



NIST

# ***Gas-Loading Capabilities at the NIST Center for Neutron Research***

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Sample Environment at Neutron Scattering Facilities  
Argonne, IL USA  
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**Gas Loading**

$0.3\text{K} \leq T \leq 4.0\text{K}$

$4.0\text{K} \leq T \leq 800\text{K}$

**Computer Controlled Sieverts Apparatus**

- **Pressure Vessels up to 10kbar**
- **Summary**
- **Questions**

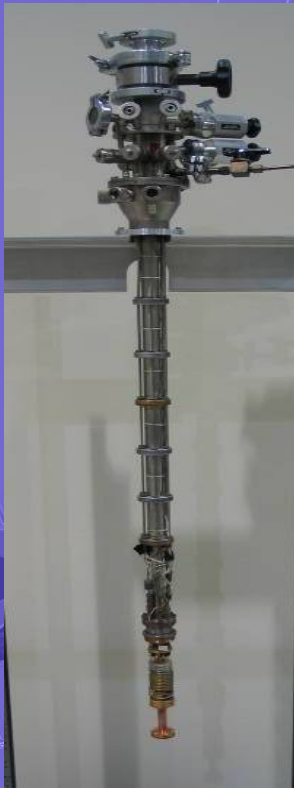
$0.3\text{K} \leq T \leq 4.0\text{K}$

**OC Dilution Insert:**

**50 mK base Temp**

**70 mm x Ø35 mm smpl spc**

**2 - 0.8mm capillary lines**



**Cu Sample Can:**

**$V = 5.5 \text{ cm}^3$  or  $20 \text{ cm}^3$**

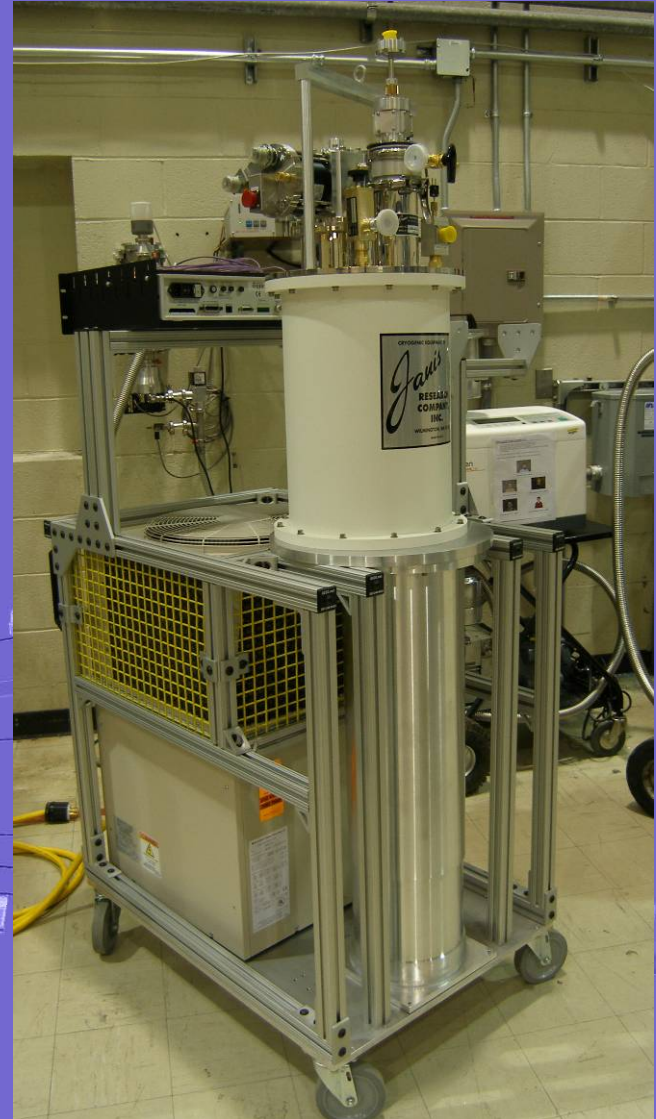
**500bar rating (SF2)**



$4.0\text{K} \leq T \leq 800\text{K}$

**TLCCR:**

**55 mm bore allows for handling air sensitive and cryogenic samples as well as 10T magnet insert**



$4.0\text{K} \leq T \leq 800\text{K}$

**TLCCR:**

**Sample sticks with temperature controlled heated gas line provide up to 25 watts @ 24V along the entire length**

**Pressure rating (SF2):**

**Al - 1kbar**

**Va - 200bar**





# Computer Controlled Sieverts Apparatus

Four different pressure gauges for accurate reading:

