Refinements to the ALS Crystallography Sample Loader

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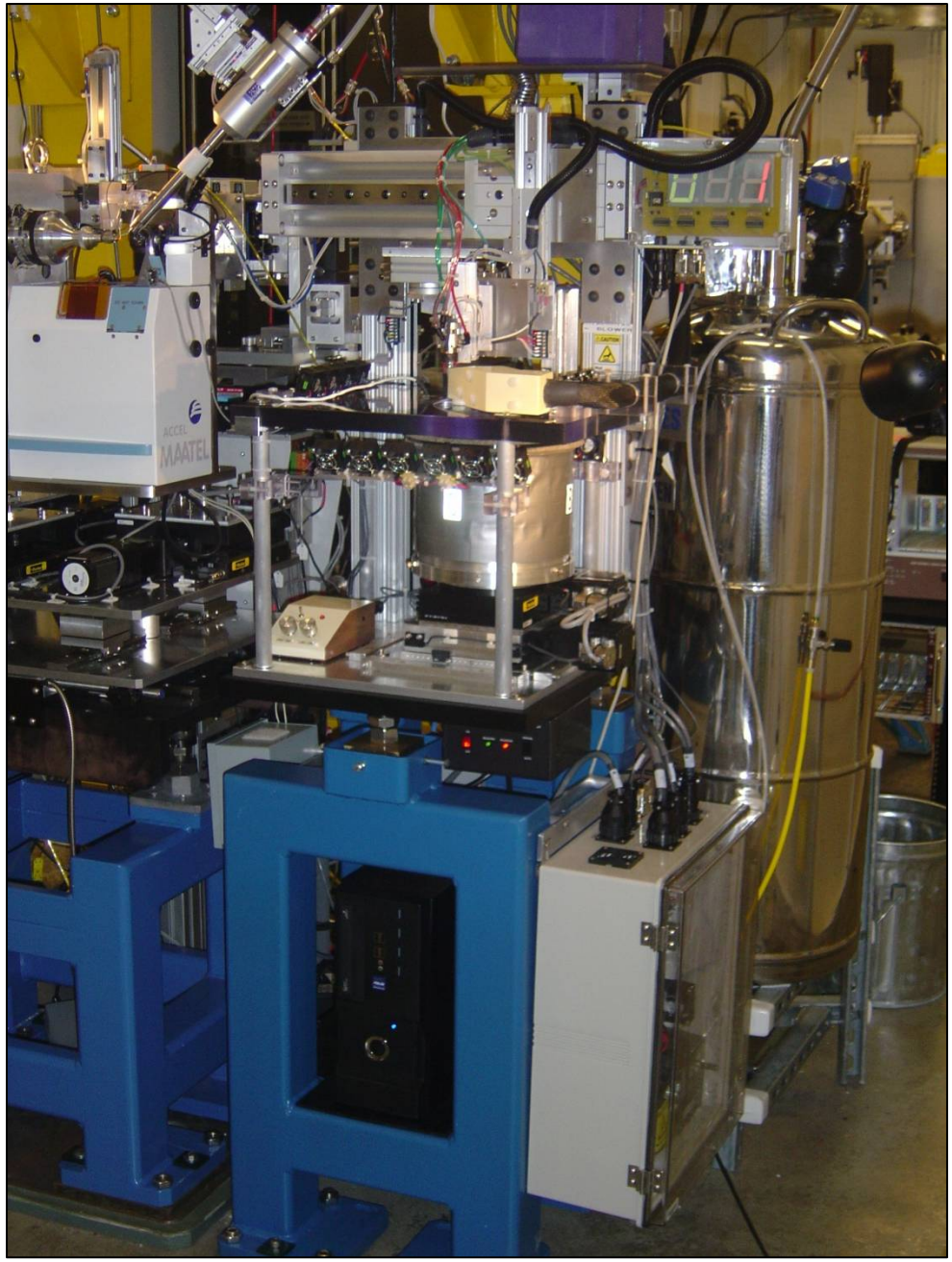
Cornell University

NE-CAT



Simplicity:

2 stepper axes
6 pnuematic axes
PLC controls

Low Cost:

$25K capital components
Sweat Equity

Safety:

Can't collide with detector or users

Downside:

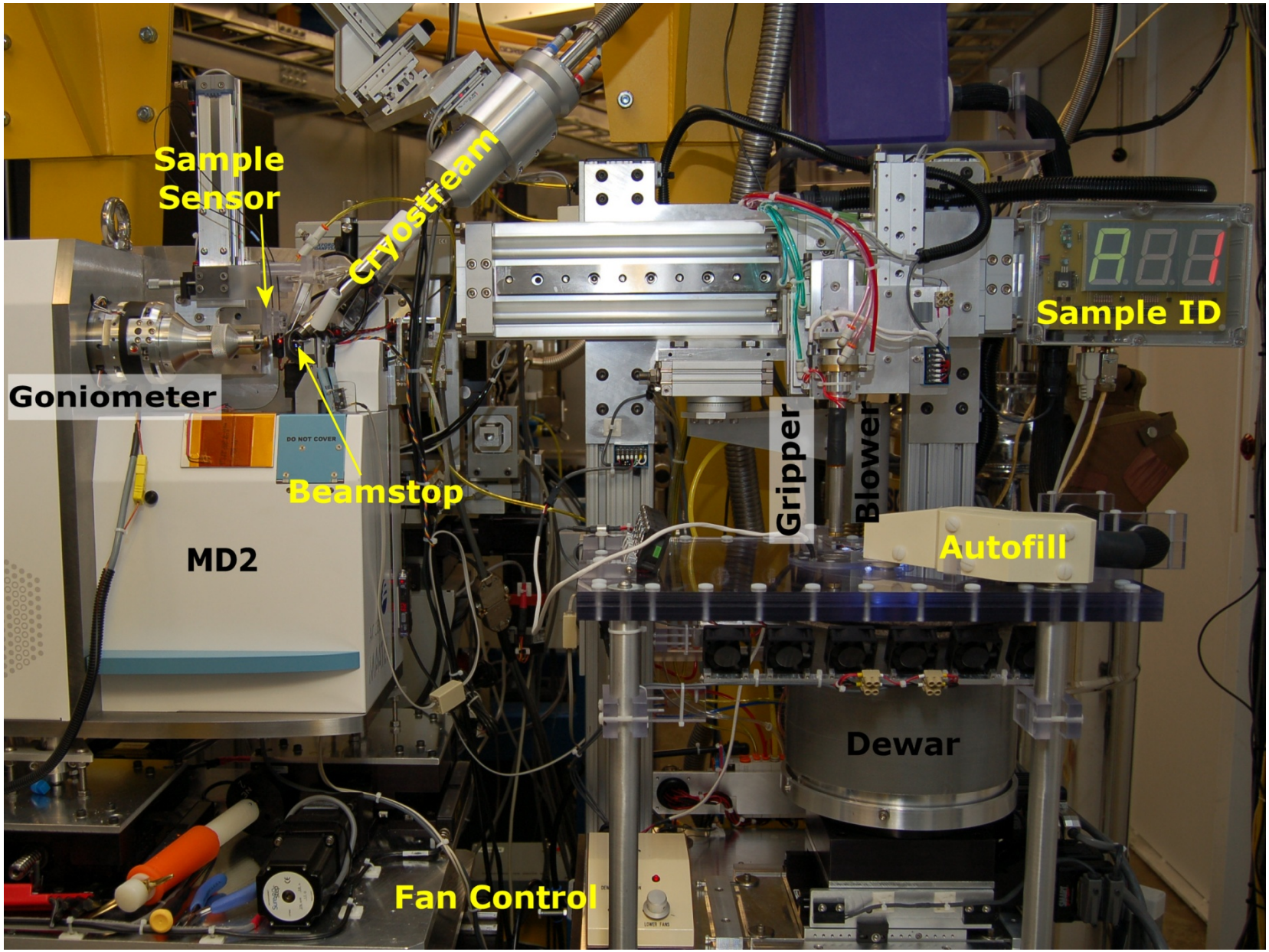
No intelligence / adaptability

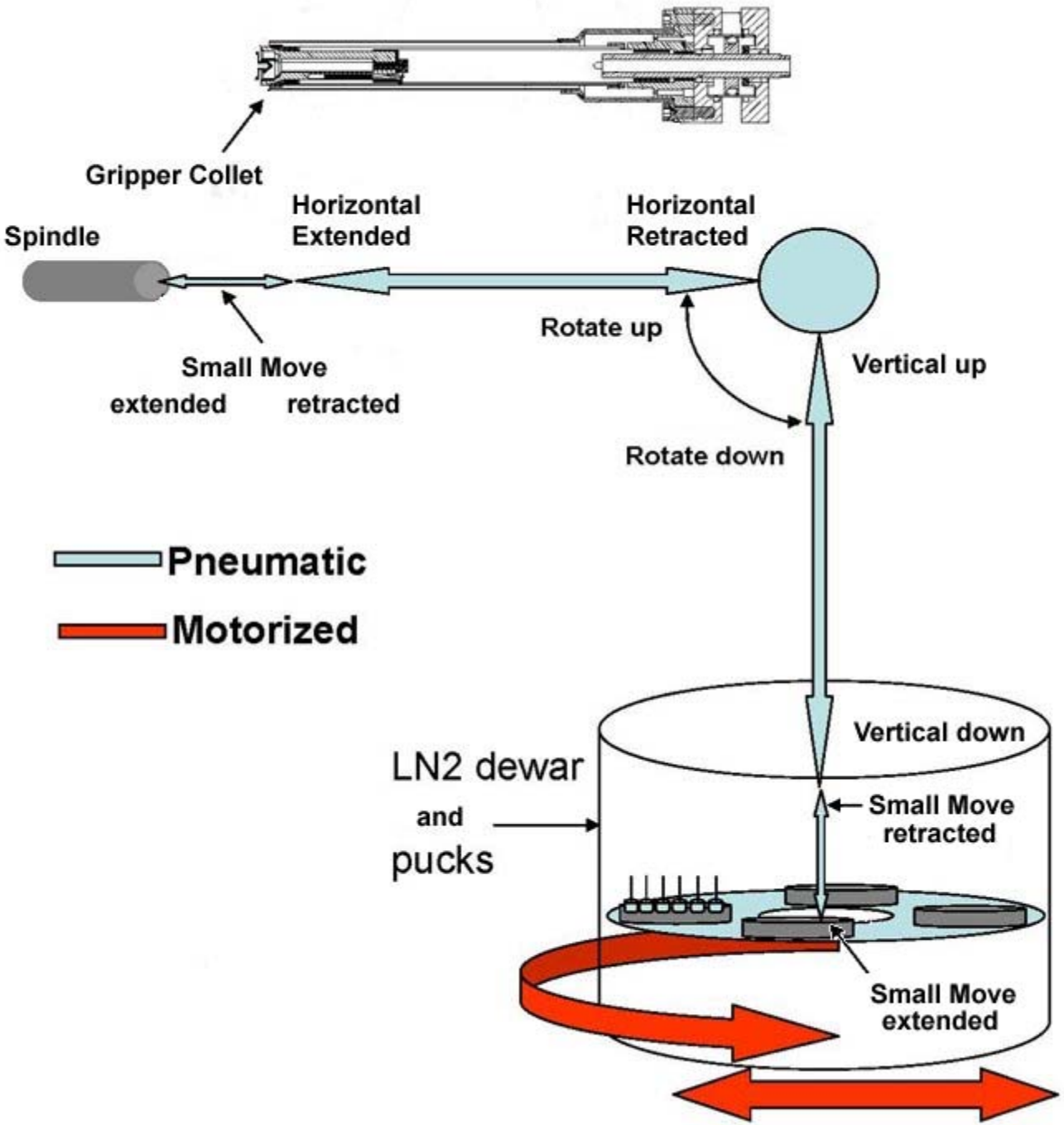
Limited sample format compatibility

Relatively low sample capacity (64 in our implementation)

Can't mount from vials (forces sample transfer operation).

