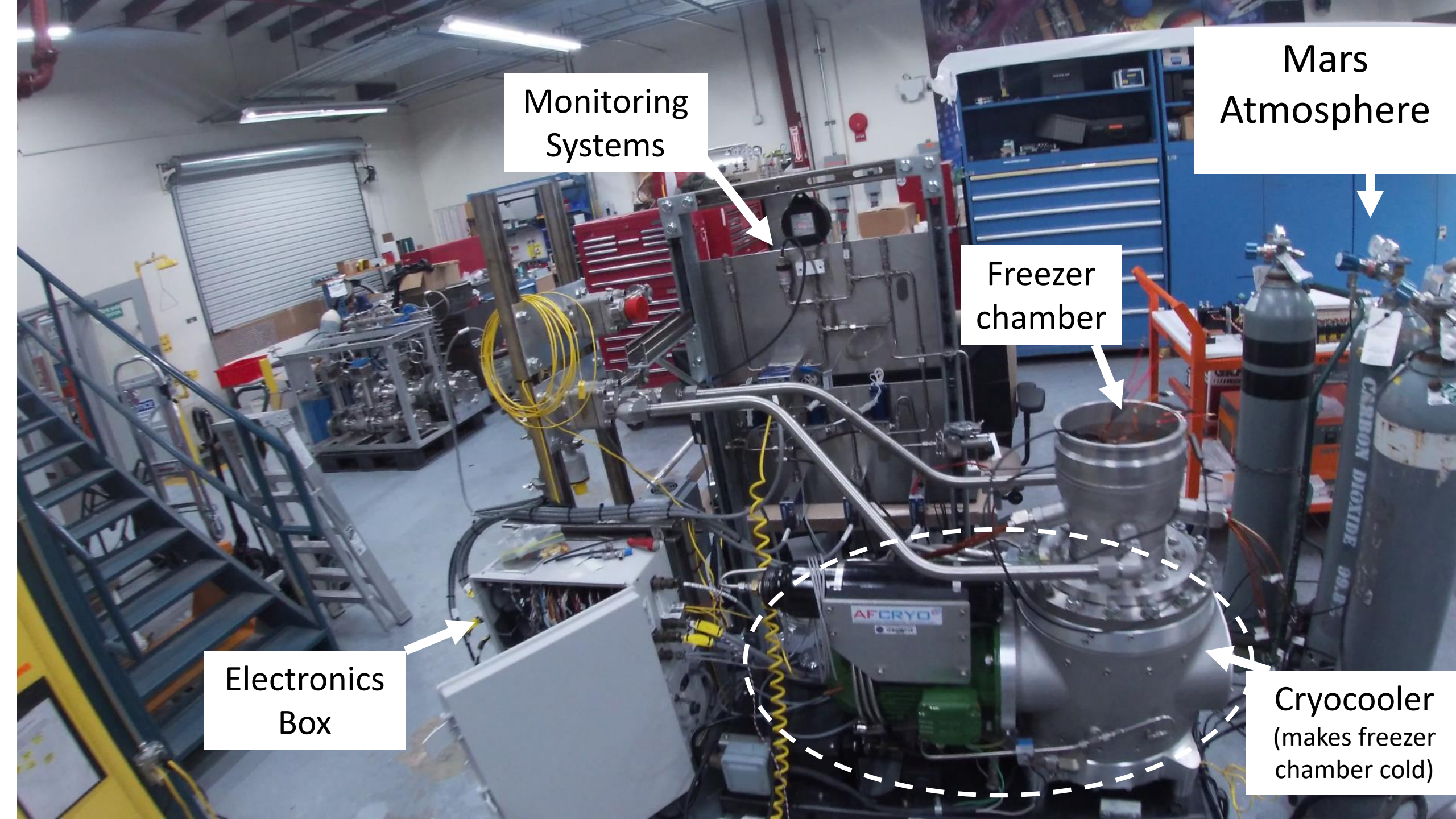
*Bret G. Drake*

**December 4, 2008**

## Project Goals

Freeze 1.1  
kg/hr CO<sub>2</sub>