0 - 2 bar

0 - 7 bar

0 - 35 bar

0 - 200 bar

$P \leq 100\text{bar}$

$4.0\text{K} \leq T \leq 1500\text{K}$

$V_d \sim 10\text{ cm}^3$



# Computer Controlled Sieverts Apparatus

## Safety Features:

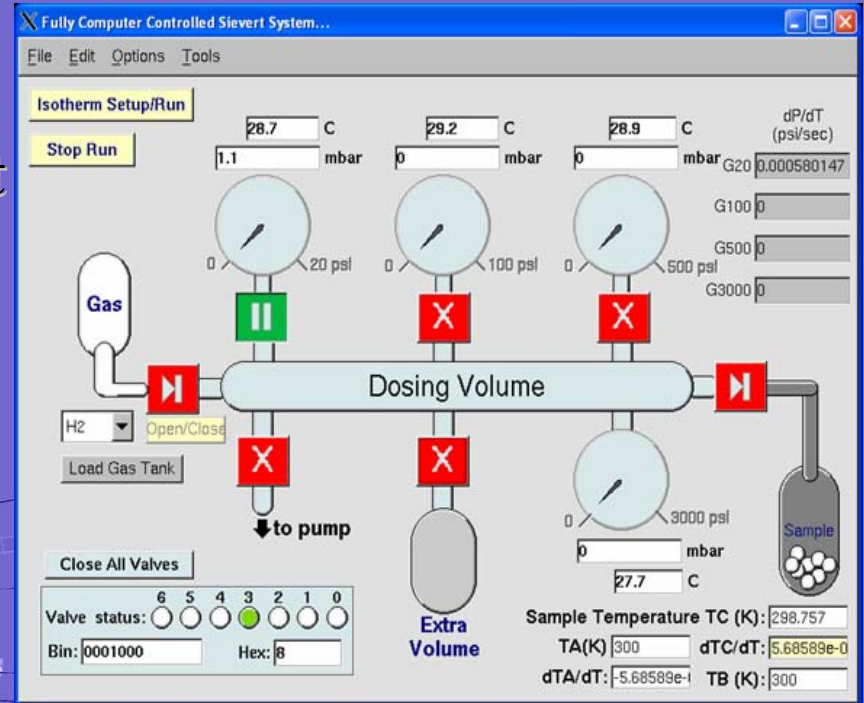
If pressure exceed max. limit

Cylinder valve closes

