Bubble Chamber

Installation and
Beam Test Schedule

https://wiki.jlab.org/ciswiki/index.php/Bubble_Chamber

- Beam Test Schedule
- Summer 2014 SAD:
  I. Fast Valve after ¼ Cryounit
  II. New MBV0L02 Dipole Magnet
  III. Install Bubble Chamber for Test Run
- Safety

SCHEDULE

Now – May 2, 2104	5.5-pass to Hall D
May 3 – September 18, 2014	Summer Shutdown, CHL@4K
September 19 – December 22, 2014	2.2GeV/pass
December 23, 2014 – February 5, 2015	Winter Shutdown, CHL@2K
February 6, 2015 – June 12, 2015	Hall A Physics, Hall D Eng. Run
June 13, 2015 – September 10, 2015	Summer Shutdown, CHL@2K (?)

1st Opportunity in October

2nd Opportunity in January

3rd Opportunity in Summer

For helium processing of Cryo-modules

1. Fast Valve after ¼ Cryounit:

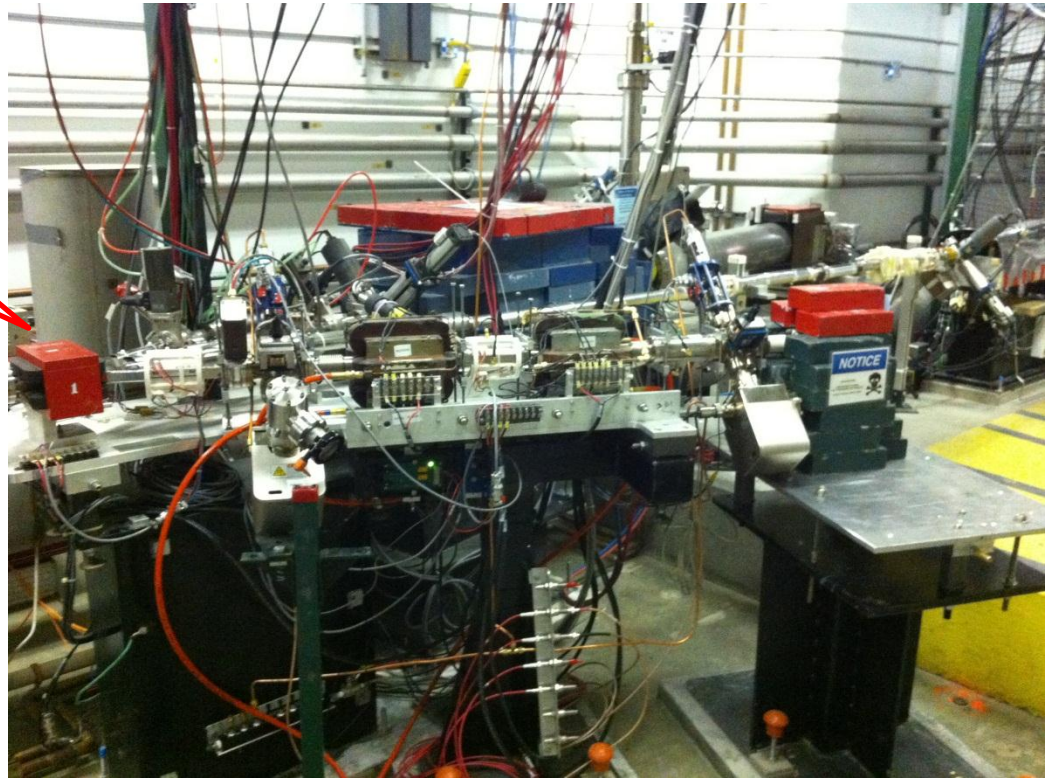
1. Heckman: ordered fast valve
2. Kortze: to order controller electronics, complete installation
3. Install Group: to move DP station after cryounit to make room for valve
4. Survey/Alignment: to check DP station
5. MPS: to integrate fast valve in FSD
6. Trigger gauge to be installed in 5D line

New Fast Valve to protect from vacuum failure in front of ¼ Cryo-unit

2. New MBV0L02 Dipole Magnet

1. Benesch/Mechanical Engineering (ME): to complete design, find vendor, get quotes, place order
2. Suleiman: to order Hall Probe system
3. Controls: Hall Probe communication
4. Magnet mapping
5. Survey/Alignment
6. Power Supply: 10 A Trim Card