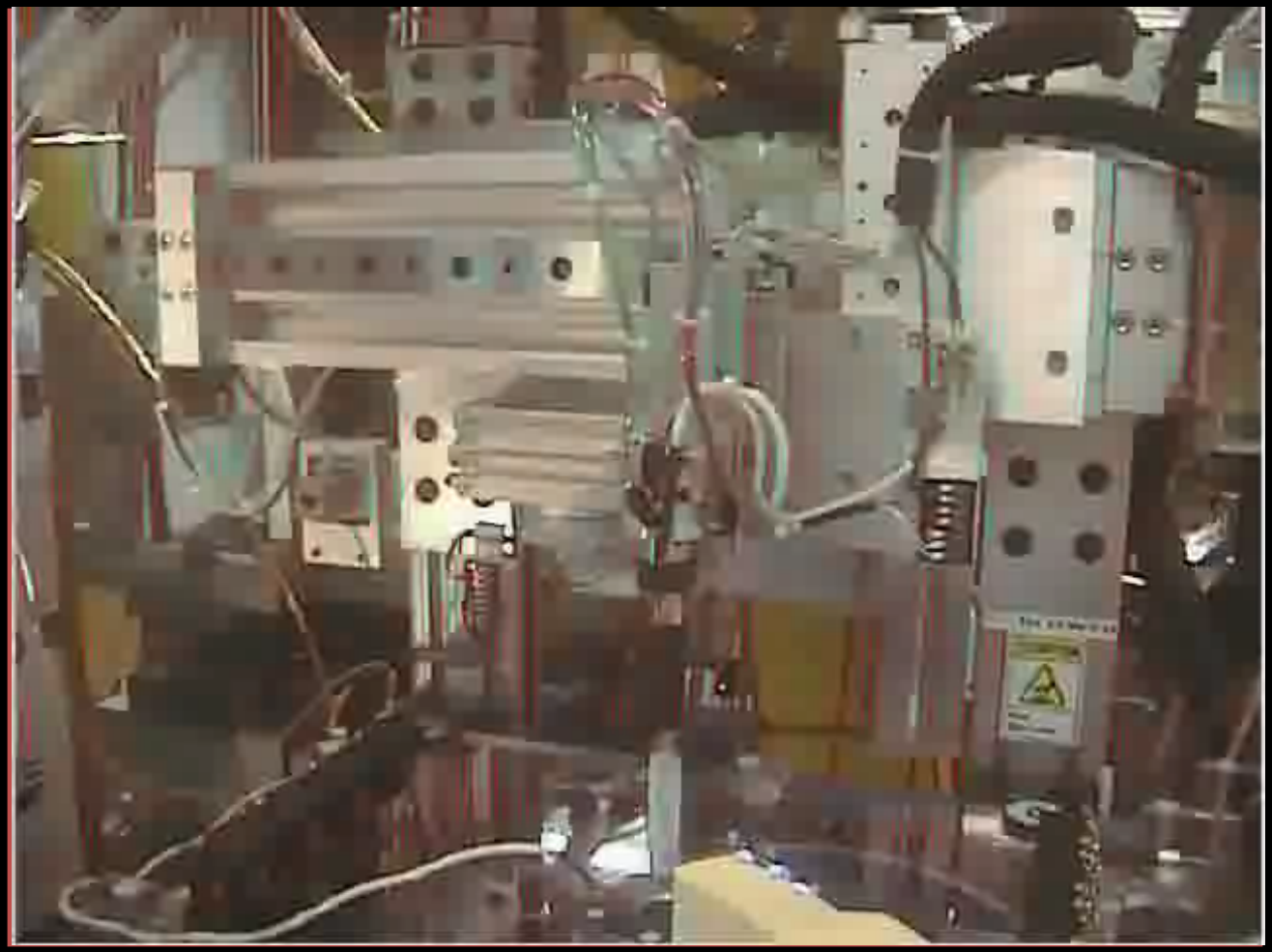
Relation to MD2 Microdiffractometer



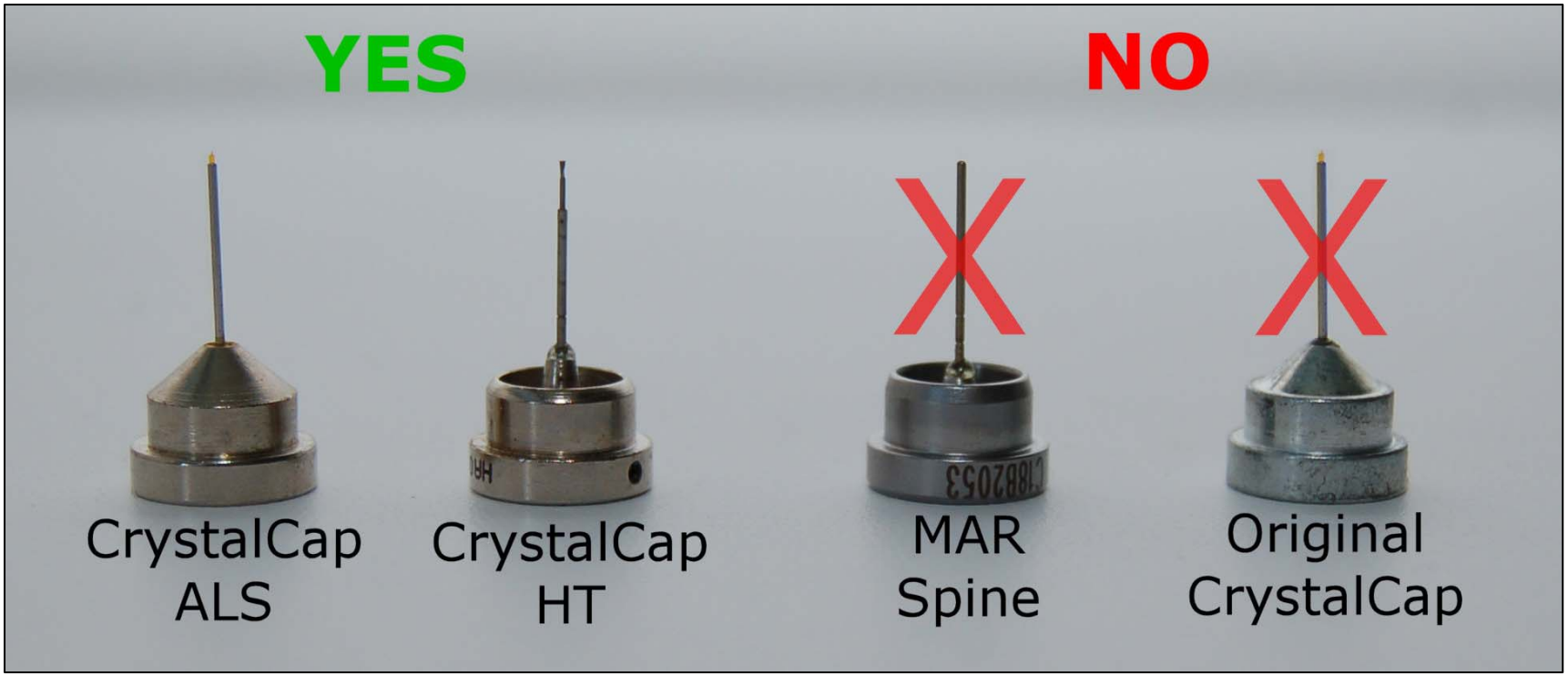

Gripper Collet
Spindle
Horizontal
Extended
Horizontal
Retracted
Small Move
extended
retracted
Rotate up
Vertical up
Rotate down
Pneumatic
Motorized
Vertical down
LN2 dewar
and
pucks
Small Move
retracted
Small Move
extended