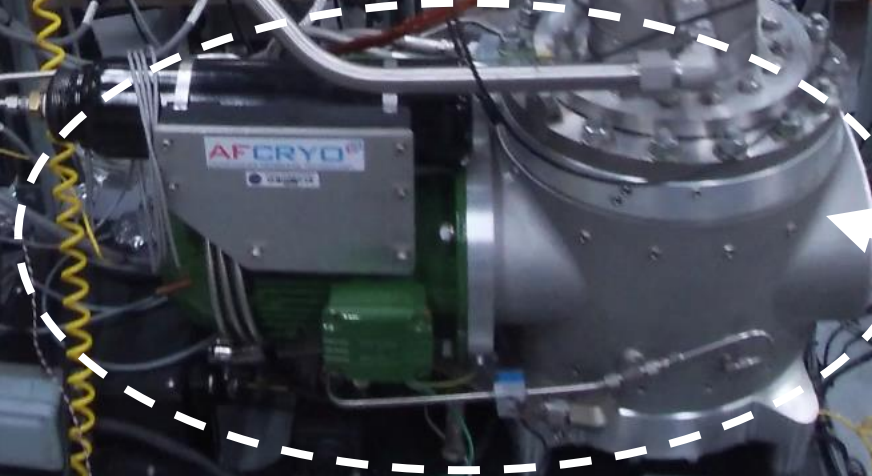
Monitoring  
Systems

Mars  
Atmosphere

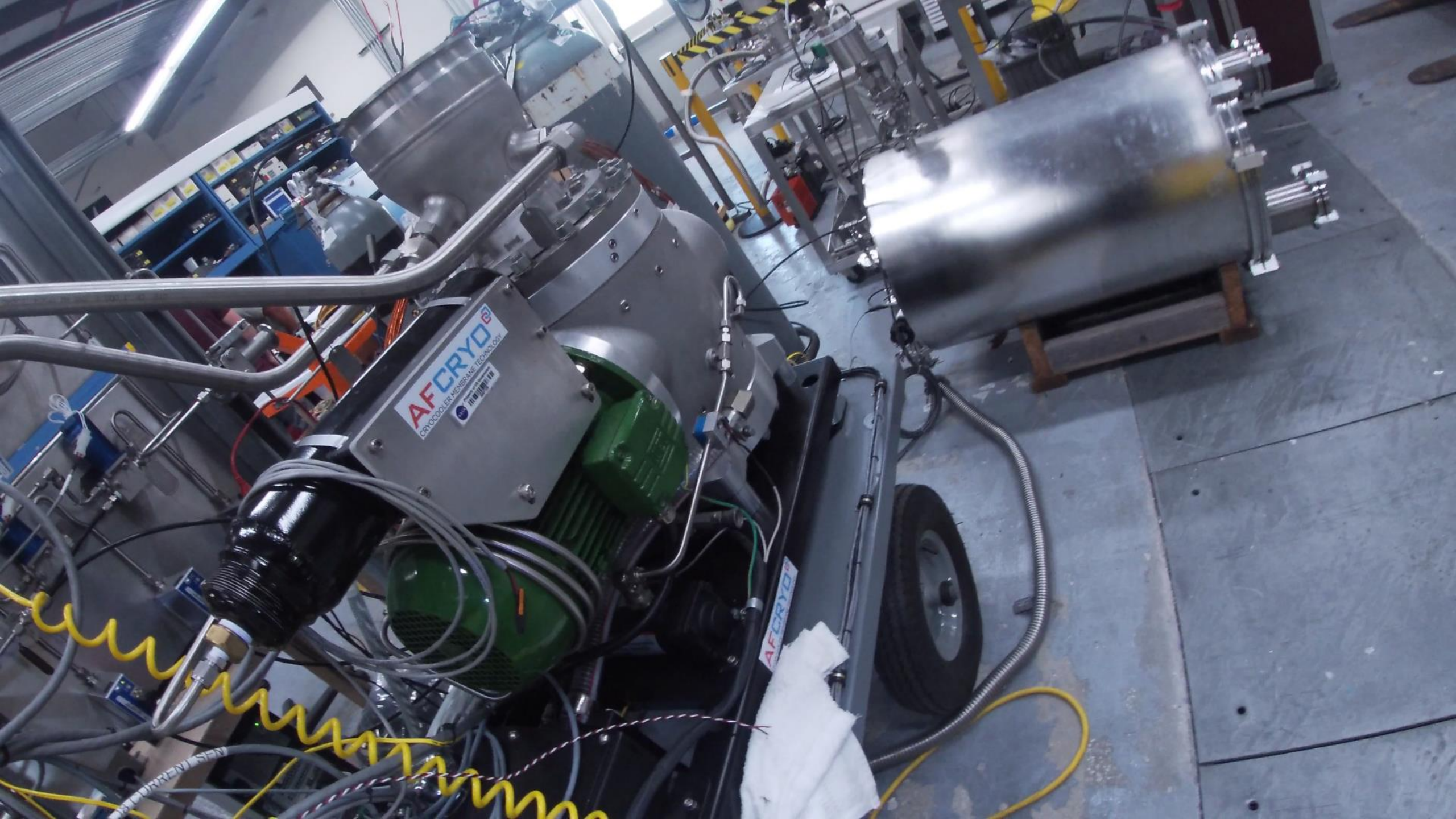