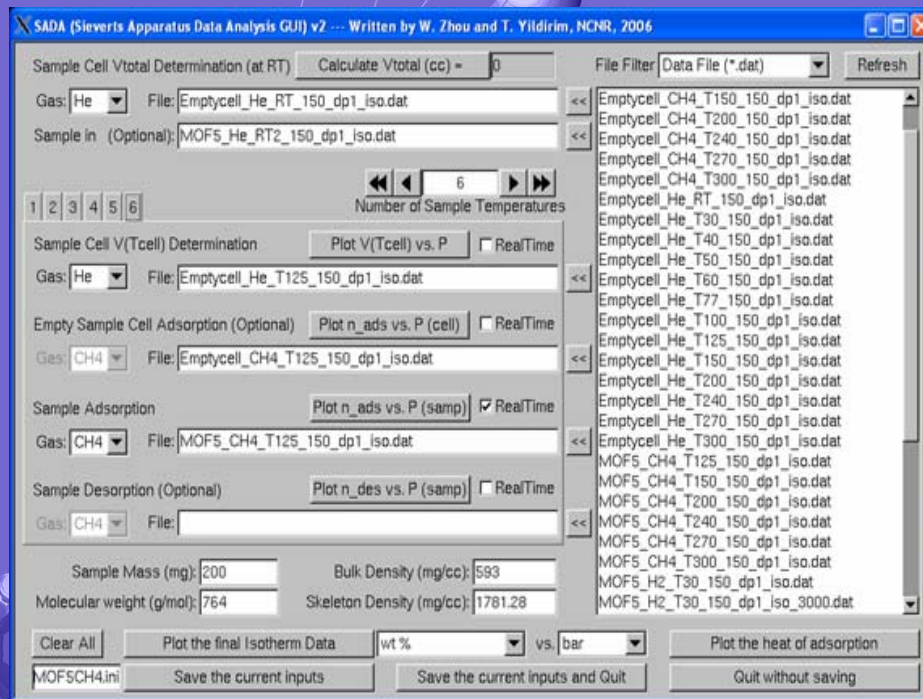
Gauge valves close

Sample valve opens

$V_d$  is evacuated



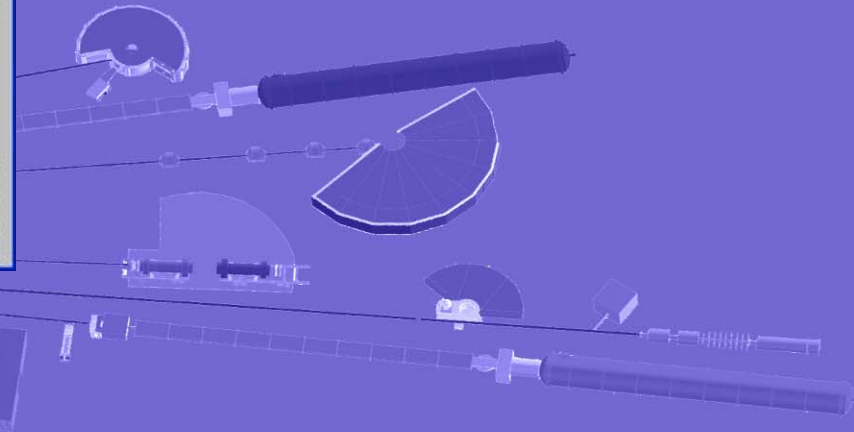
# Computer Controlled Sieverts Apparatus



RS232 communication

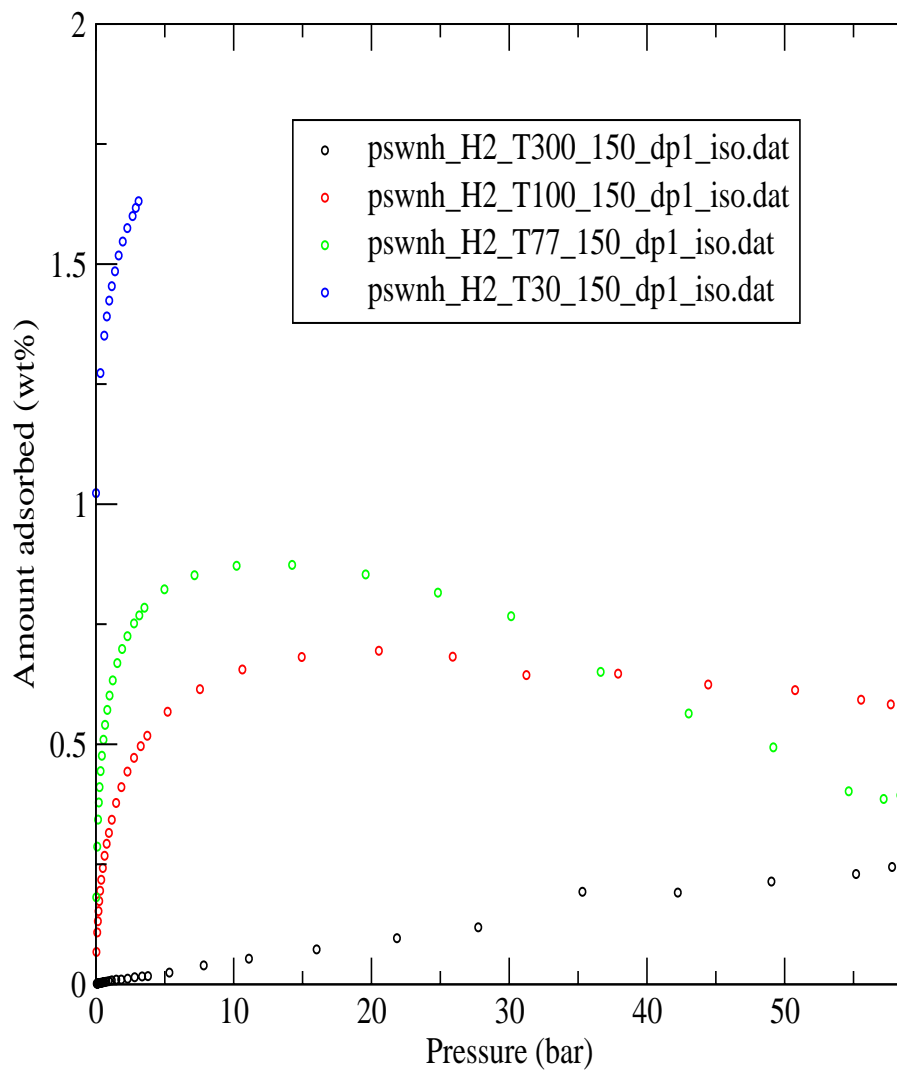
Python GUI works both  
in linux and “Bill”