Stepper-Driven Stages

Pneumatic Stages

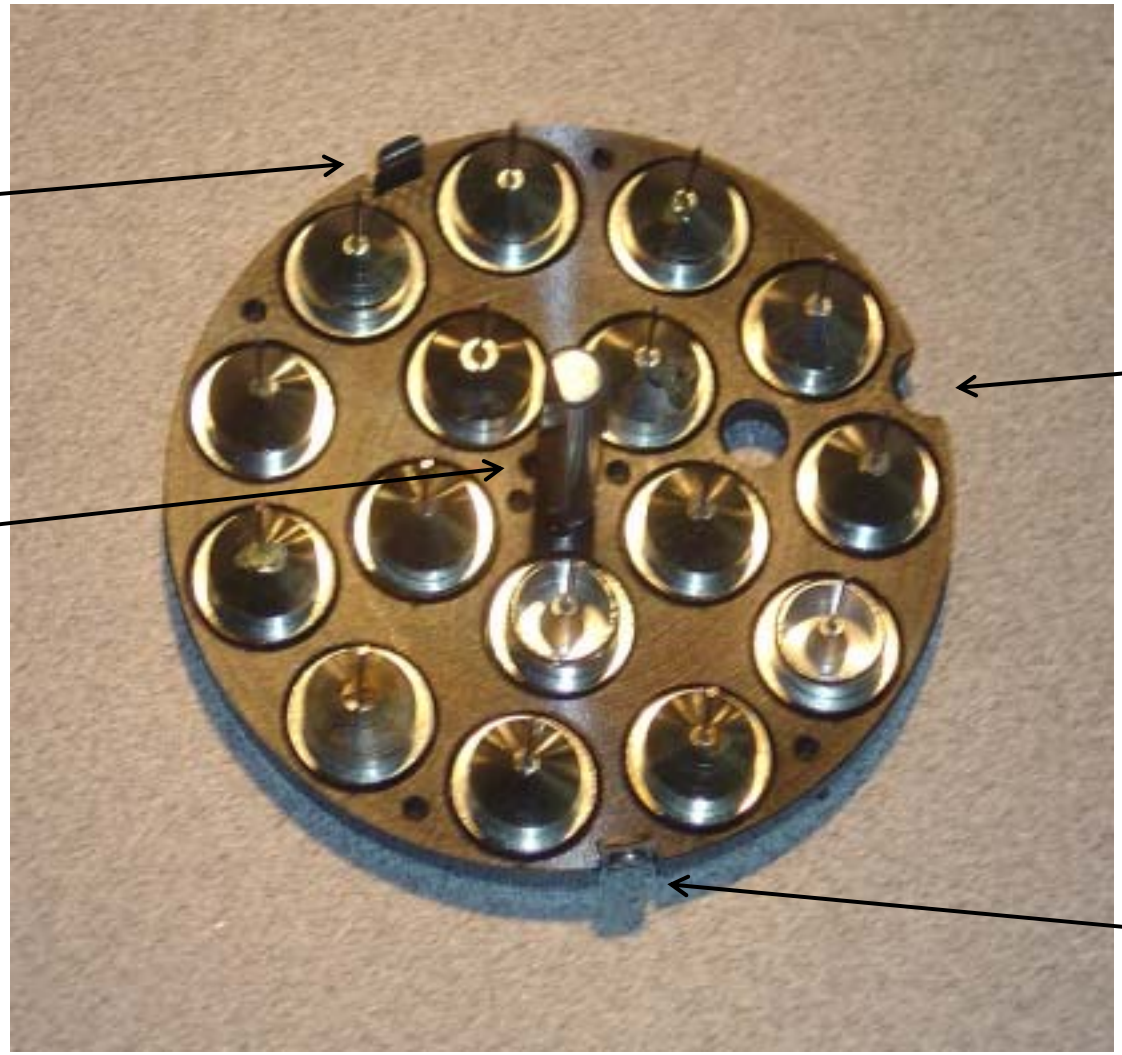


Compatible Sample Mount Formats

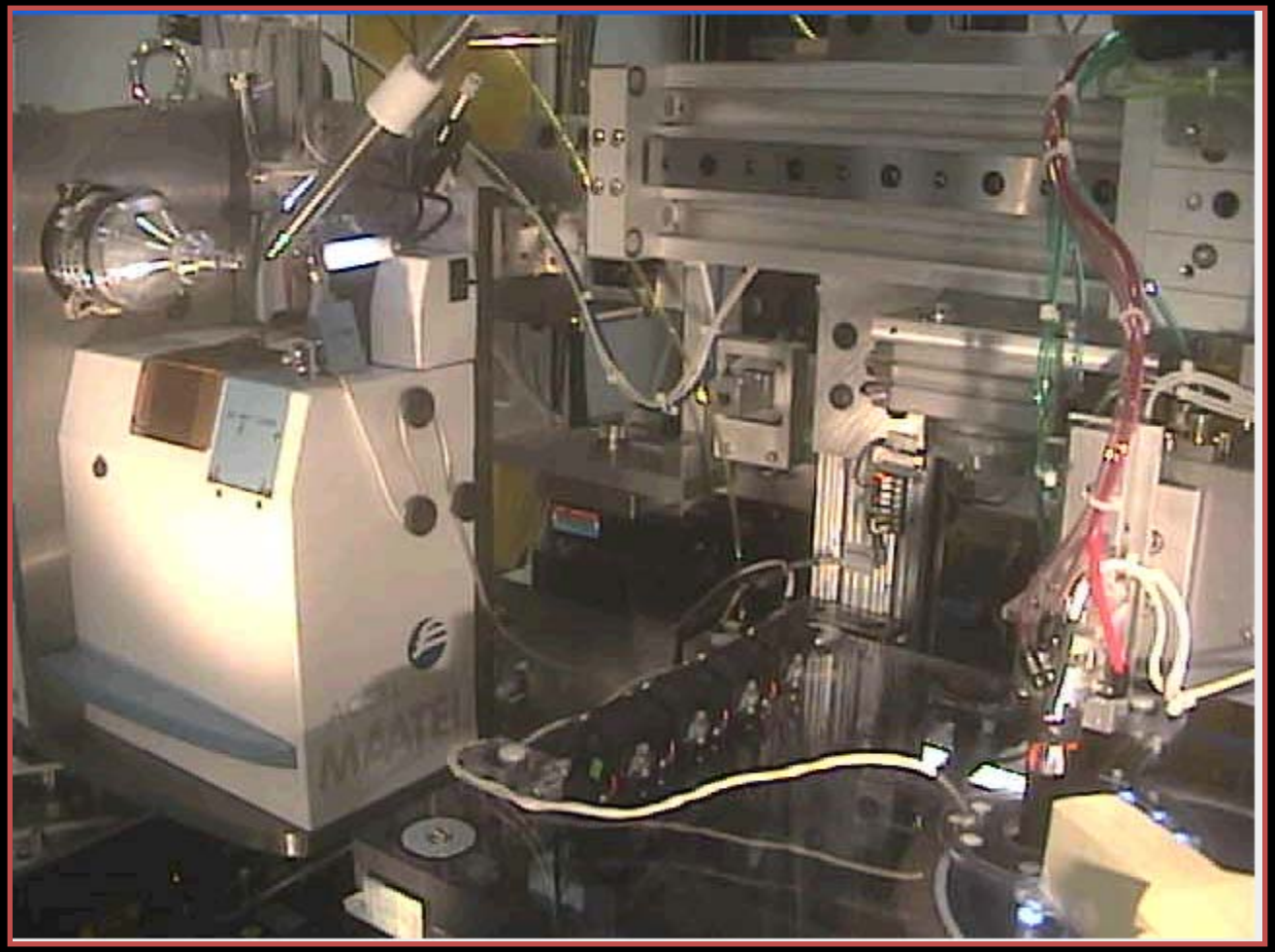


Sample Carriers (Pucks)

Puck Lid



Sample Mount



Tabulation of Refinements

Overall redesign of the ALS robot for ease of maintenance, reliability and compatibility with NE-CAT's sample goniometry (Maatel MD2).

Puck mounting plate and dewar lid redesigned to enable visualization of dewar interior & improve ease of puck installation and recovery.

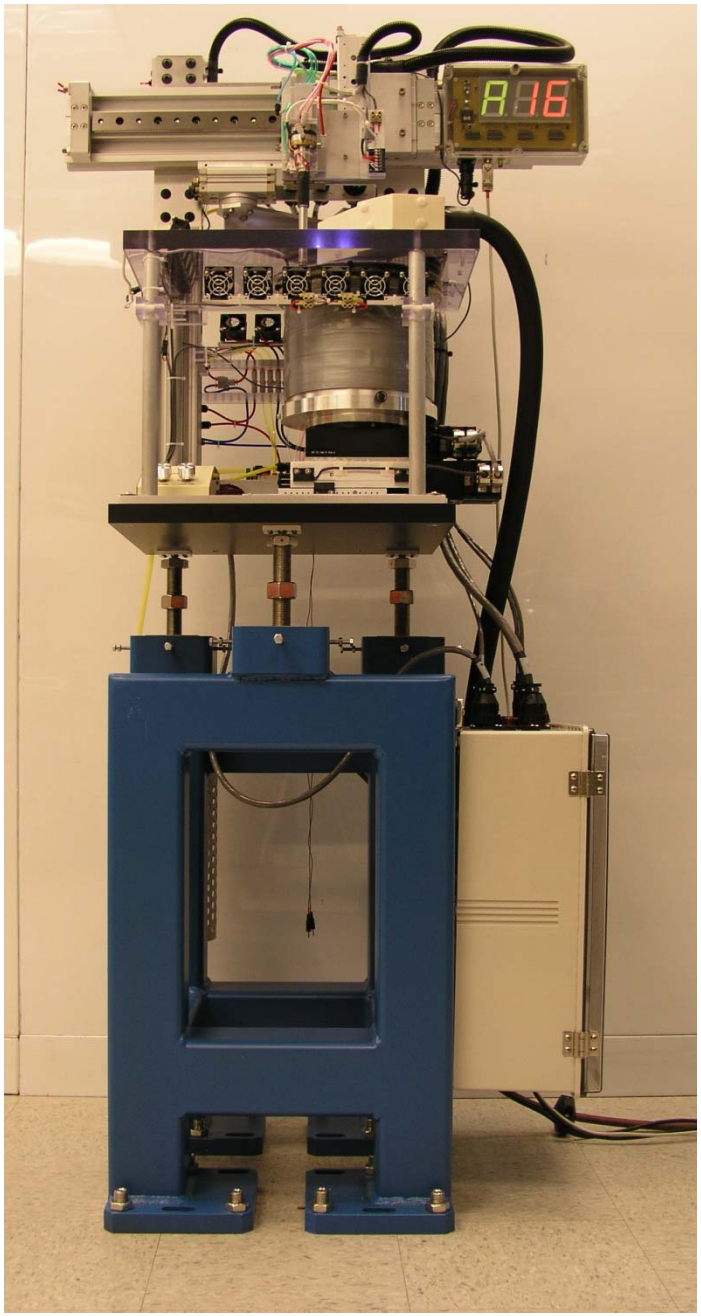
LN2 Distribution revised to increase reliability & minimize turbulence during filling.