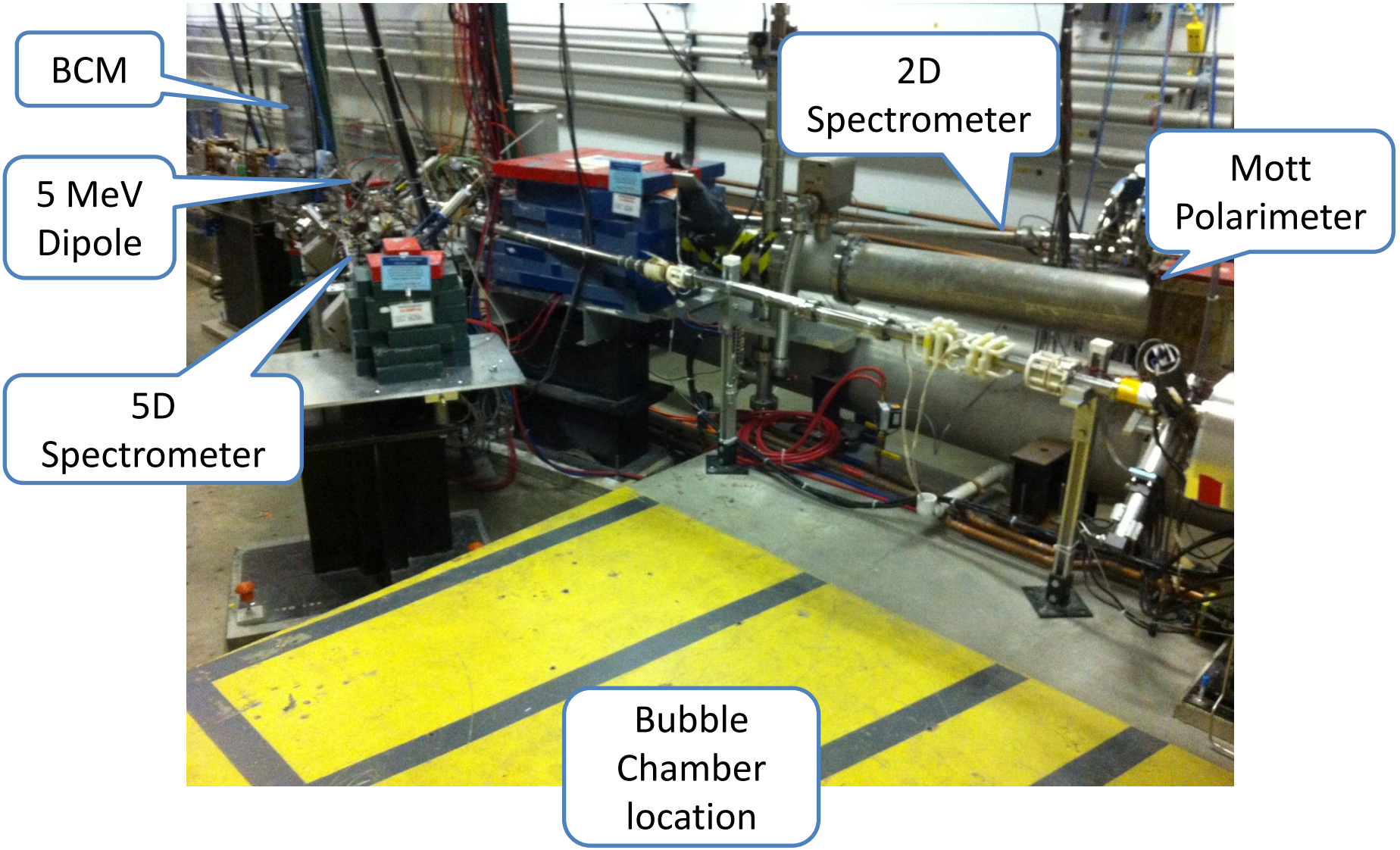
5 MeV Dipole

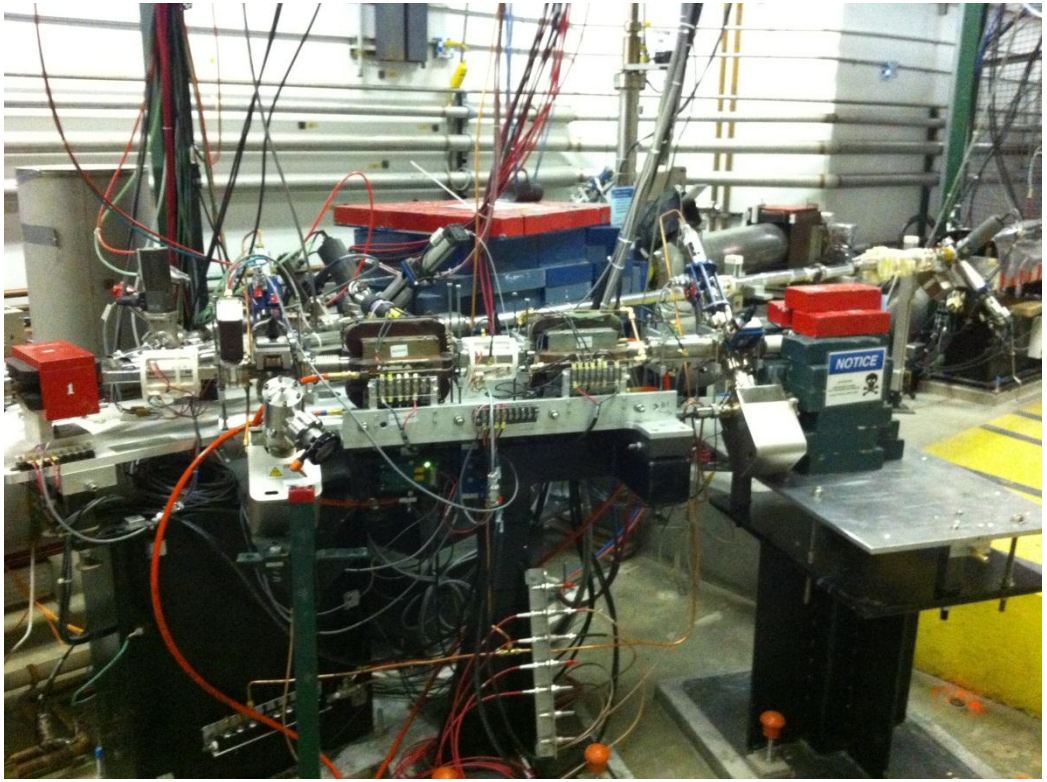


3. Install Bubble Chamber for Test Run

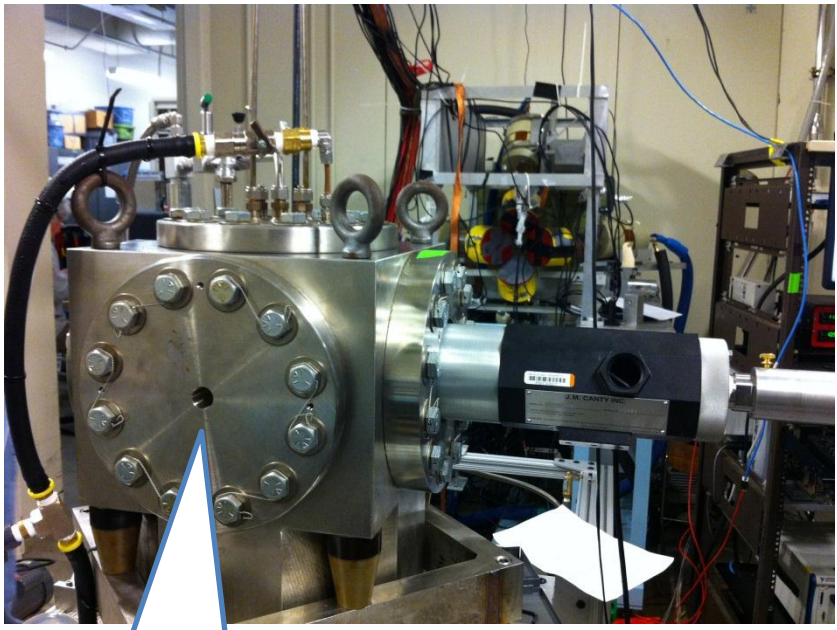
1. Suleiman/ME: to complete design modifications for 5D line and bubble footprint
2. EGG: to do vacuum work
3. Install Group: to crane bubble chamber and hardware to tunnel
4. Survey/Alignment: to set points for bubble chamber, support alignment
5. Bubble Chamber Chiller will be derived from the same outlet as Compressor – No need for another power outlet.
6. EGG: to include “No Beam” signal from Bubble chamber in laser Shutter. Beam will be ON/OFF at a frequency of about 1 Hz. Need a beam test to study effect on ¼ Cryounit stability.
7. Suleiman/ME: design cupper for Flange radiator/dump
8. ME: Thermal analysis of Flange radiator/dump
9. Suleiman/ME: design and build Photon Collimator and Photon Dump
10. New beamline Components: (1) Corrector (2) Superharps

- **Need to have an installation plan, pre-review by late April**


BCM
5 MeV Dipole
5D Spectrometer
2D Spectrometer
Mott Polarimeter
Bubble Chamber location