Freezer  
chamber

Electronics  
Box

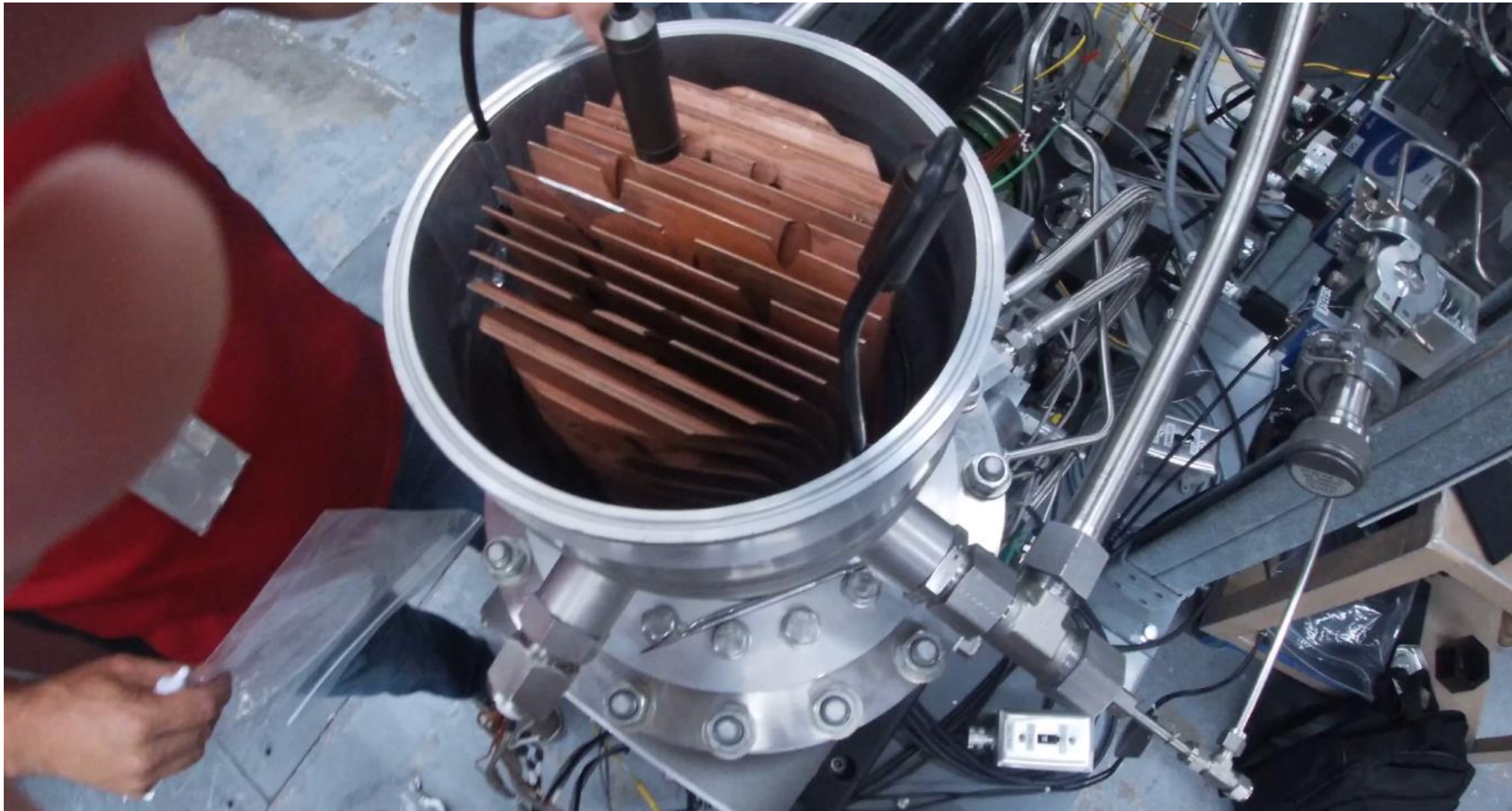
Cryocooler  
(makes freezer  
chamber cold)



