

The UVa Polarized Target Current Status and Prospects for Hall A

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Hall A Collaboration Meeting
Wednesday Dec.16, 2009

TARGET OVERVIEW

The UVa or “Hall C” Polarized Target is a dynamically polarized solid target (NH_3/ND_3) consisting of:

5 Tesla Superconducting magnet

1 K high cooling power ^4He evaporation fridge

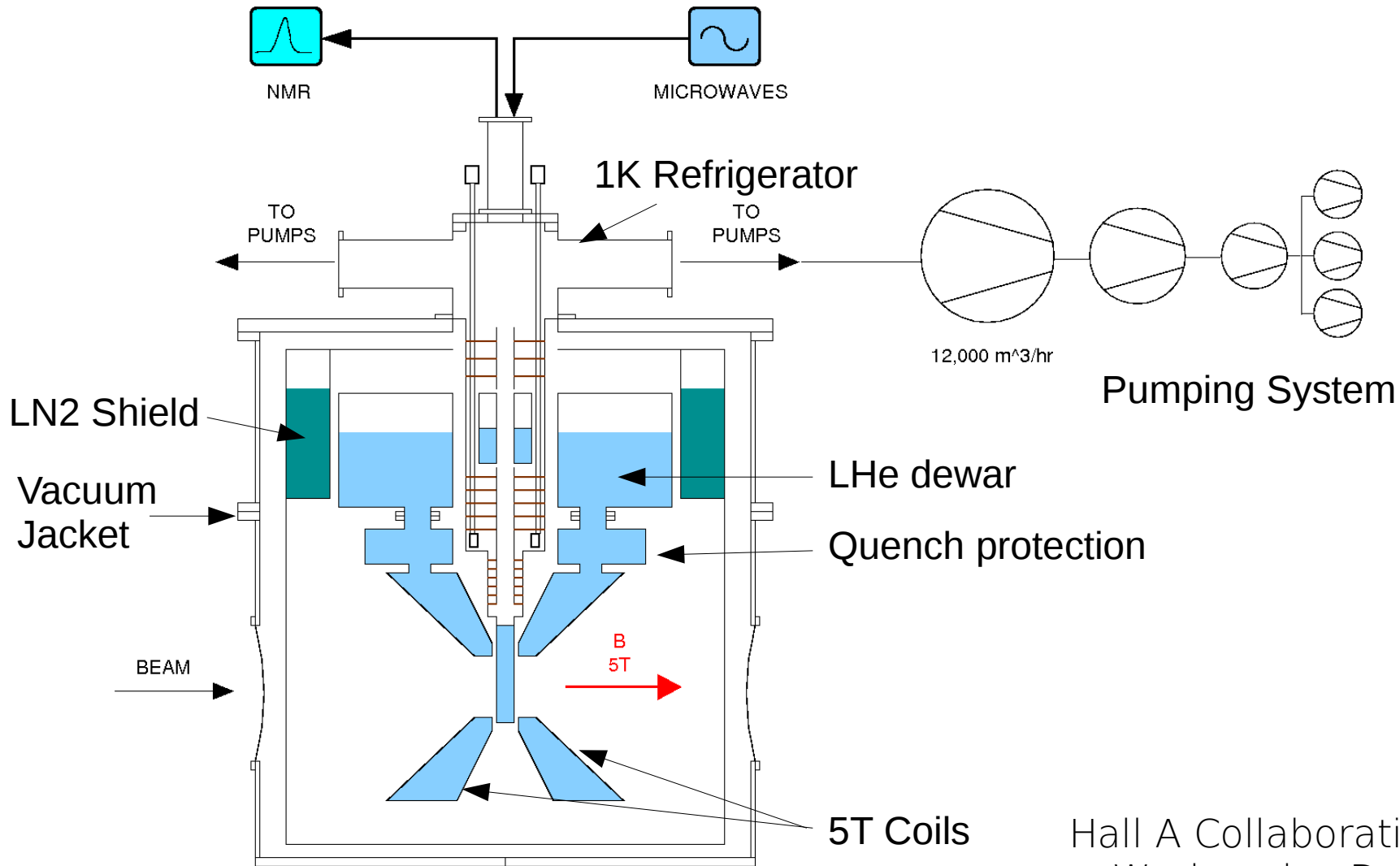
12,000 m^3/hr Roots pumping system

140 GHz Extended Interaction Oscillator (EIO)

Continuous Wave NMR system (Liverpool Q-meters)