5D
Spectrometer



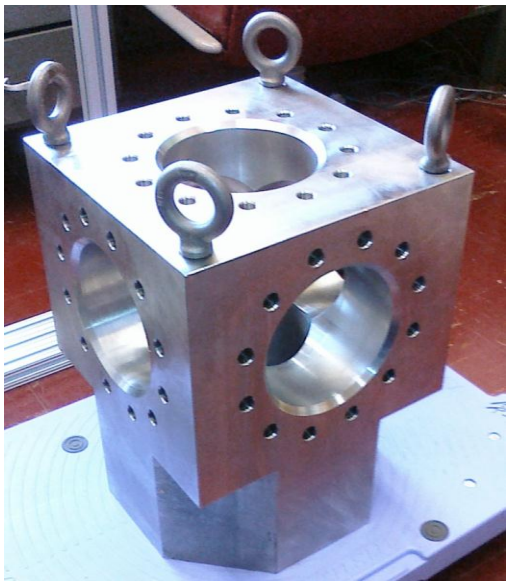
Bubble Chamber
at HIGS
April 2013

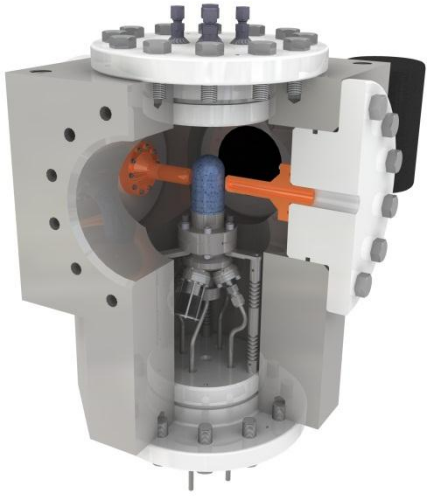
Photon Beam
Entrance

N_2O Bubble Chamber

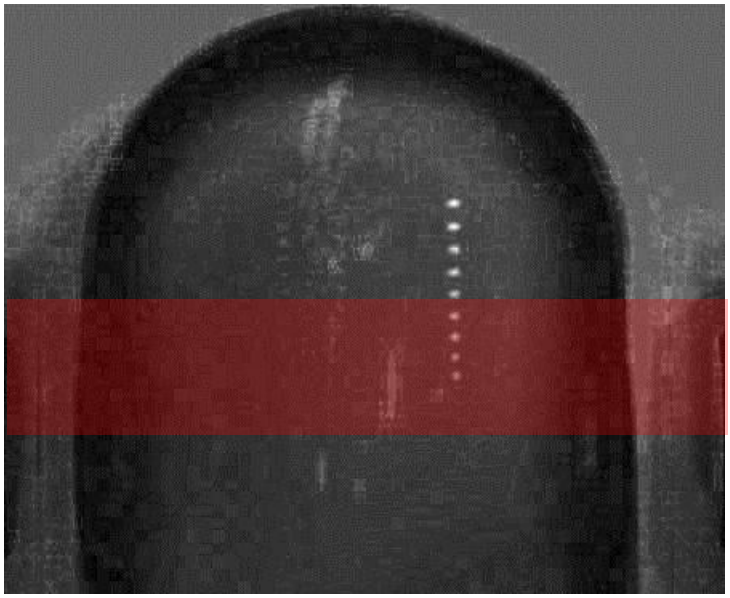
T = -5˚C

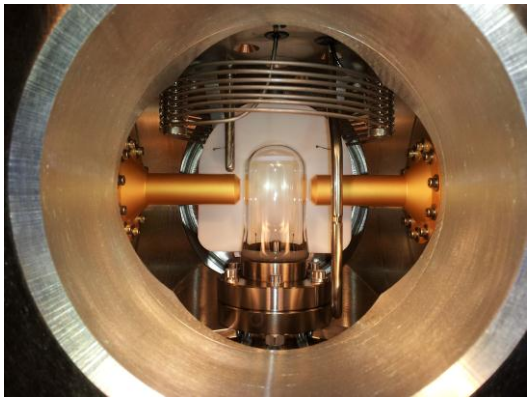