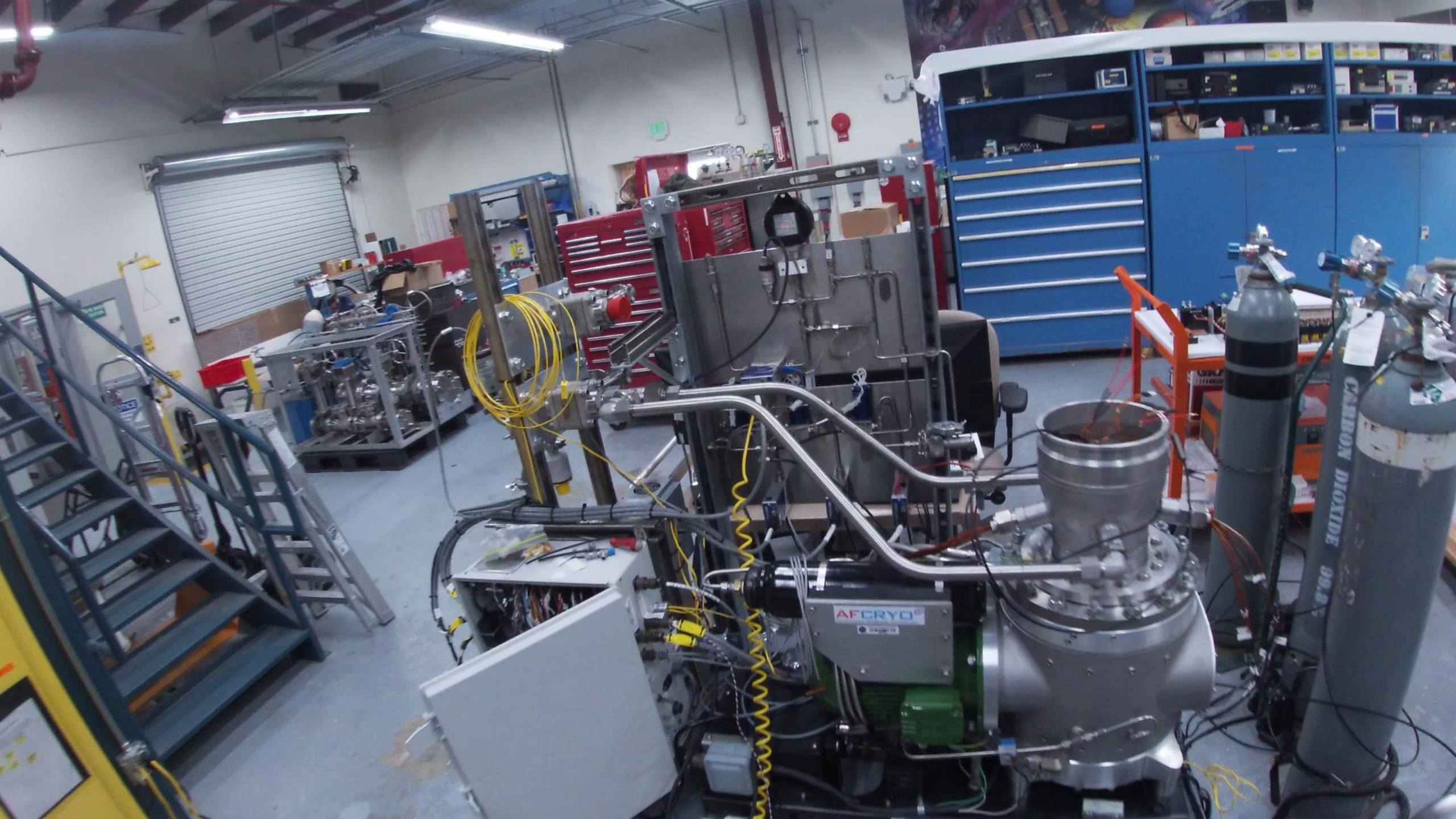




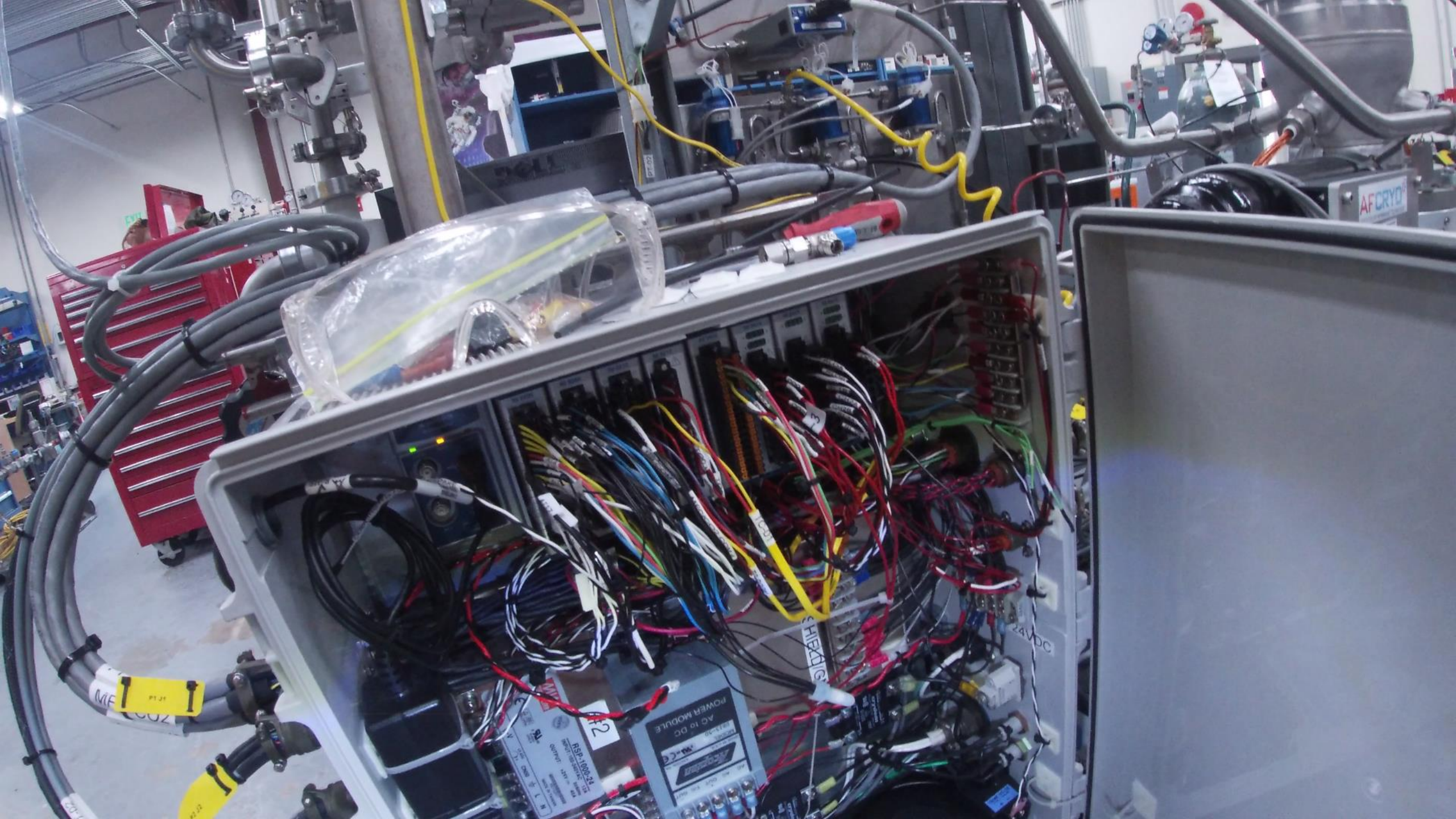












Clear plastic bag containing a red-handled tool.