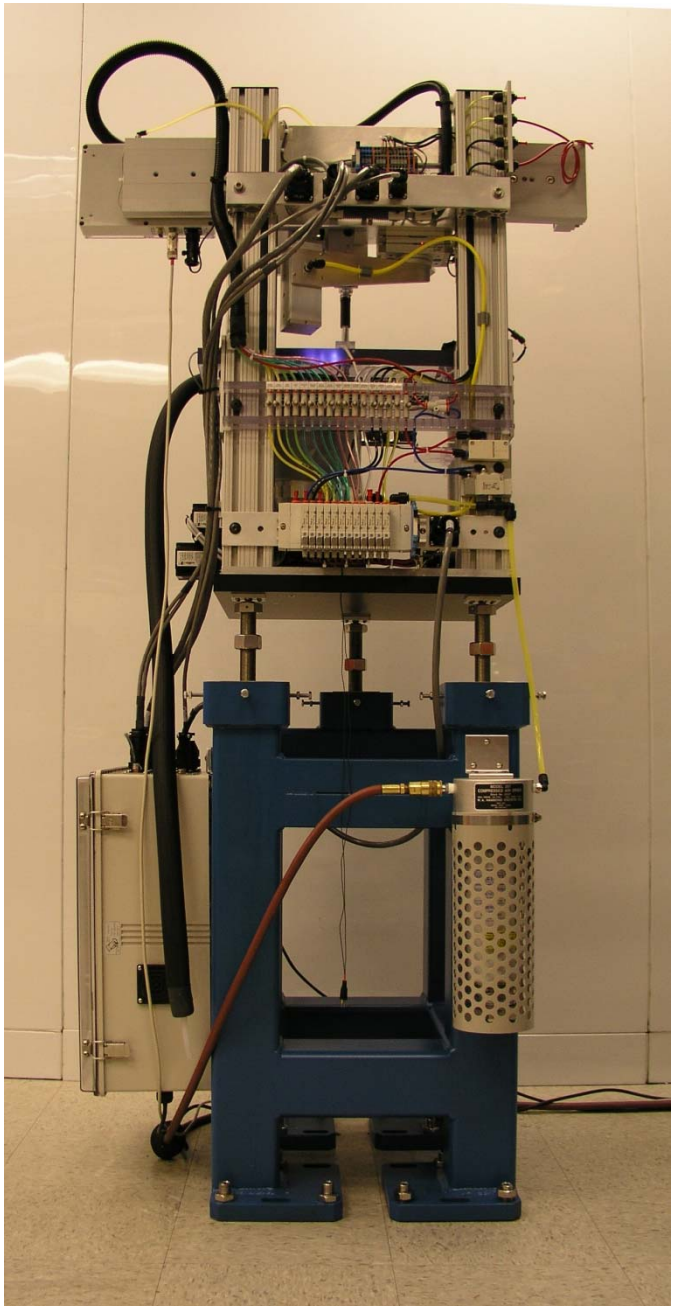
Modified gripper mount to minimize mechanical shock to spindle bearing during sample loading and recovery.

Mitigate frost build up on sample gripper, sample dewar and dewar lid.

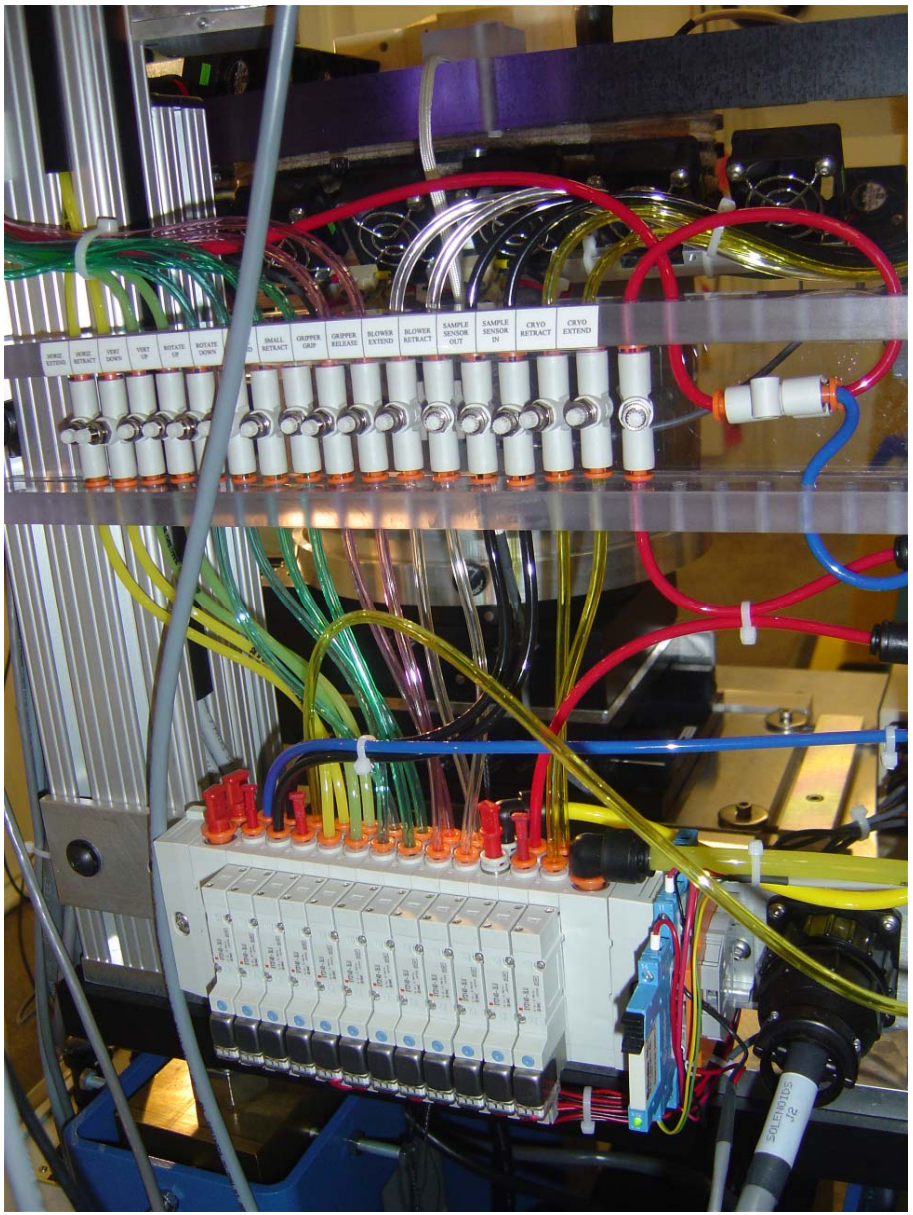
Automatic methods for removing weakly-bound frost from samples

Streamlined sample transfer to pucks.