Supports scripting for  
remote experiments

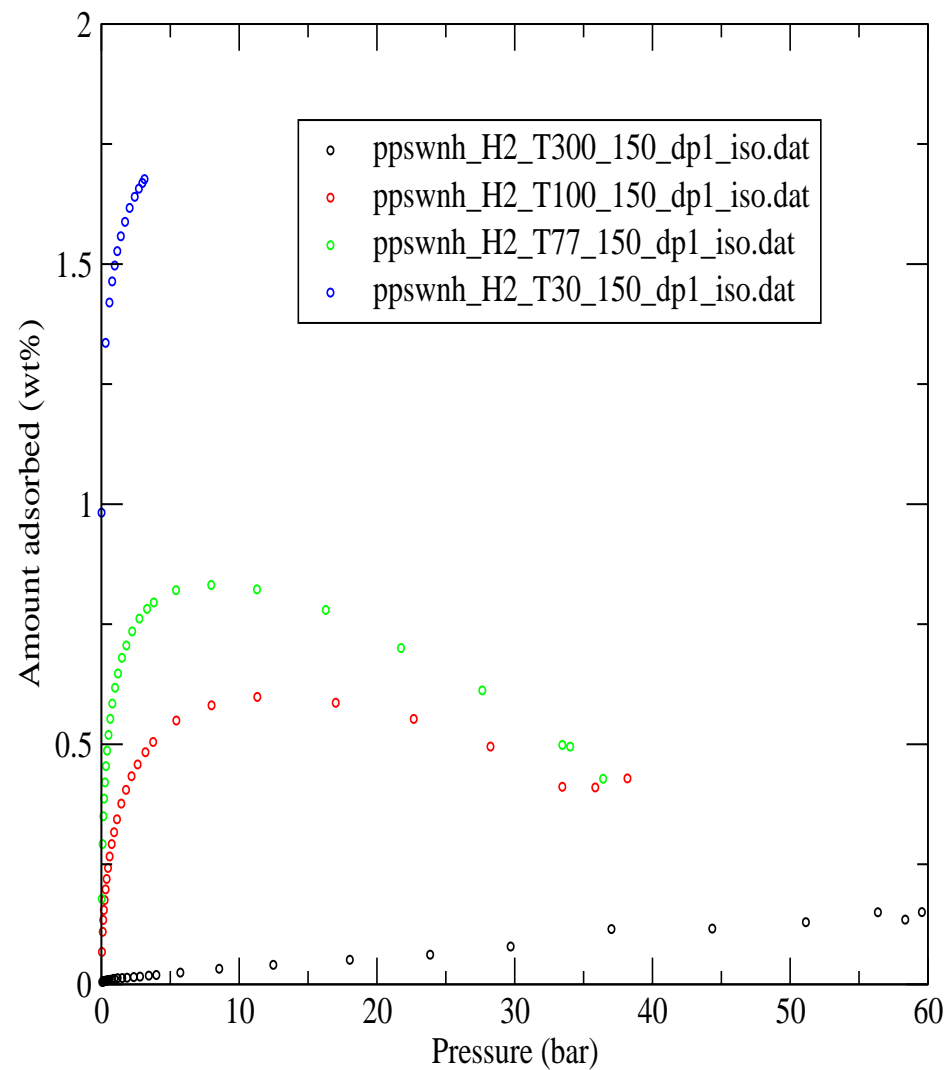




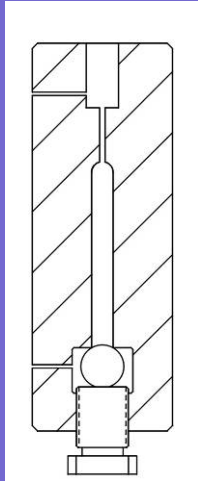
### Excess Adsorption Isotherm (SWNH)