AC 10 DC  
RSP-1000-24  
POWER MODULE

SHIELDING

24VDC

AFCRYO

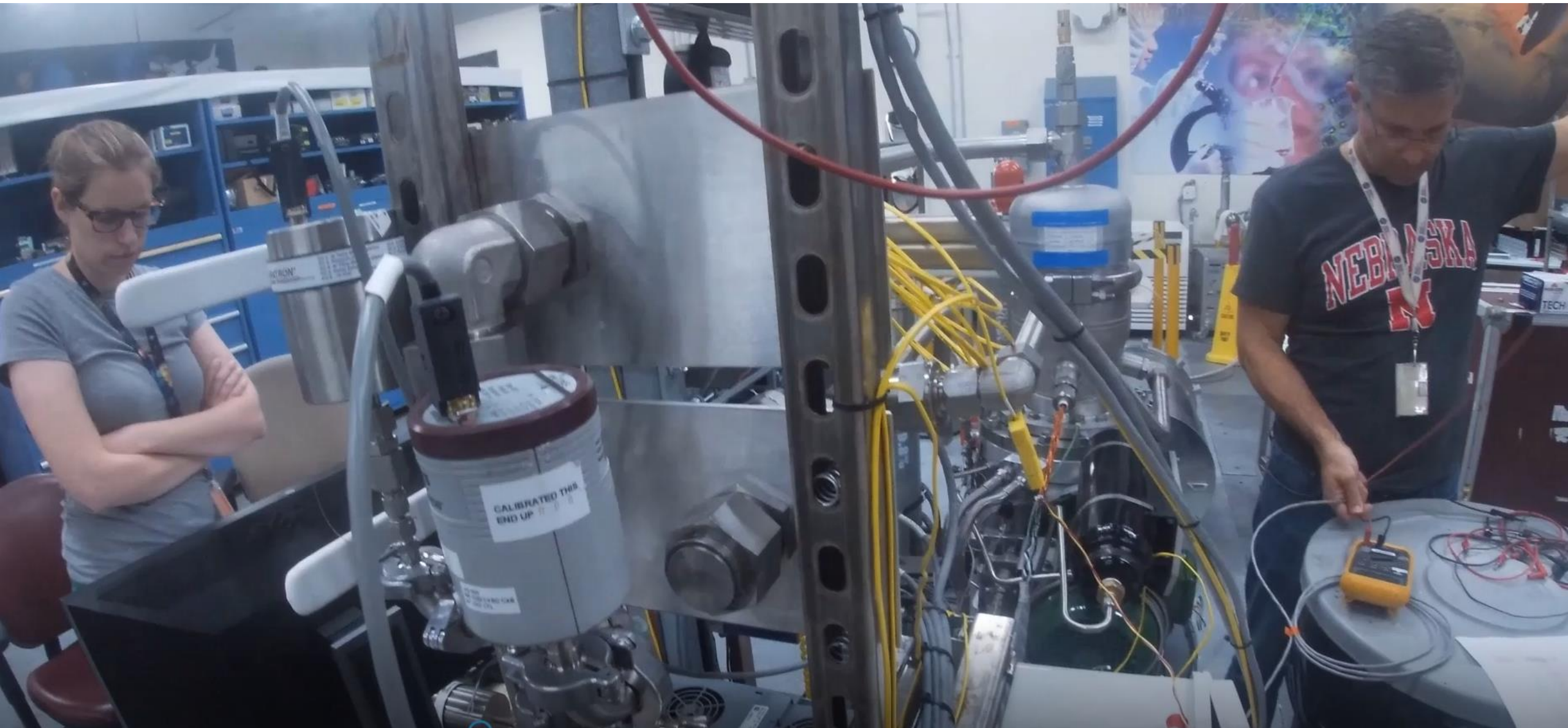
ME 1002















IVI CORP.