Target Insert with 5 sample containers and vertical motion

Hall C/UVa Polarized Target



TARGET HISTORY

The target system has been used at SLAC on 3 occasions

E143 (1993)

E155 (1997)

E155X (1999)

and at JLab on 3 occasions

Gen (1998)

Gen + RSS (2000)

SANE (2008)

Performance during SANE was severely compromised by failures of:

Superconducting magnet

1 K refrigerator

Pumping system

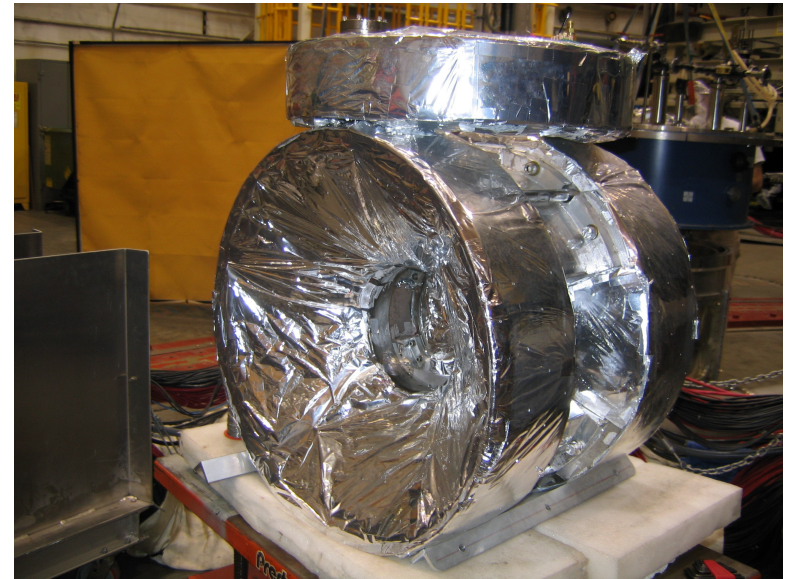
Target motion mechanism

Target Status: SUPERCONDUCTING MAGNET

Magnet dewar was severely damaged in catastrophic vacuum failure, 1999. Repaired at JLab.

Magnet wiring and quench protection circuit damaged by quenches (or series of quenches), 2008. Repaired at JLab, but random quenches persisted throughout SANE experiment (2009).

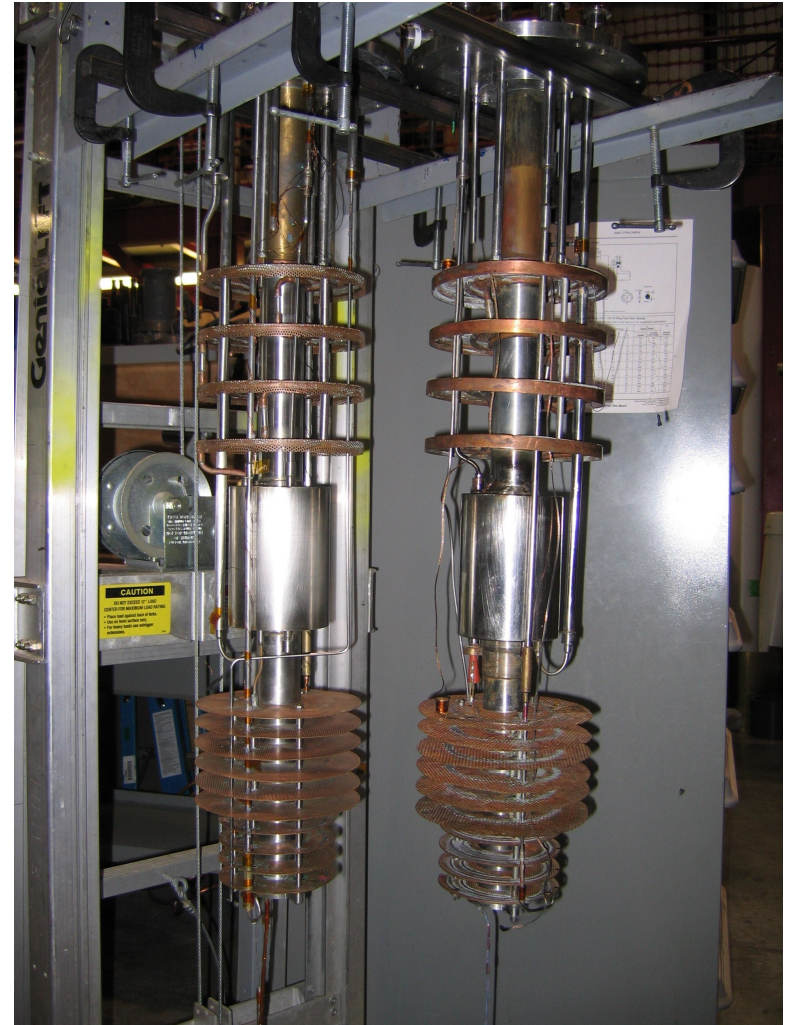
Magnet to be sent to Oxford Instruments (UK) for repair in December 2009.