P = 60 atm



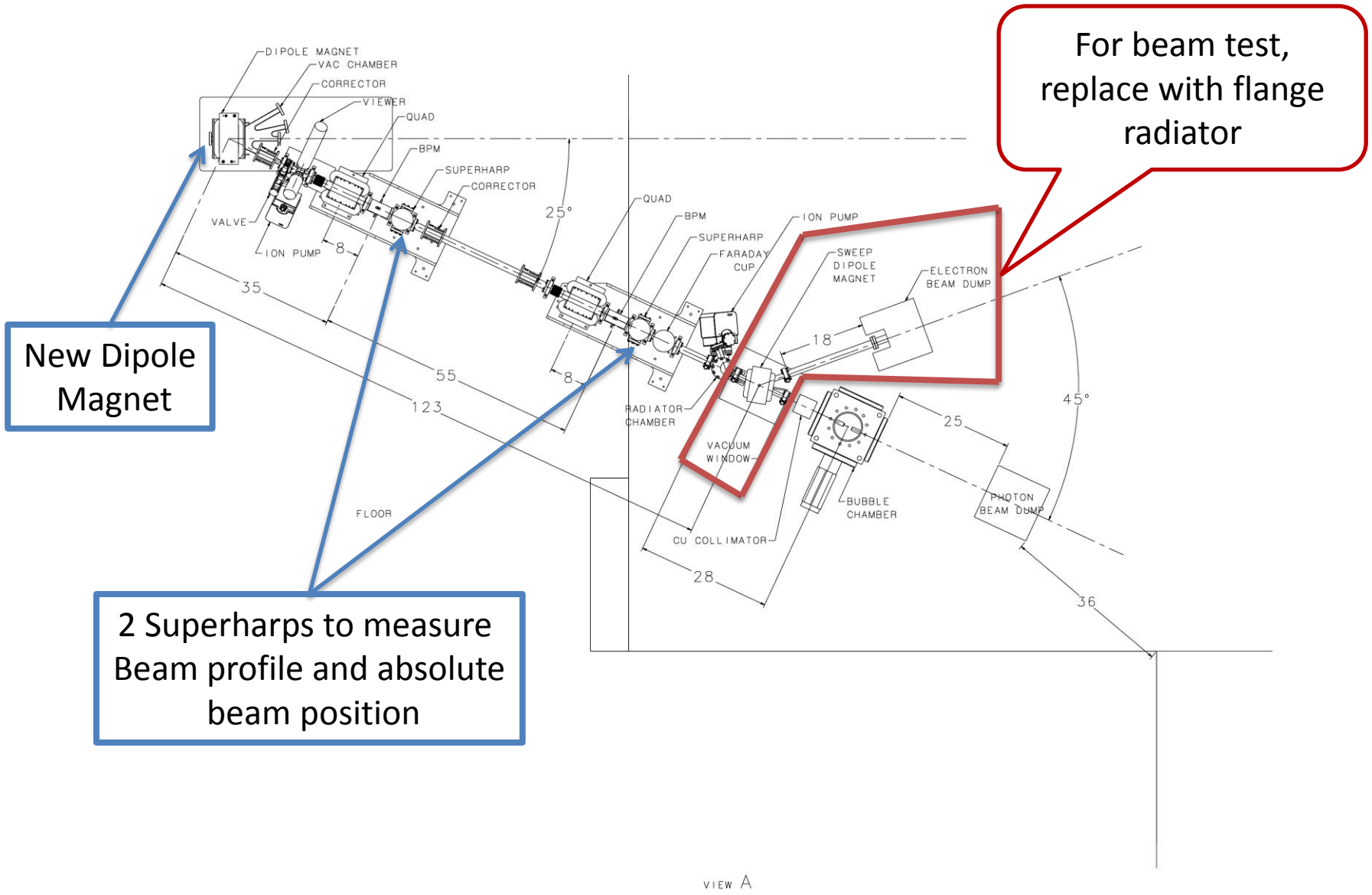


First γ+O→α+C bubble
April 2013





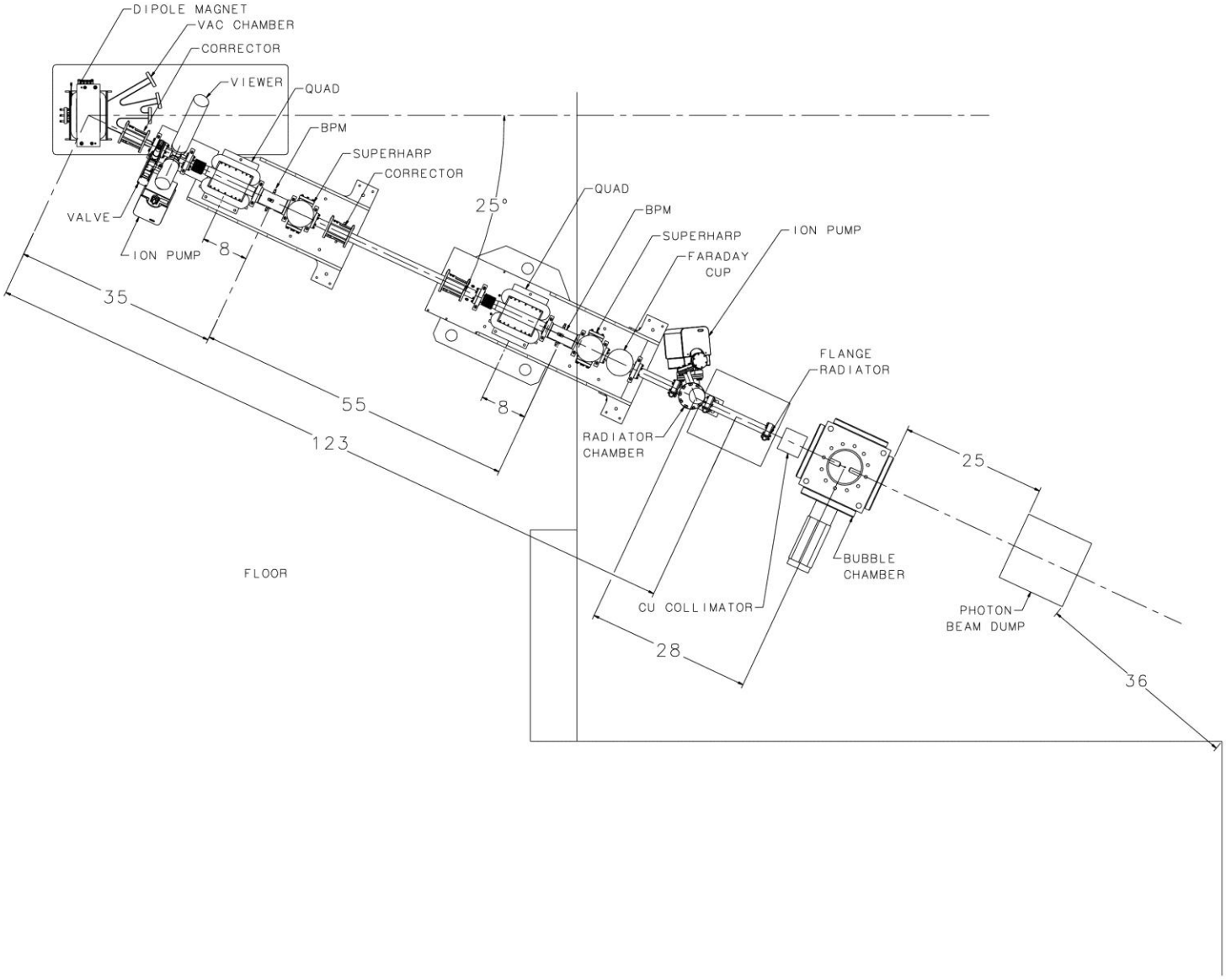
BEAMLINE



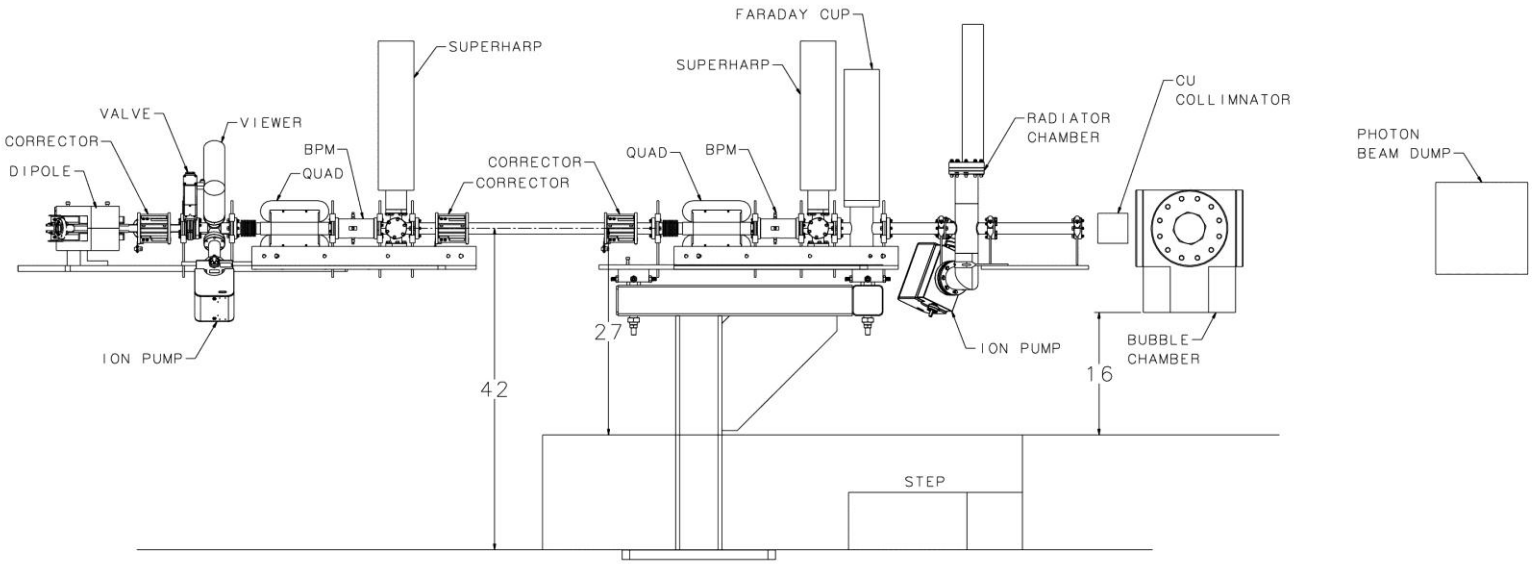
New Dipole Magnet

For beam test, replace with flange radiator