CONTROL PANEL  
VACUUM FURNACE  
POWER OFF  
HEAT OFF  
TEMP. 1000  
TIME 00:00

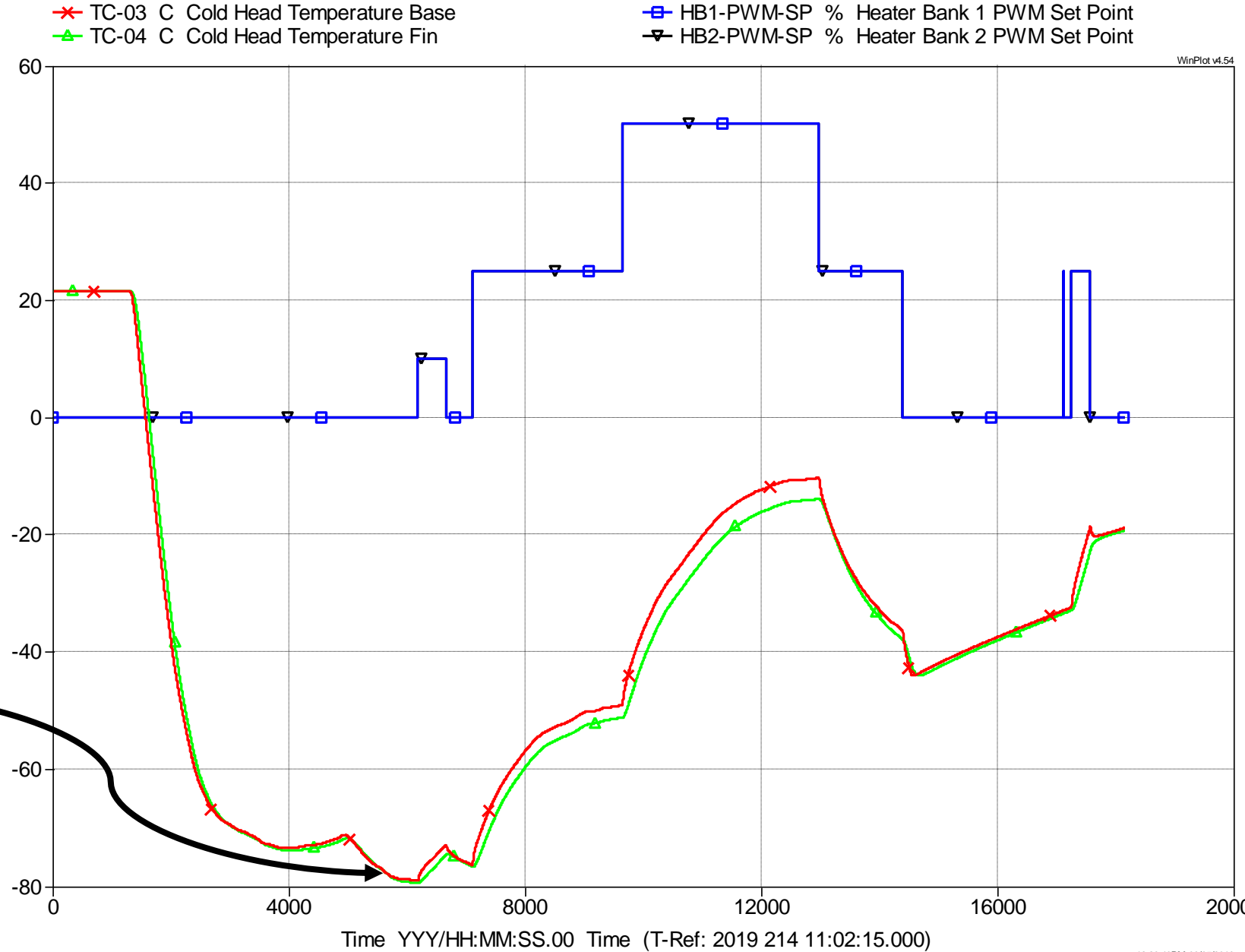






# Conclusions

- Only froze at 25% of our goal
- Cryocooler performed poorly
- Did not reach low enough temps.



Formulated by  
J. Sass et. al.





# KSC National Intern Day



A promotional graphic for the podcast 'Rocket Ranch'. The background features a stylized sun with rays and a bald eagle in flight. On the left, a pencil is positioned vertically. The title 'ROCKET RANCH' is written in a large, decorative, black font, with a rocket ship integrated into the letter 'T'. In the top right corner is the NASA logo. The episode title and date are listed on the right side, along with social media handles. At the bottom, it says 'New episodes every month!'.




**Episode 14:**  
**The Kids of**  
**Summer**  
September 2019

@NASAKennedy  
#NASARocketRanch

New episodes every month!





LAUNCHES THIS YEAR 07



## 2019 NASA Internships

# Intern of the Year Nominee

*Peter Henson*

*Was nominated for being an exemplary Intern who was always prepared, had a willingness to learn and grow, maintained a positive attitude, and upheld the NASA Core Values of Safety, Integrity, Teamwork and Excellence.*

*Priscilla Moore*

PRISCILLA MOORE, NI PROGRAM MANAGER

*August 8, 2019*

DATE







Conference Room











# NASA's Core Values





Thank you

Any Questions/Comments?