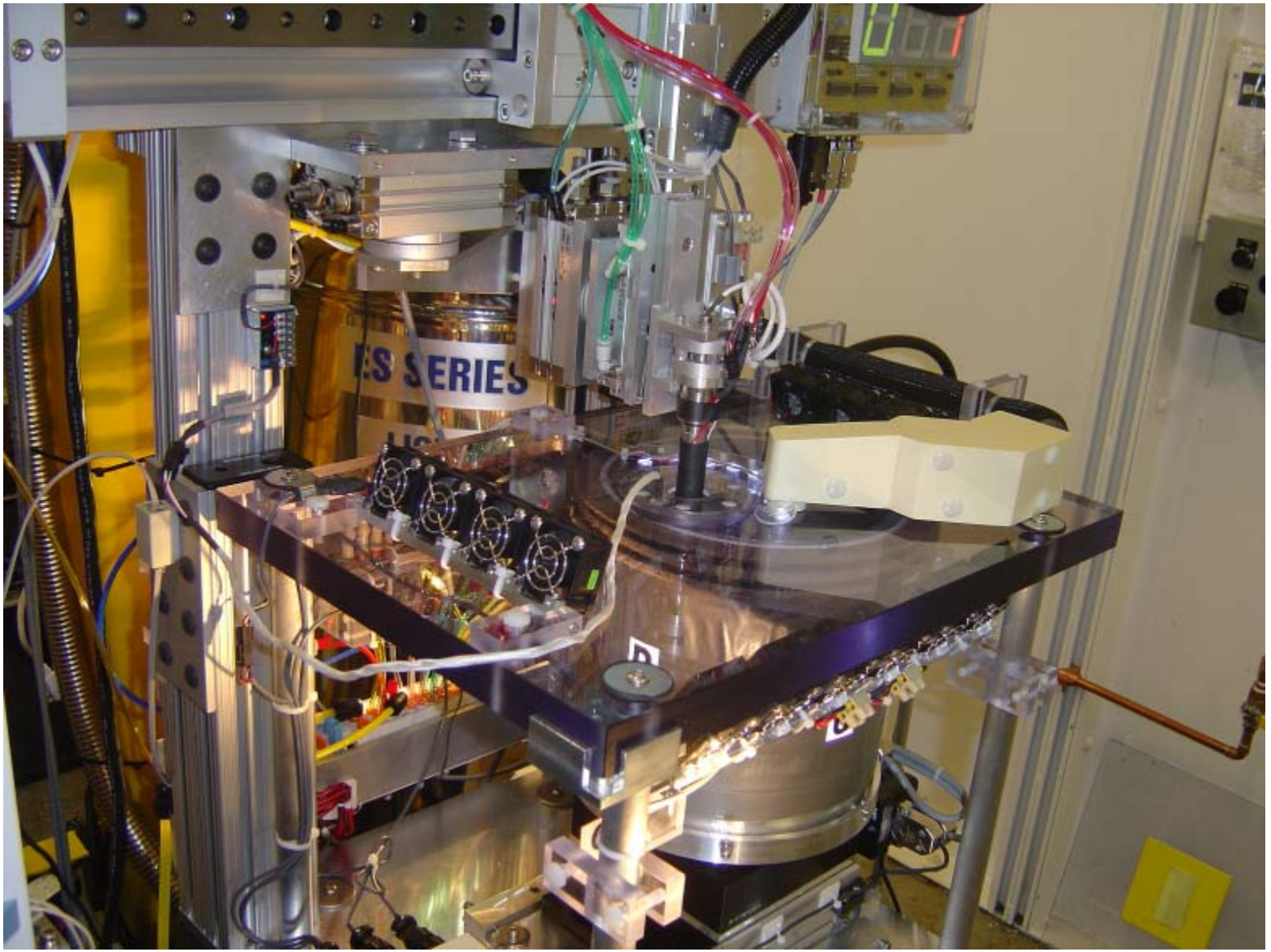




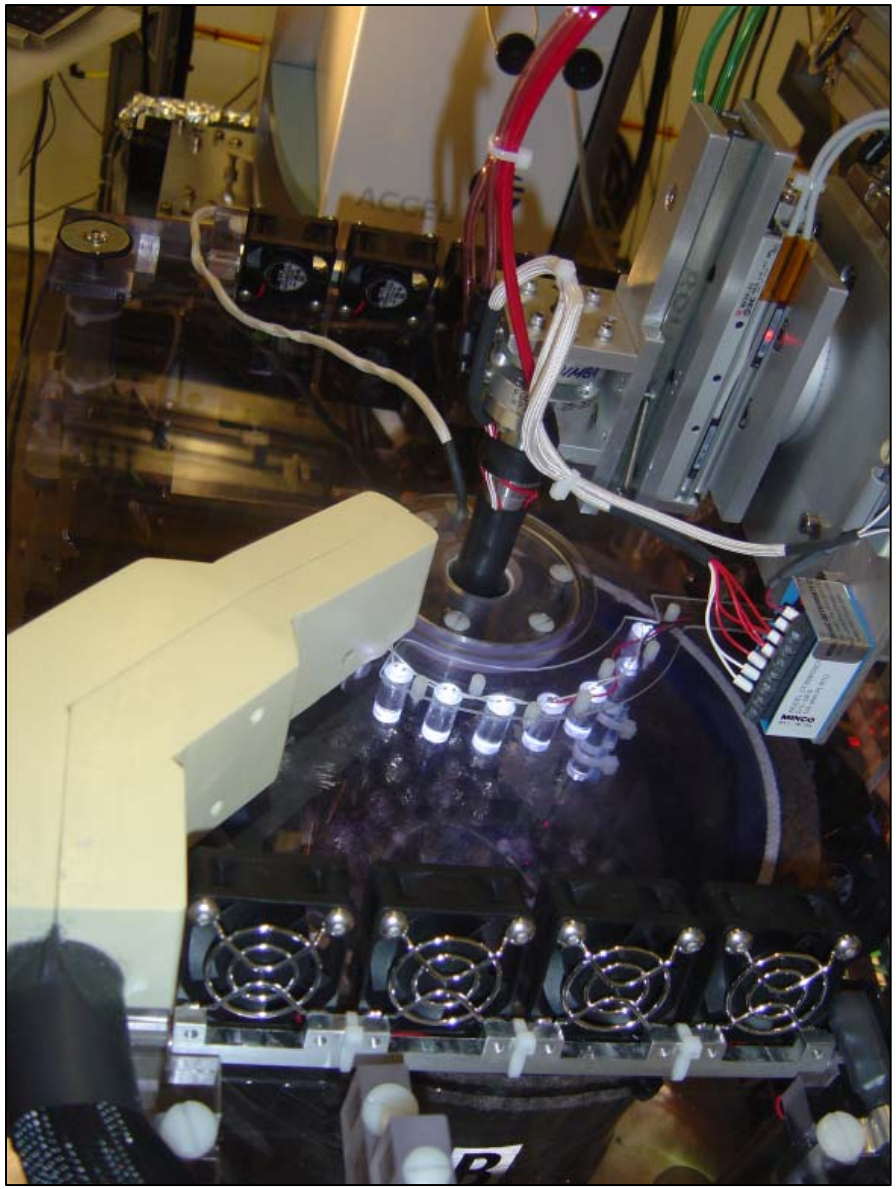
Re-engineered for Maintainability

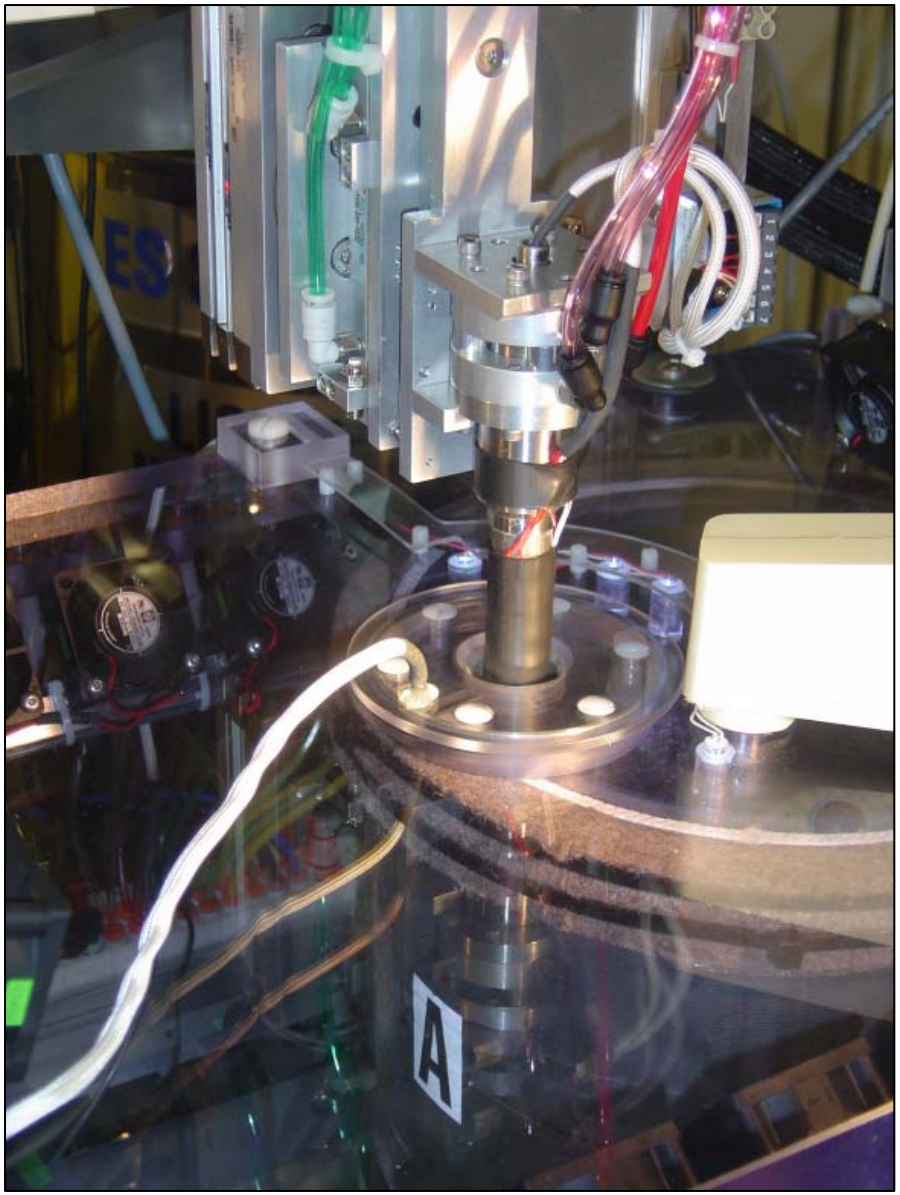


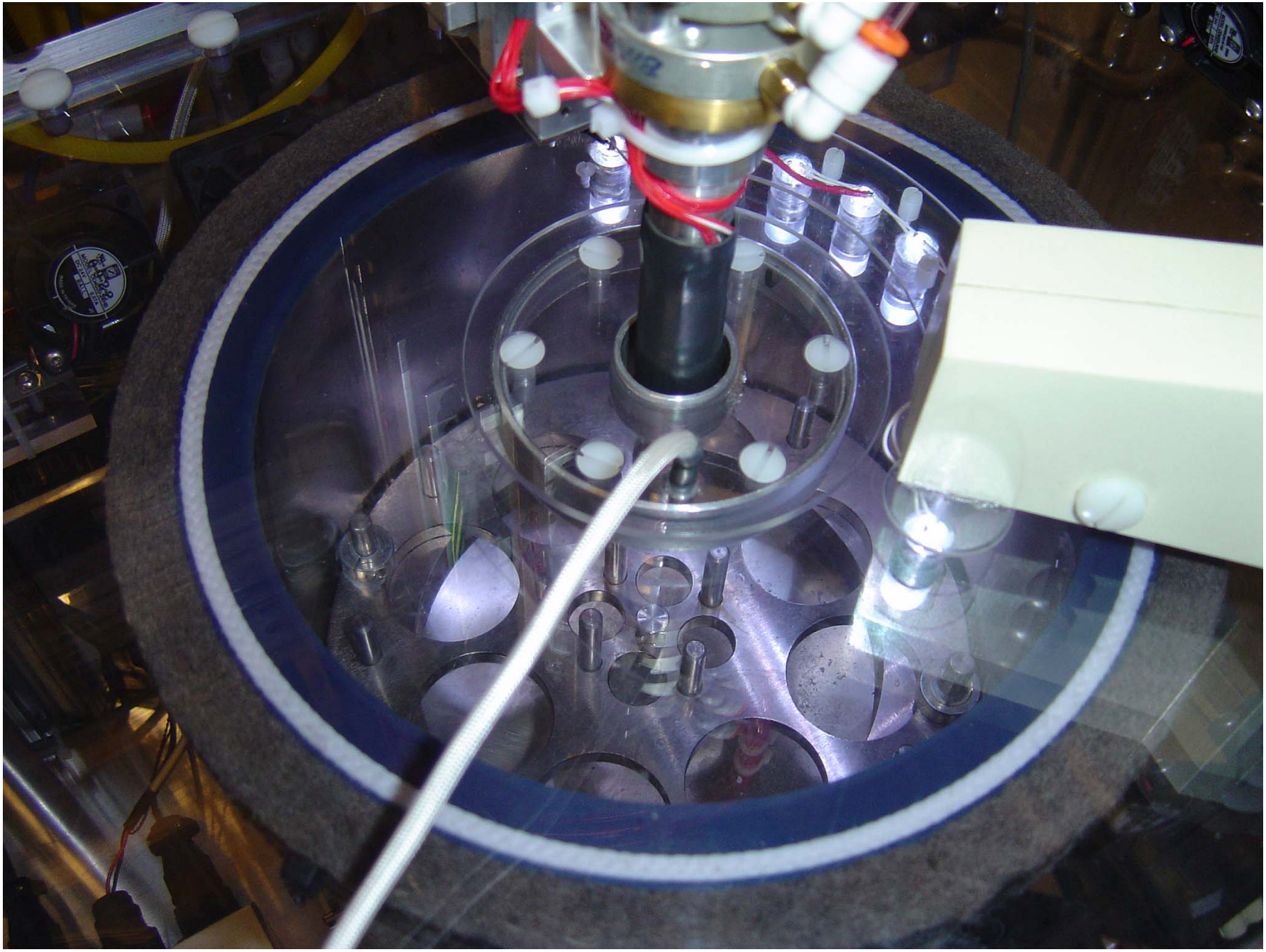
Transparent Dewar Lid



Illumination LEDS & Anti-Frost Heaters

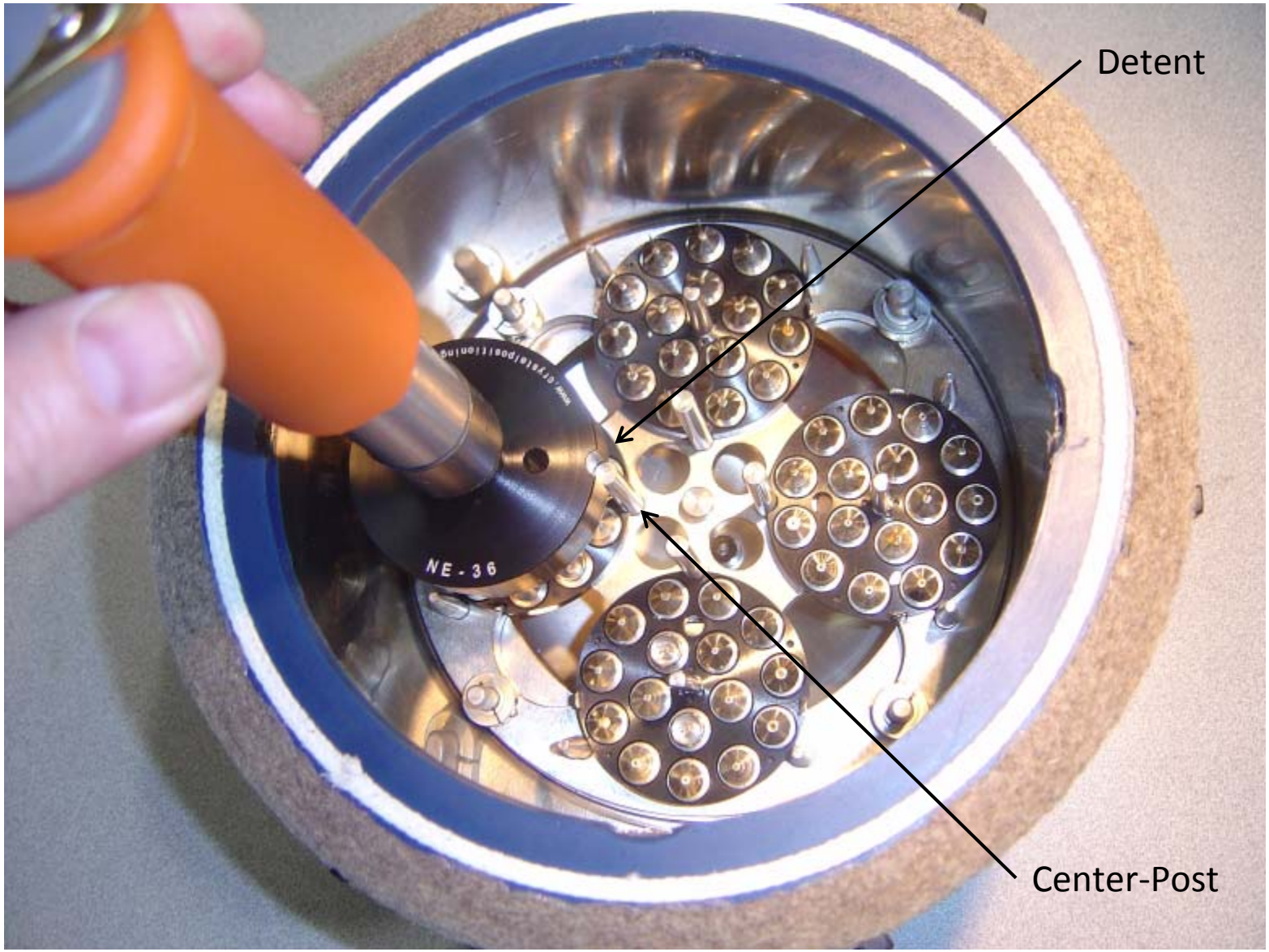




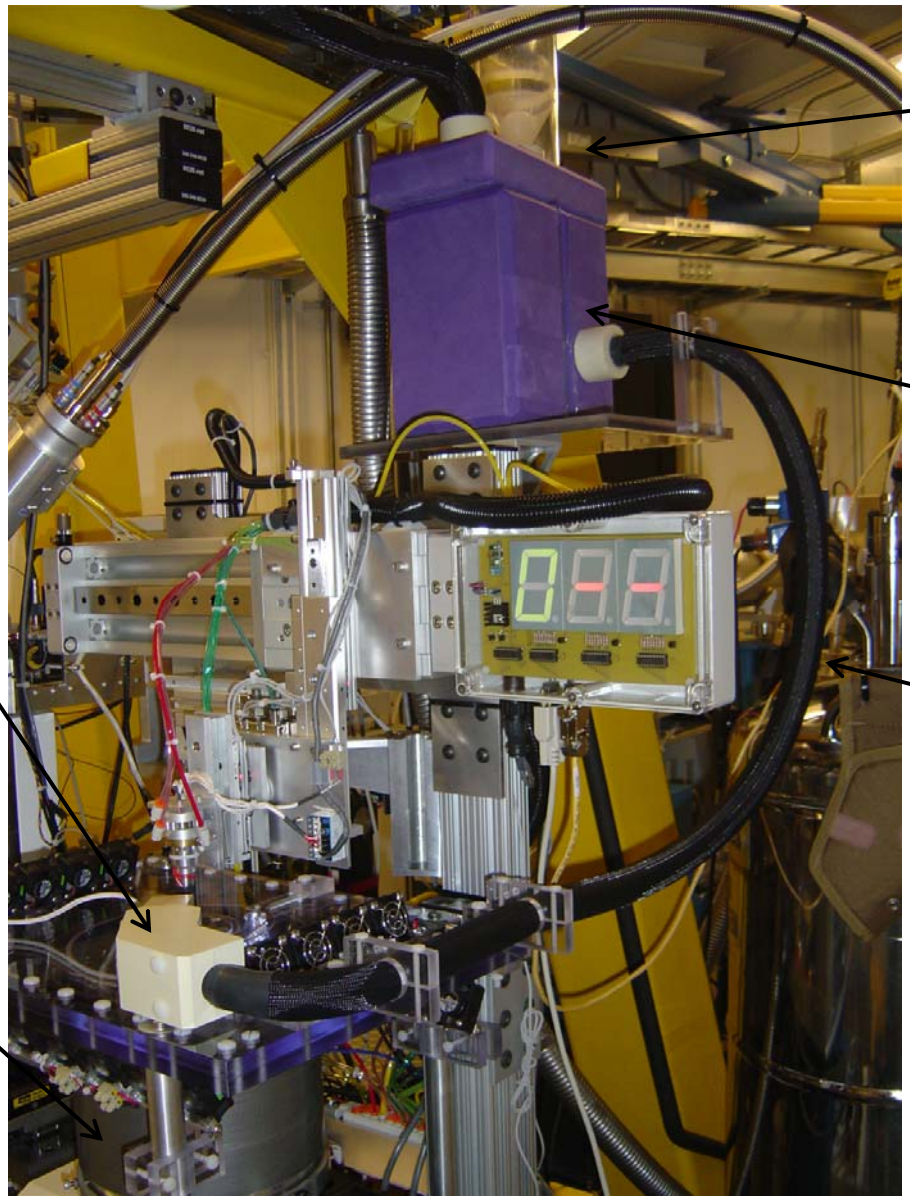