Target Status: 1K REFRIGERATOR

Refrigerator developed catastrophic leak in 4K separator during SANE (2000). Unsuccessful repair attempted at JLab left 'fridge inoperable.

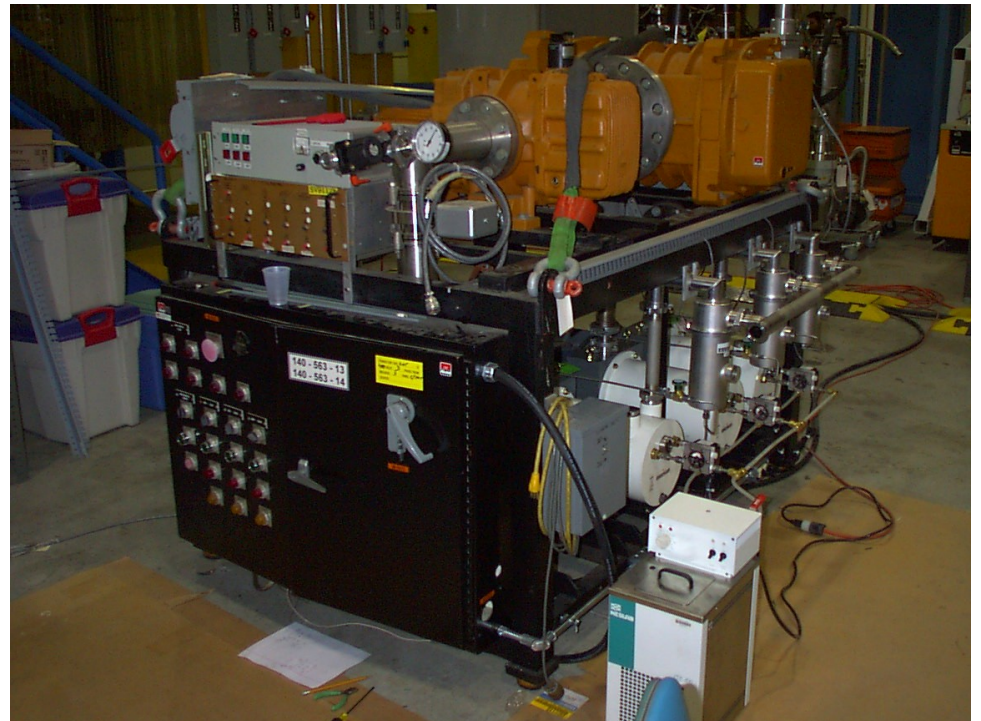
Refrigerator replaced during SANE (2009) with “Charlottesville” 'fridge after minor alterations.



Target Status: PUMP SYSTEM

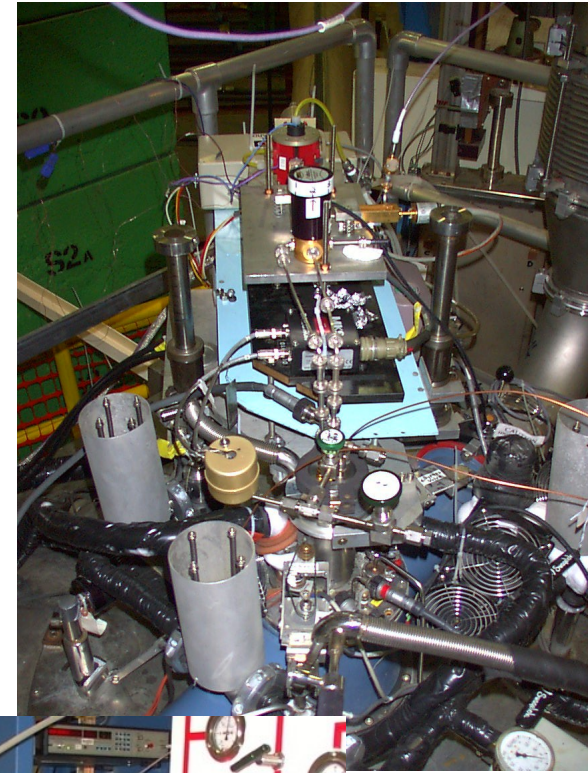
Three Alcatel 2060H rotary vane Pumps were damaged during SANE. Subsequently rebuilt at JLab.