### Excess Adsorption Isotherm (Pt SWNH)



# Pressure Vessels



**Al 7075-T6 construction**

**$P \leq 6\text{kbar}$  (SF1.5)**

**$W = 4.5:1$**

**$1.5\text{K} \leq T \leq 300\text{K}$**

**$V_s = 1.6\text{ cm}^3$**

**$T_{2\theta_{av}} = 65\%$  at  $2\text{\AA}$**

**13-8Mo construction**

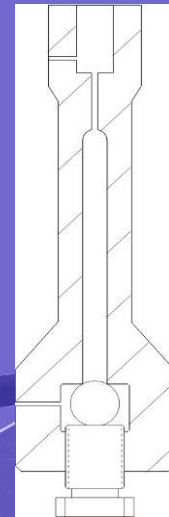
**$P \leq 10\text{kbar}$  (SF1.5)**

**$W = 3:1$**

**$1.5\text{K} \leq T \leq 300\text{K}$**

**$V_{S\text{eff}} = 1.6\text{ cm}^3$**

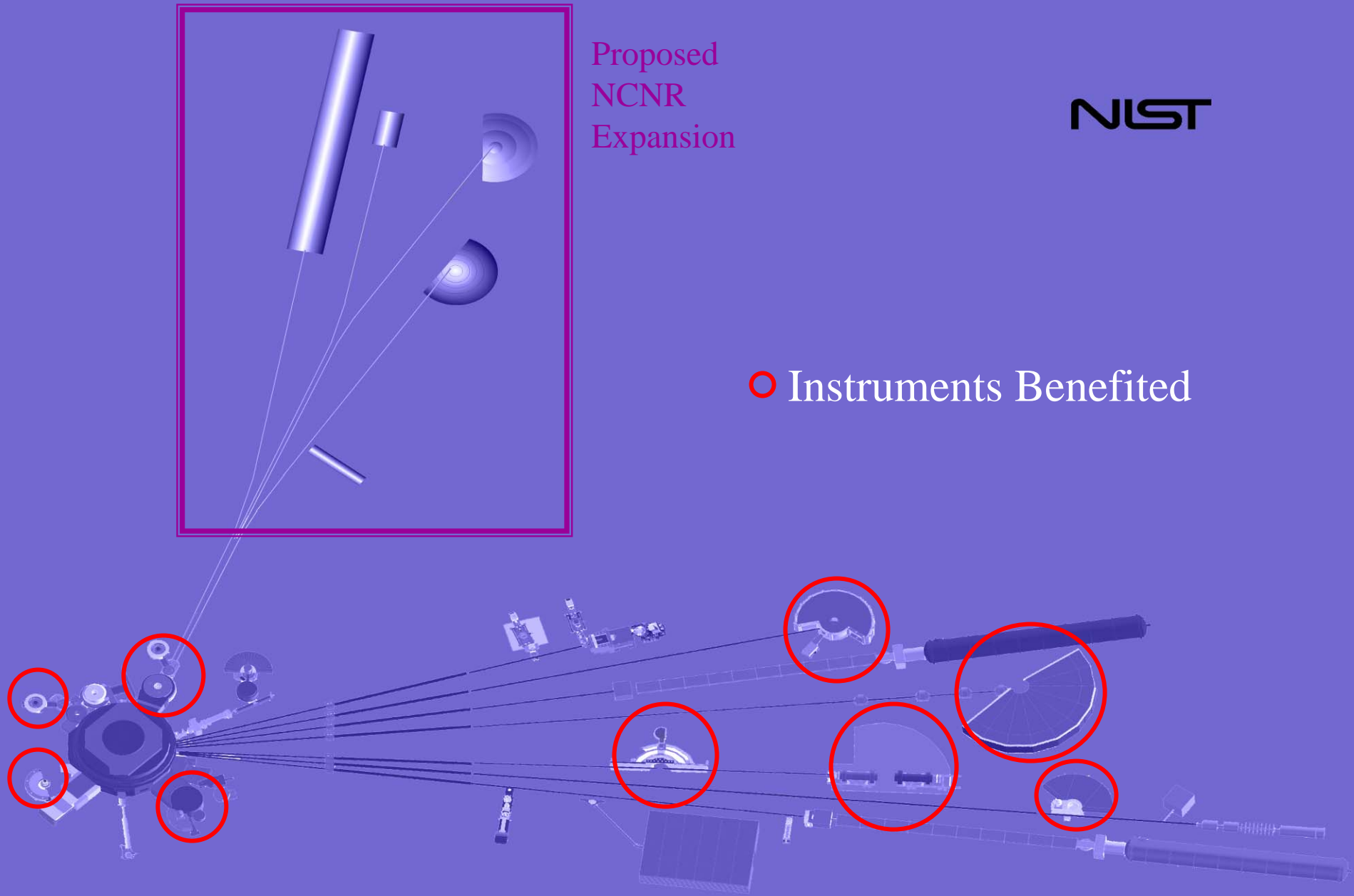
**$T_{2\theta_{av}} = 25\%$  at  $2\text{\AA}$**