2 Superharps to measure Beam profile and absolute beam position



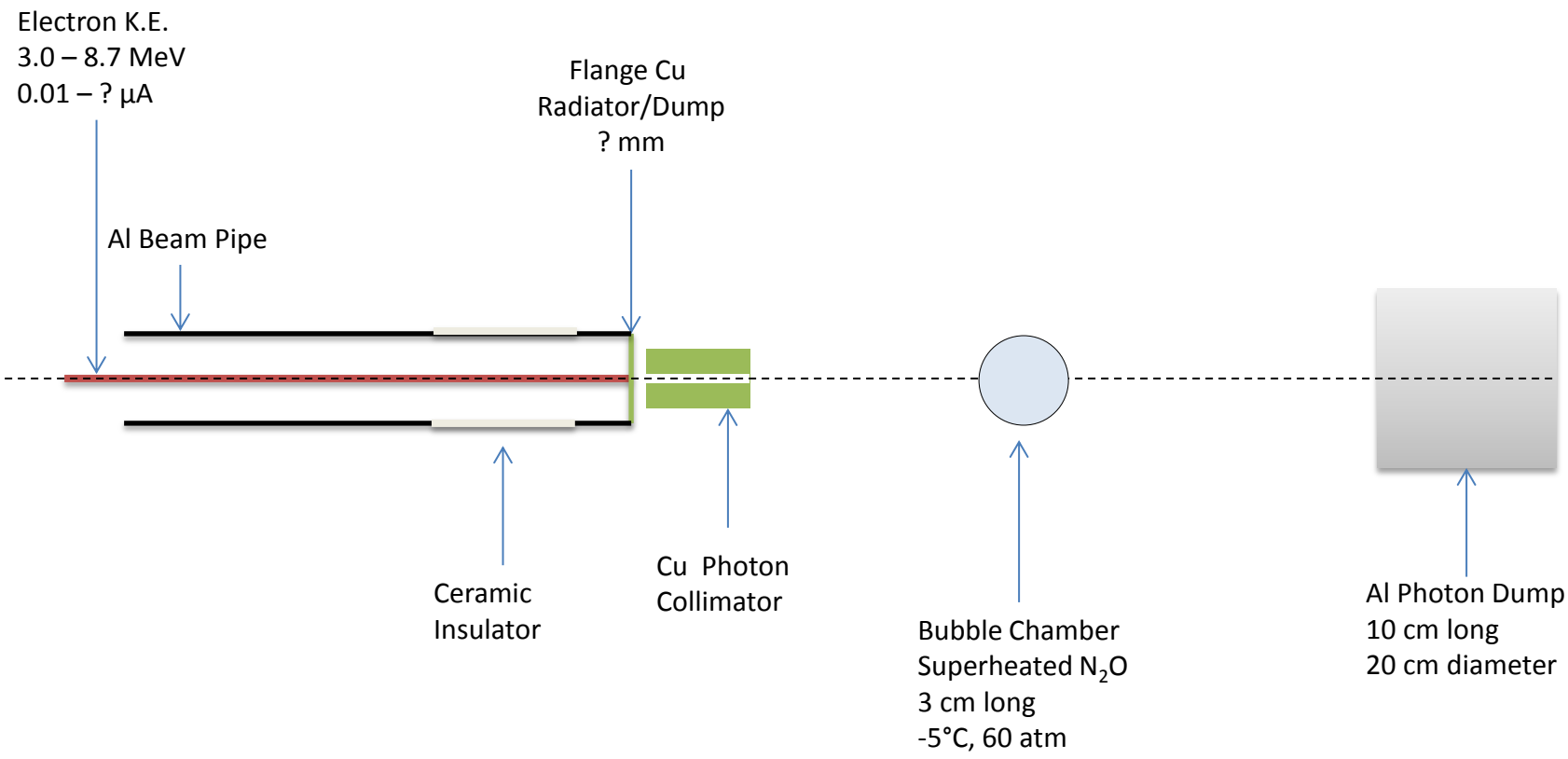
UNITS ARE INCHES



UNITS ARE IN INCHES

SCHEMATICS

- Use pure Copper and Aluminum
- Flange isolated and current in EPICS readback



Beam Requirements

I. Beam Properties at Radiator:

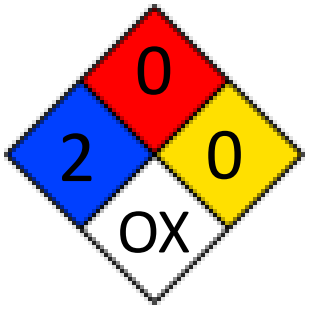
Beam Kinetic Energy, (MeV)	7.9–8.7
Beam Current (μA)	0.01–?
Absolute Beam Energy Uncertainty	<0.1%
Relative Beam Energy Uncertainty	<0.02%
Energy Resolution (Spread), σ_T/T	<0.06%
Beam Size, $\sigma_{x,y}$ (mm)	1–2