Set of four Roots pumps is now approximately 25 years old. Should be replaced for 12 GeV operation.



Target Status: MICROWAVES and NMR

UVa and JLab Target Group have multiple EIO tubes and power supplies and various microwave components.



UVa and JLab Target Group have multiple Liverpool Q-meters and other NMR electronics.

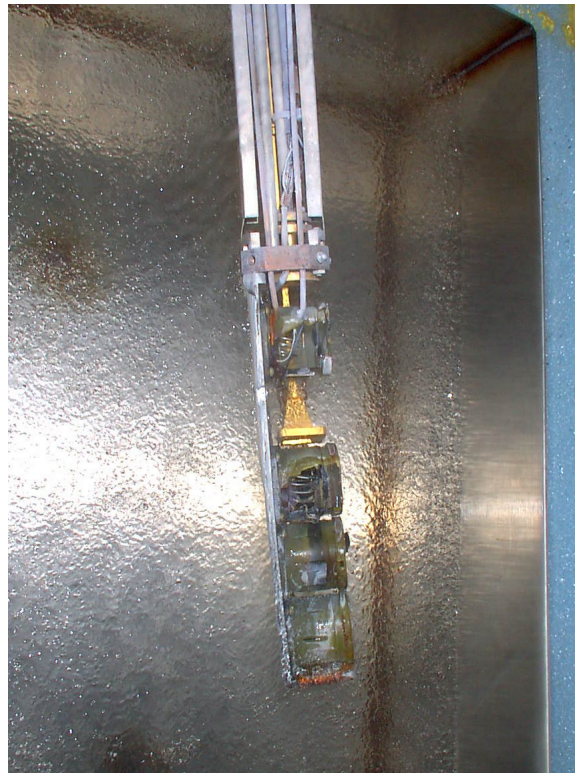
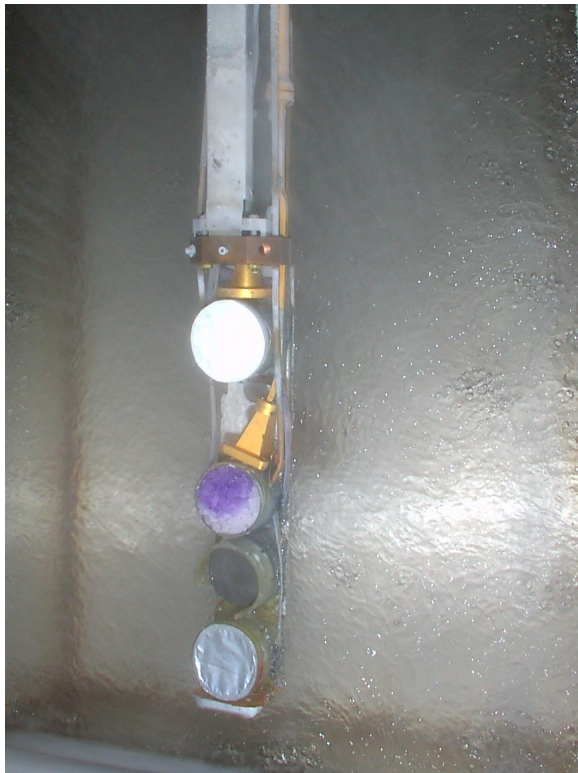


Target Status: TARGET INSERT

UVa has multiple inserts used during and prior to SANE.

Insert and motion mechanism designs have a history of alignment and reliability problems.

UVa and JLab Target Group will discuss possible design improvements tomorrow.



Target Prospects: Installation in Hall A

PROBLEM: Requires 500 liter LHe “buffer” dewar fed by ESR.

SOLUTION: Use Hall C buffer dewar and Hall A cryotarget coolant lines.