Proposed  
NCNR  
Expansion

NLST

○ Instruments Benefited

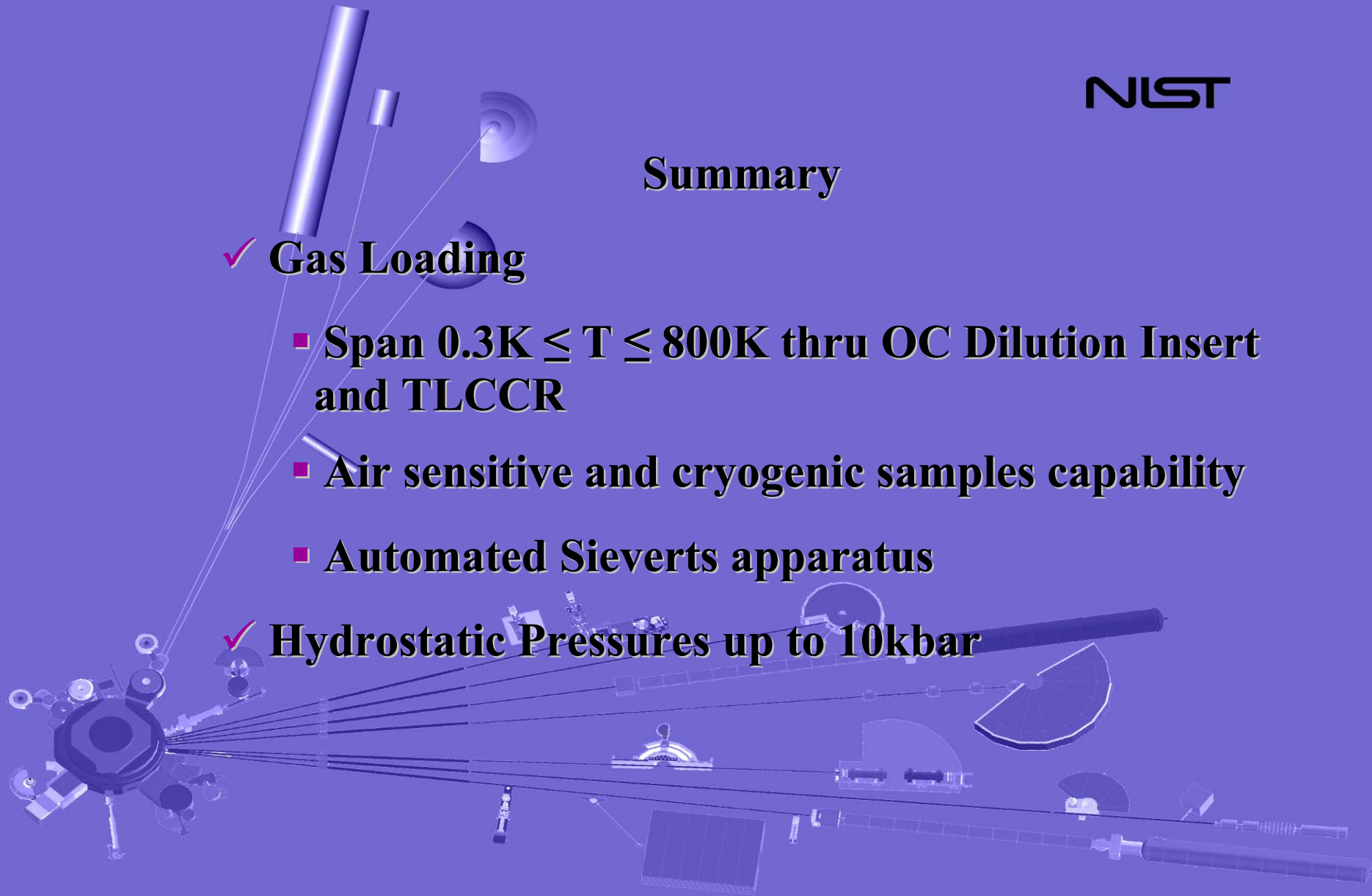


## Summary

### ✓ Gas Loading

- Span  $0.3\text{K} \leq T \leq 800\text{K}$  thru OC Dilution Insert and TLCCR
- Air sensitive and cryogenic samples capability
- Automated Sieverts apparatus

### ✓ Hydrostatic Pressures up to 10kbar





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NCNR

ANSTO

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