Dewar and Puck Plate Modifications

Center-Post Engagement Prior to Puck Installation or Recovery



LN_2 Distribution



LN_2 Purge & Control Valves

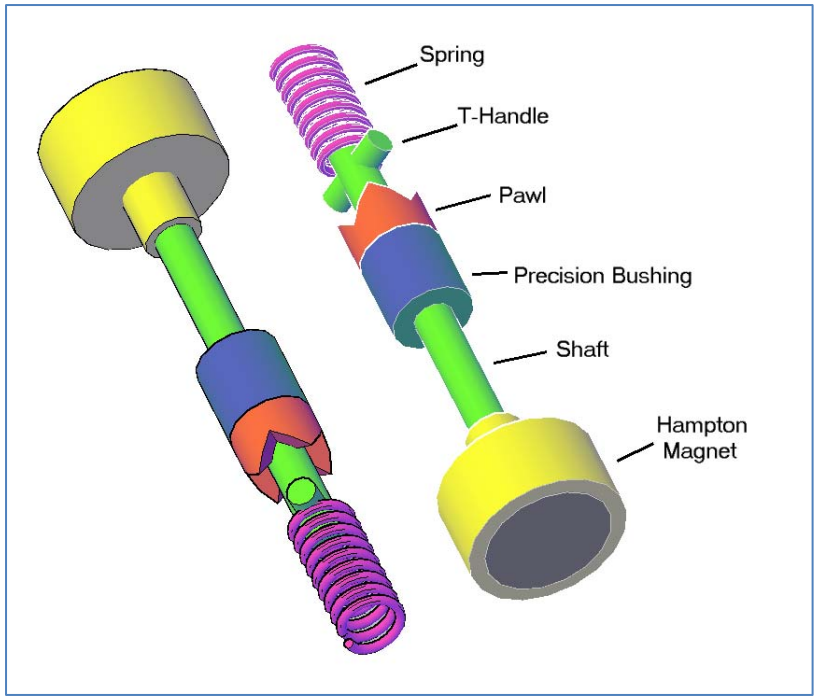
Ethyl-Vinyl Acetate Foam Gravity Sump

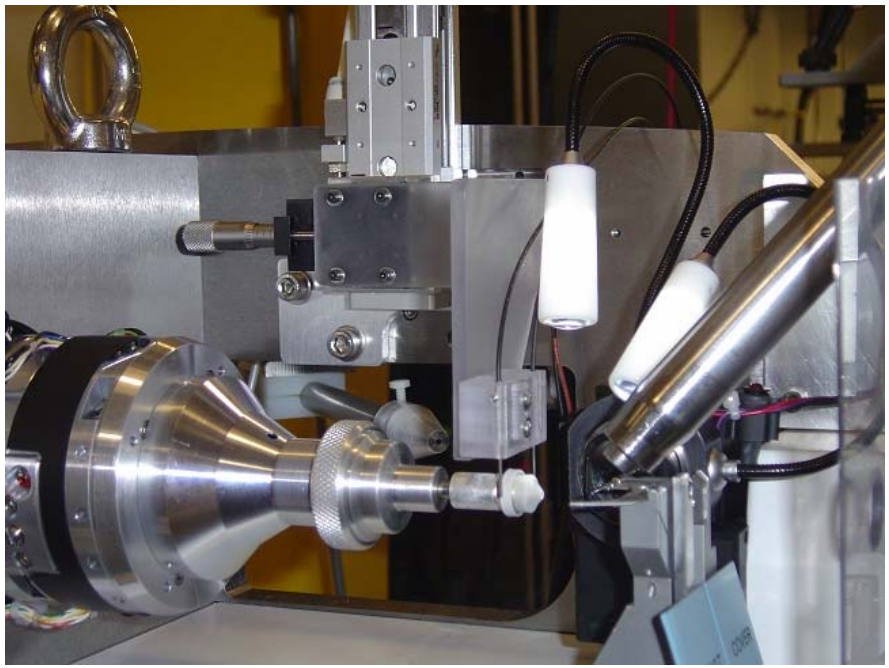
PTFE Transfer Line, Closed cell foam insulator