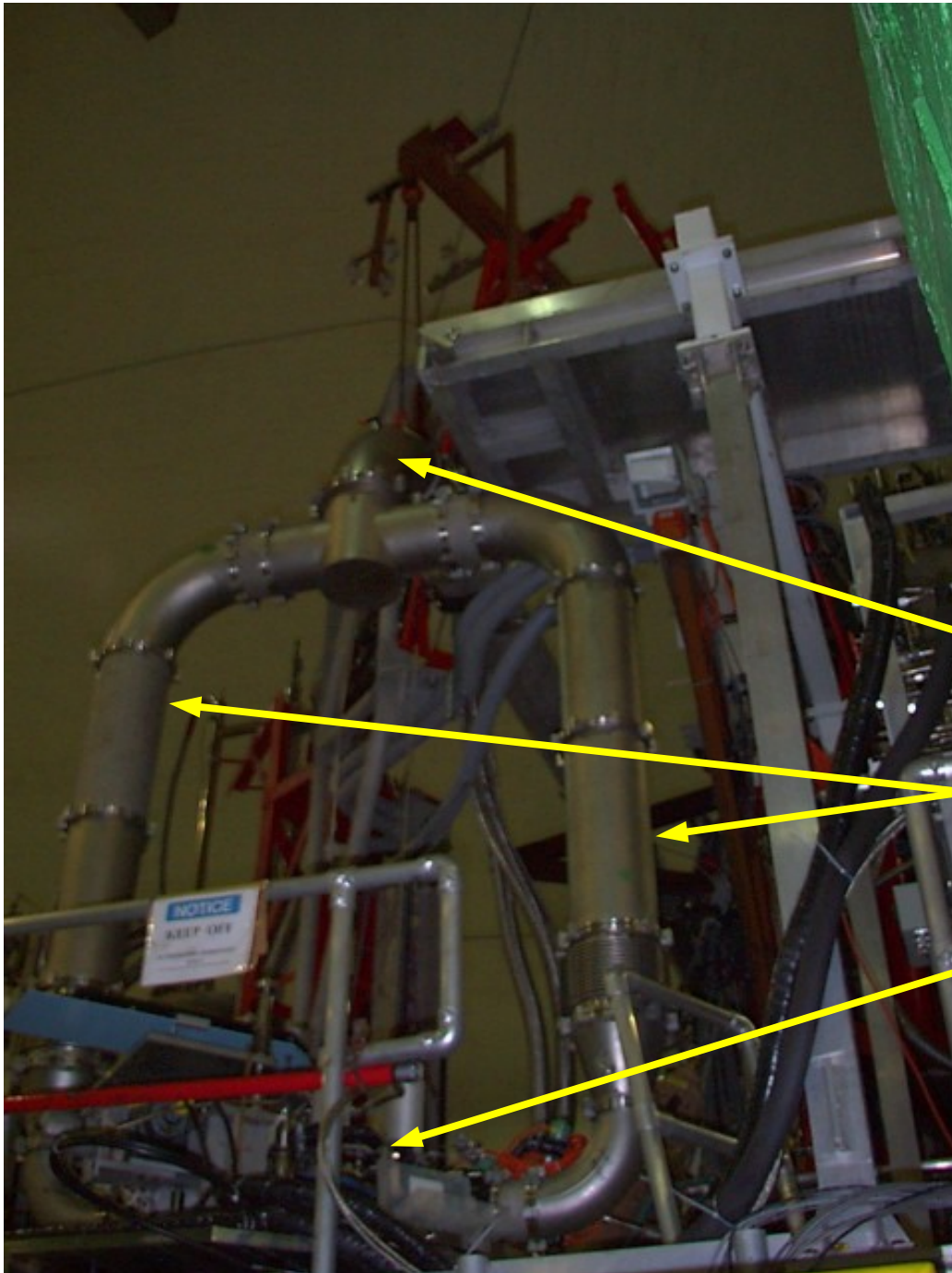
PROBLEM: Requires LN2 to cool heat shield.

SOLUTION: Replumb LN2 supply lines in Hall A or use standalone LN2 dewars

PROBLEM: Target requires ~ 10 – 12 feet of head room above beam line.

SOLUTION: Reconfigure refrigerator pumping line for horizontal orientation.

→ It still may NOT fit!! (Requires extensive design study).