High Density Urethane Foam Insertion fixture

Dewar

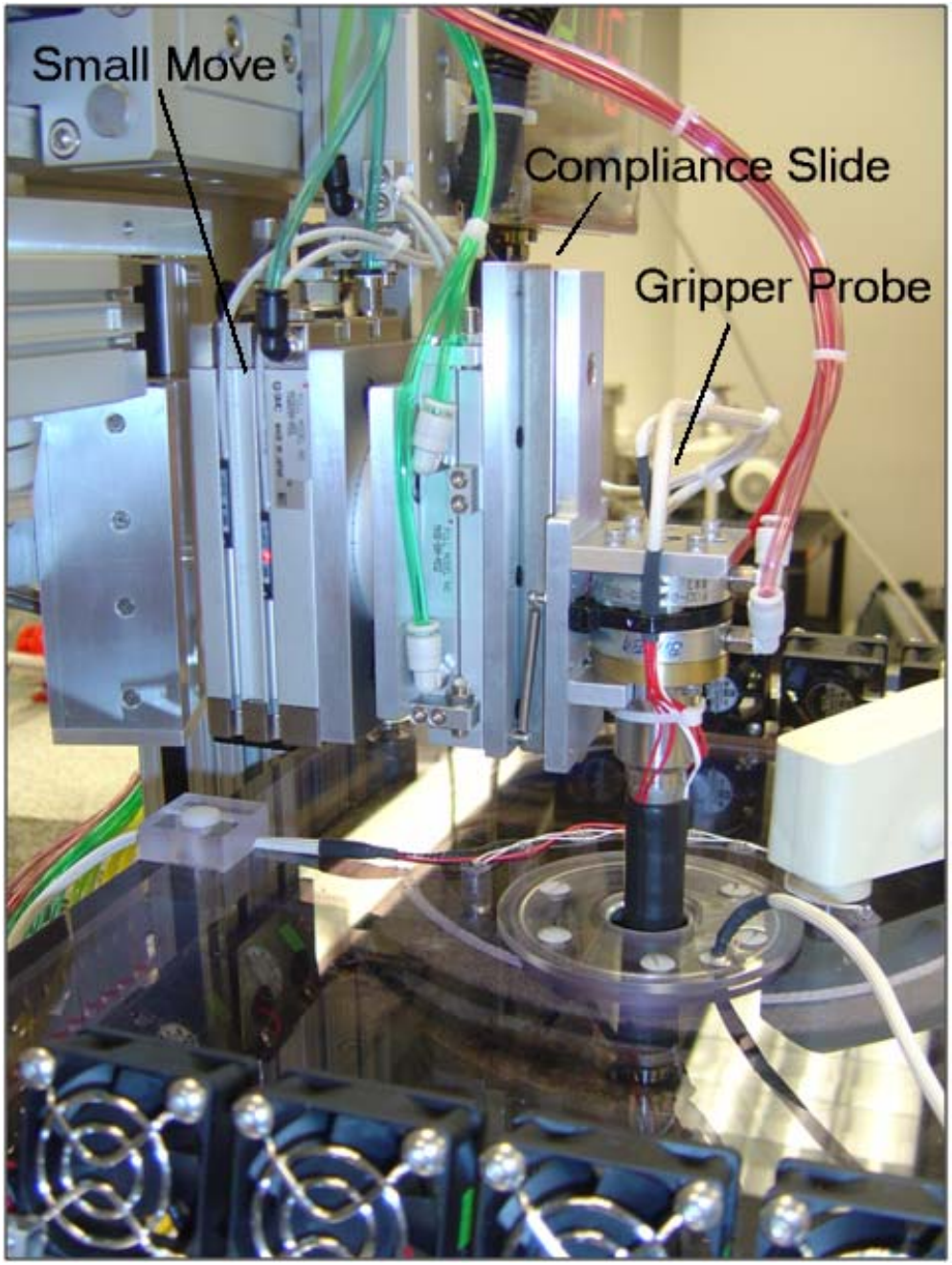
Compliance Head



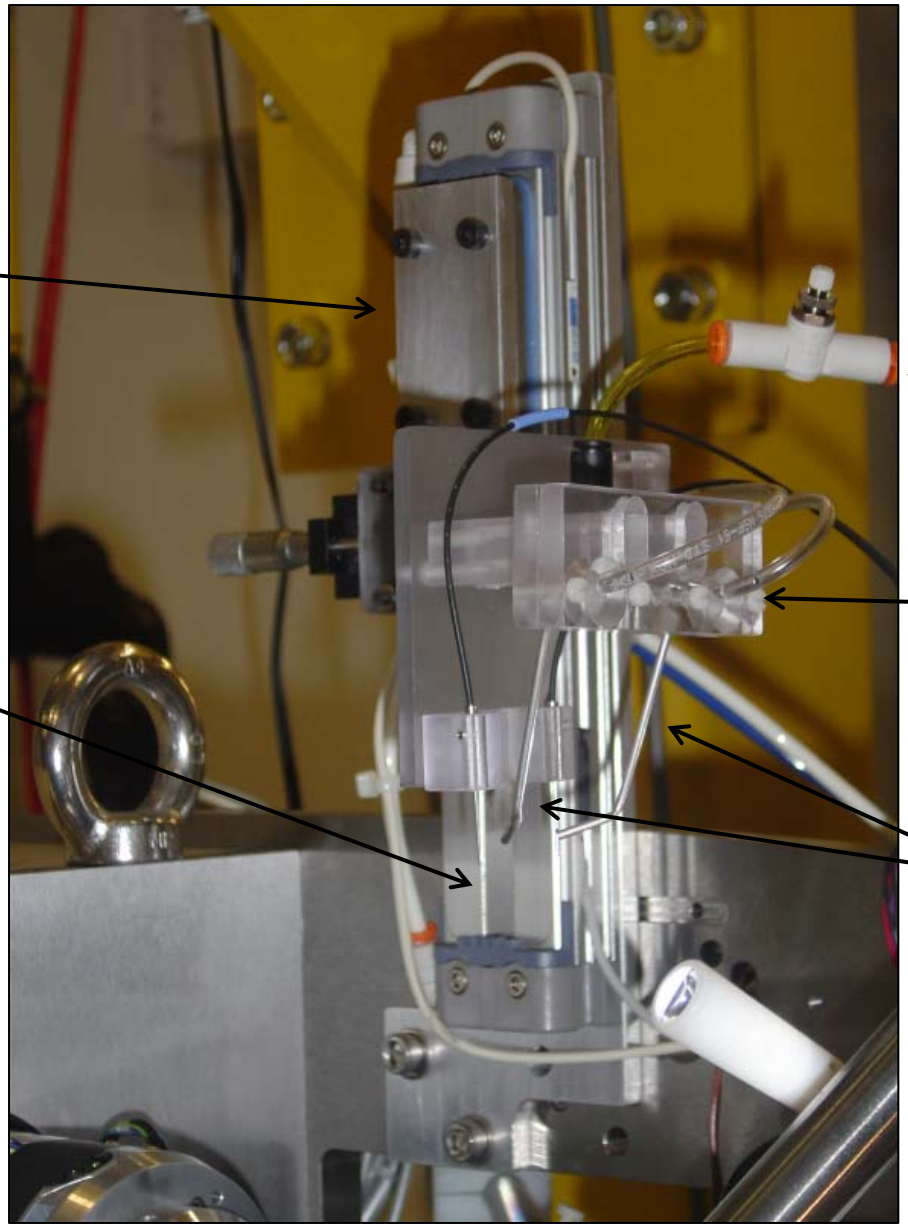


Compliance Slide

MK3 Mini-Kappa Head

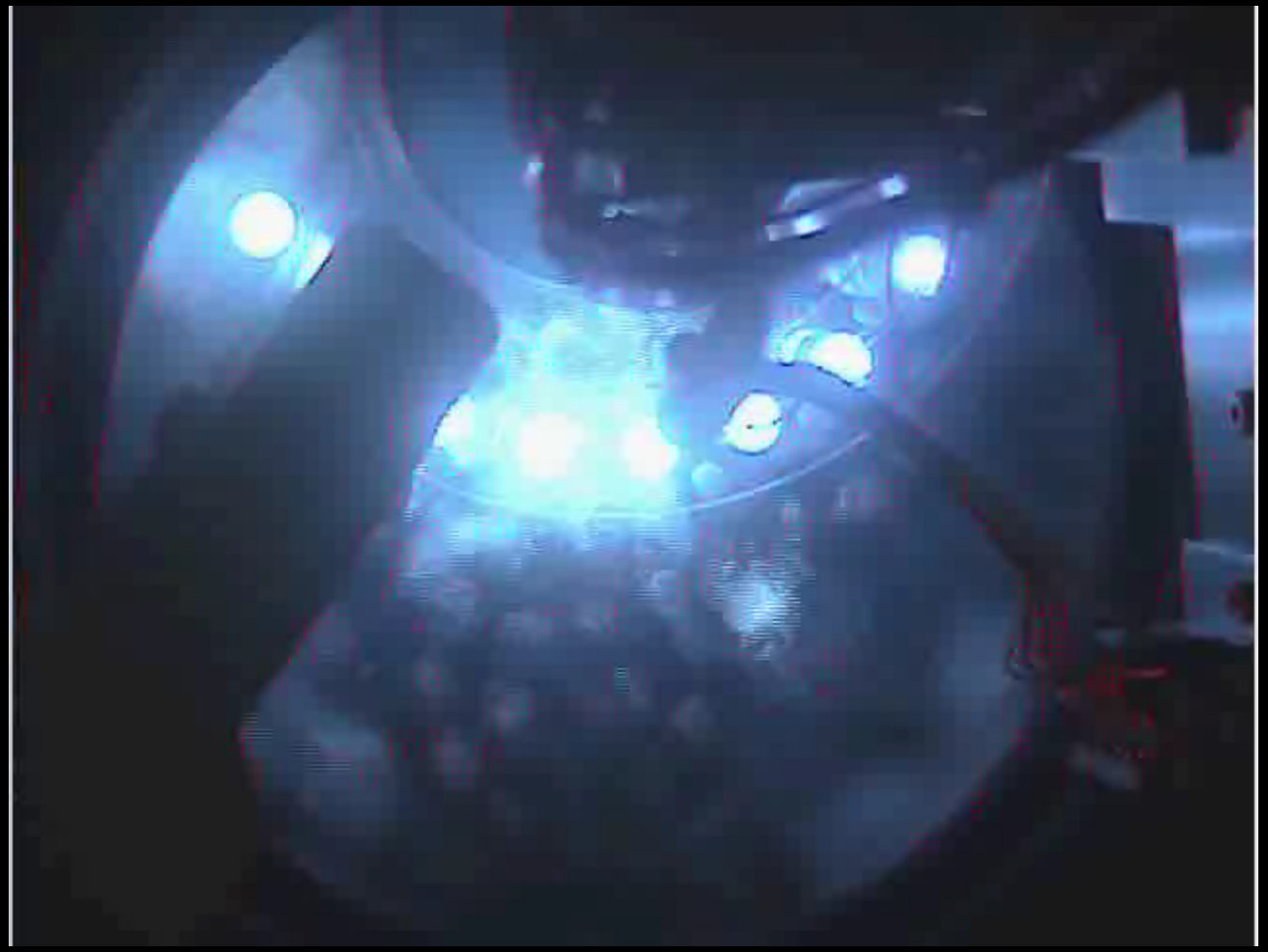


Sample Sensor & Base Thaw

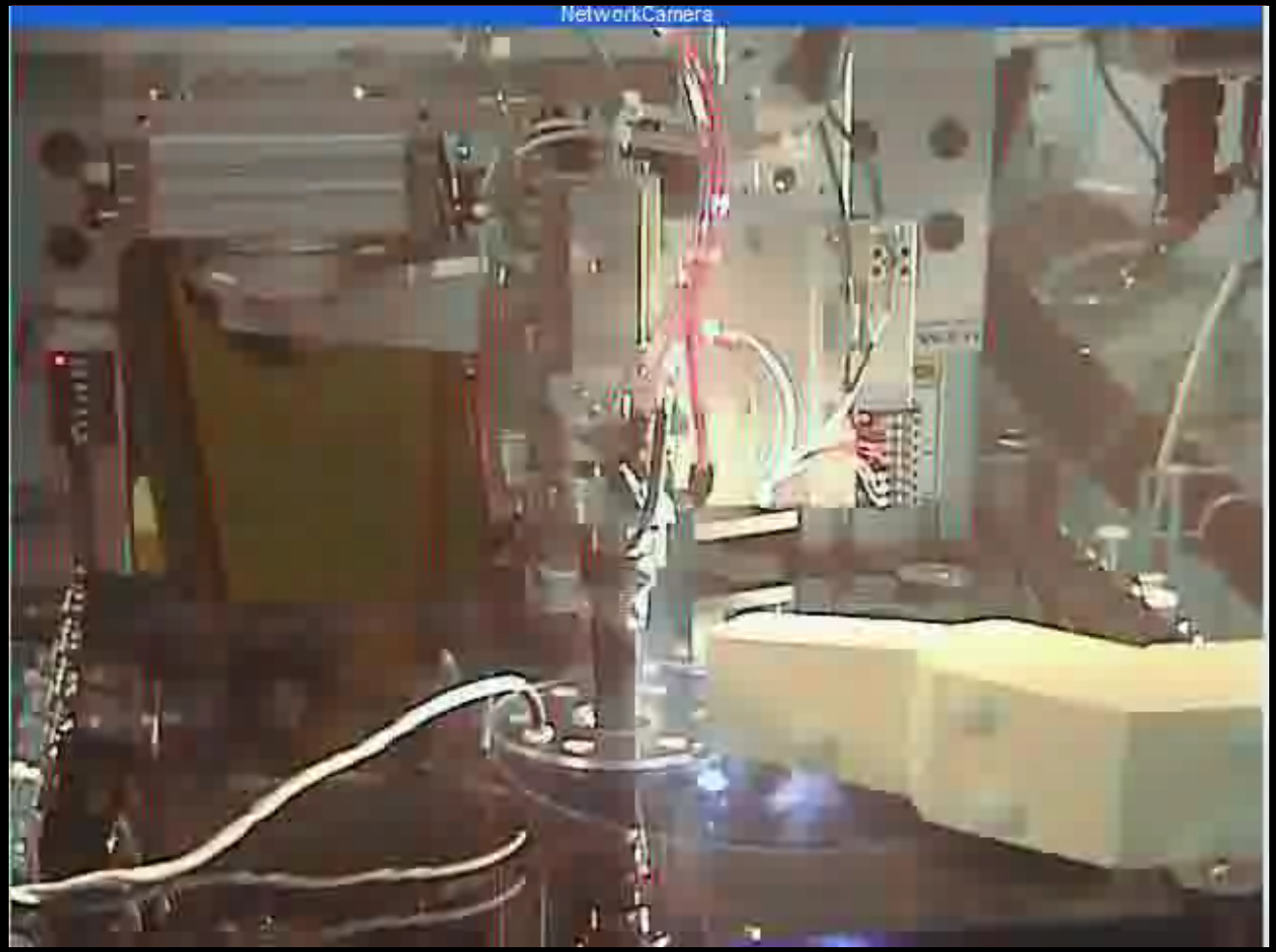


Sample Mount & Base Thaw

“Washing Machine De-Icing Mode”

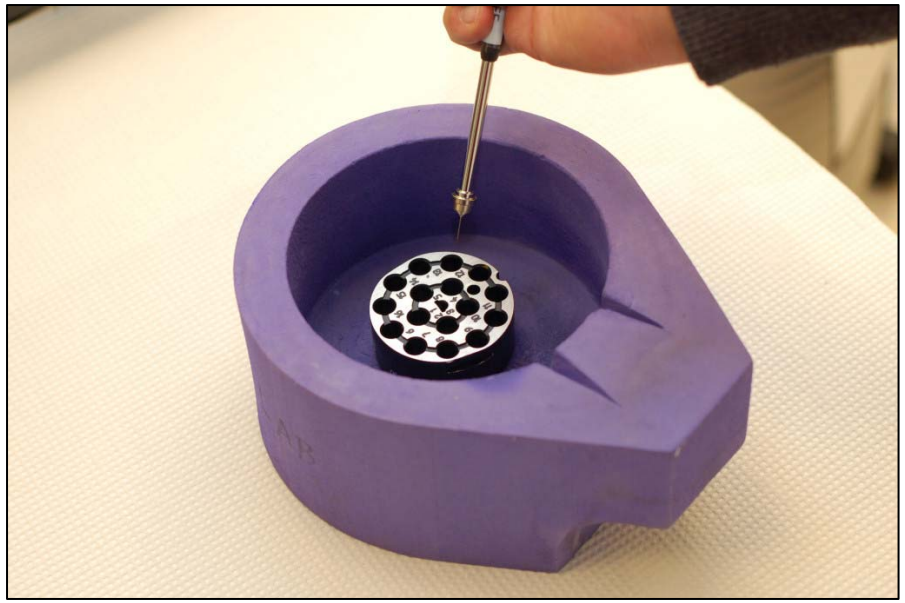


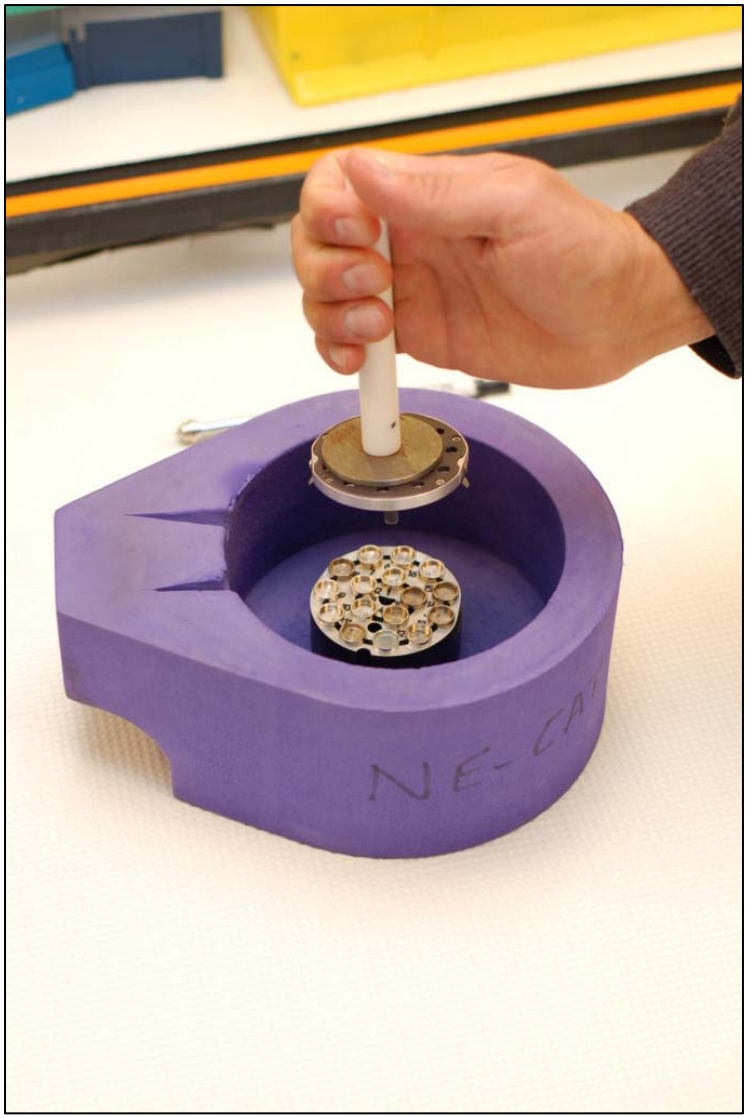
Agitation De-Icing Mode



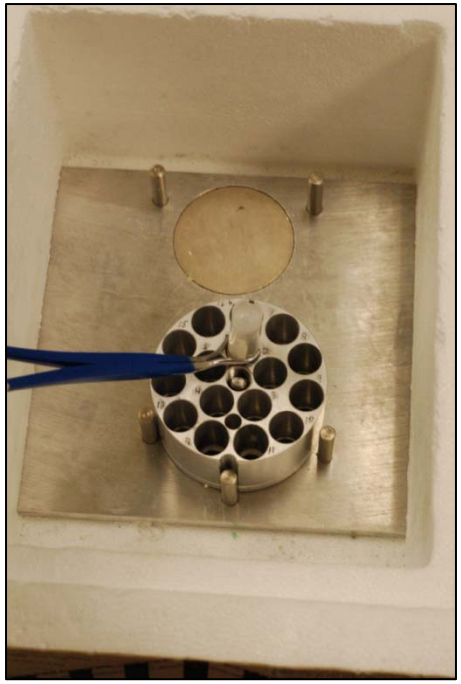
LN_2 Removal

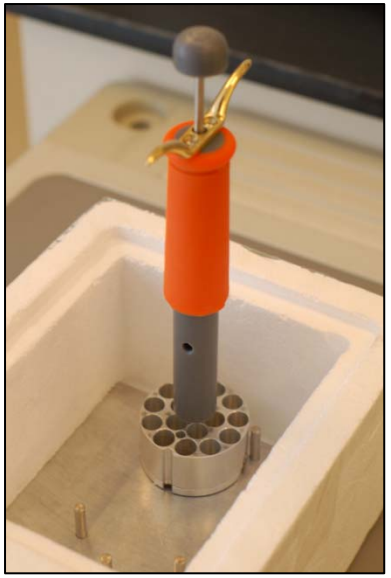
Old-Style Puck Loading





SER-CAT's Puck Loading Method





ALS-Style Puck Availability

Peter Boyd (Boyd Technologies) deceased 2009.

New Source: Richard Howells
Crystal Positioning Systems
29 Stafford Street
Jamestown, NY 14701
Telno: 716 483-3276
Faxno:716-483-0018
http://www.crystalpositioningsystems.com/Puck.htm