Main tube to pump system

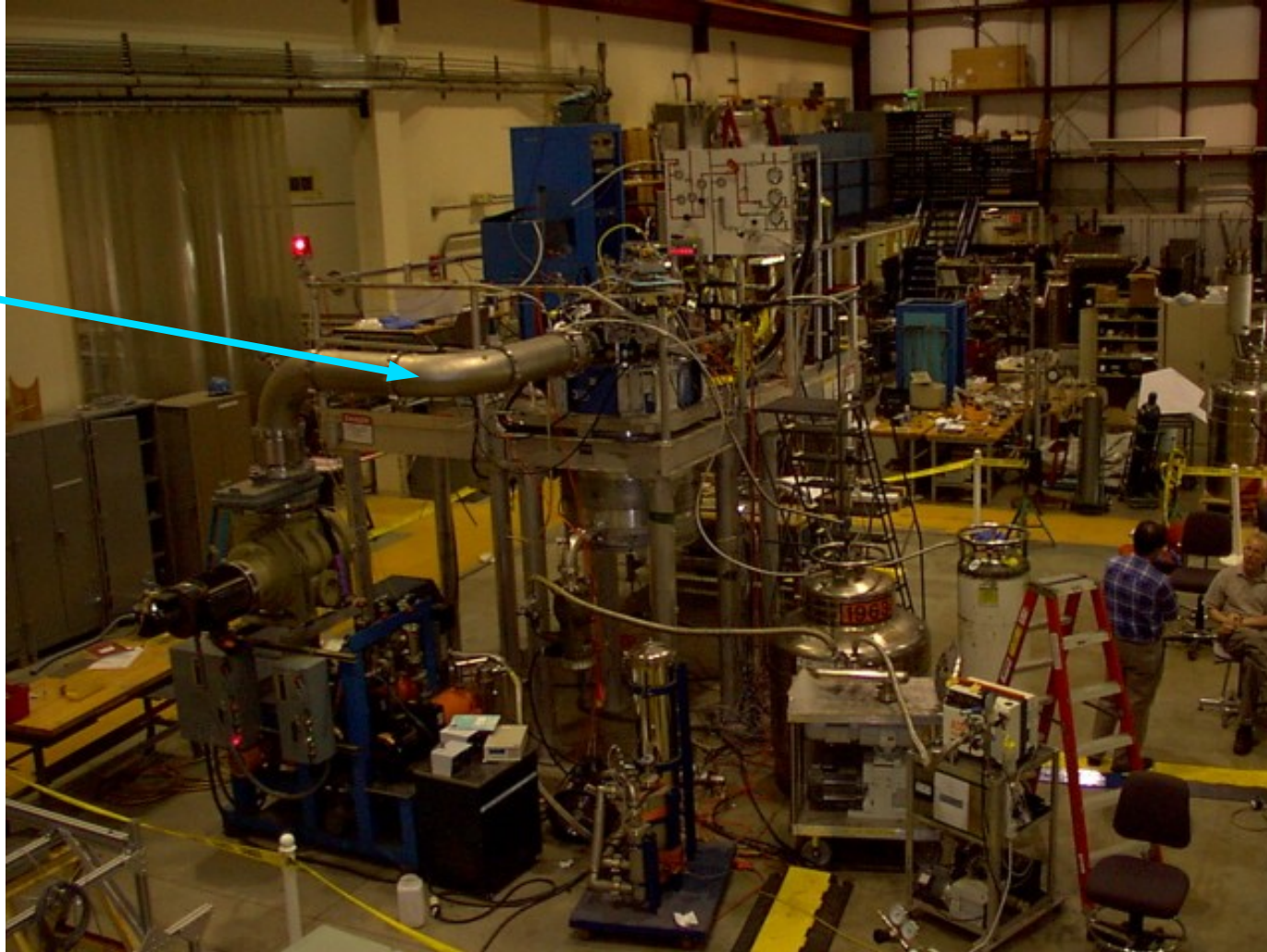
“DONUT”

Refrigerator

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Target Set-Up in EEL Building, Summer 2008

Single line to pumps



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SUMMARY

A high performance, but low reliability target.

In dire need of numerous repairs

- ◆ Magnet
- ◆ Refrigerator
- ◆ Various vacuum leaks

Other upgrades needed to improve reliability

- ◆ Insert
- ◆ Motion system
- ◆ Pumping system

→ If repairs to magnet are successful, operation for g2p and low-Q2 FF is possible in 2011 -- 2012.

→ A completely refurbished target would be valuable for 12 GeV experiments as well.