II. February 16, 2014: With one trip/hour (all are 0L02-8 ARC trips) GMeas are: 0L02-7 = 10.22 MV/m and 0L02-8 = 10.40 MV/m. Beam Kinetic Energy = 8.7 MeV

III. We may also need to helium process the ¼-cryounit

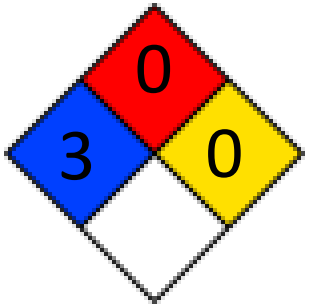
SAFETY

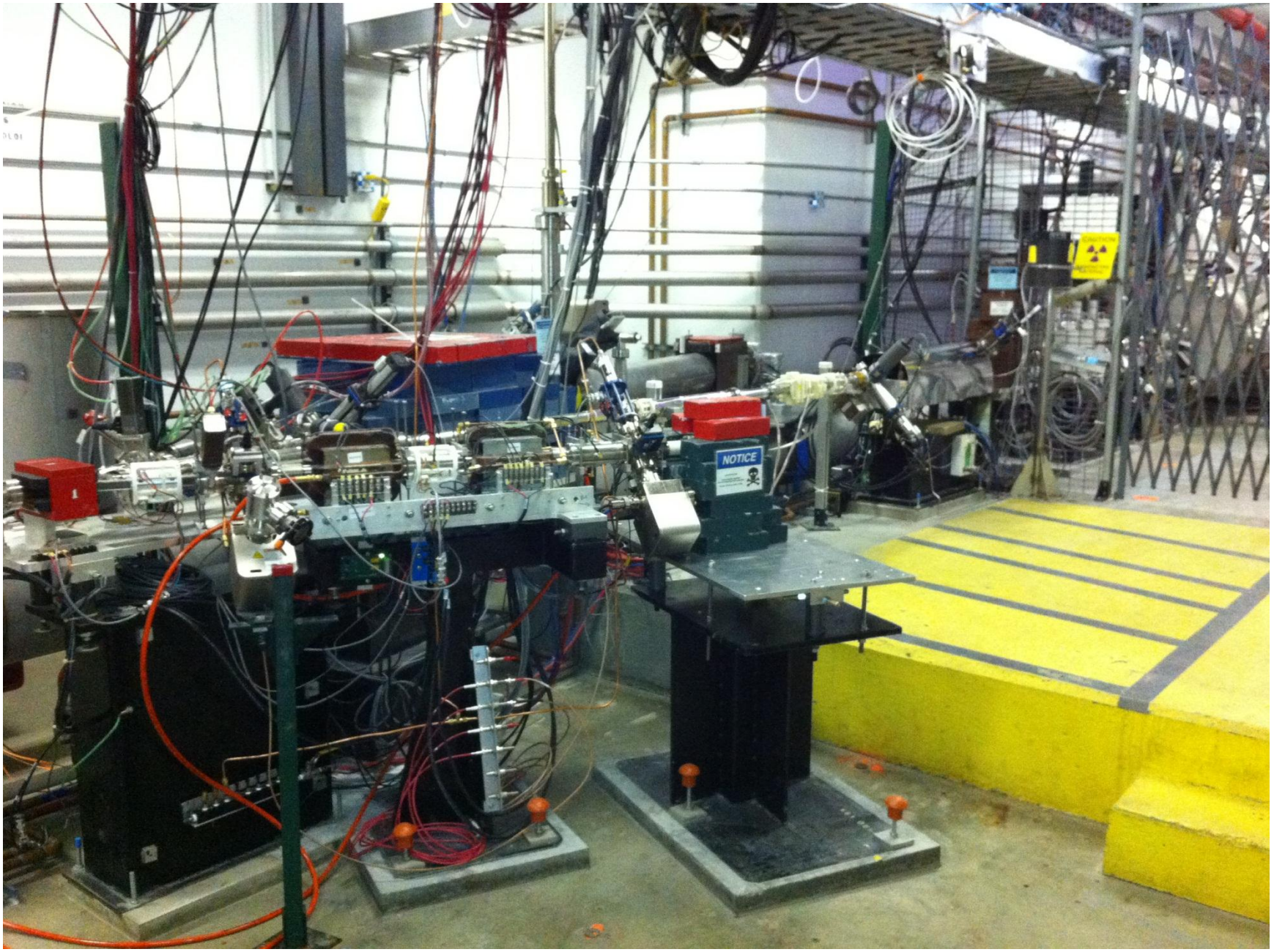
- Superheated liquid: N_2O, Nitrous oxide (laughing gas)
  I. At room temperature, it is colorless, non-flammable gas, with slightly sweet odor and taste

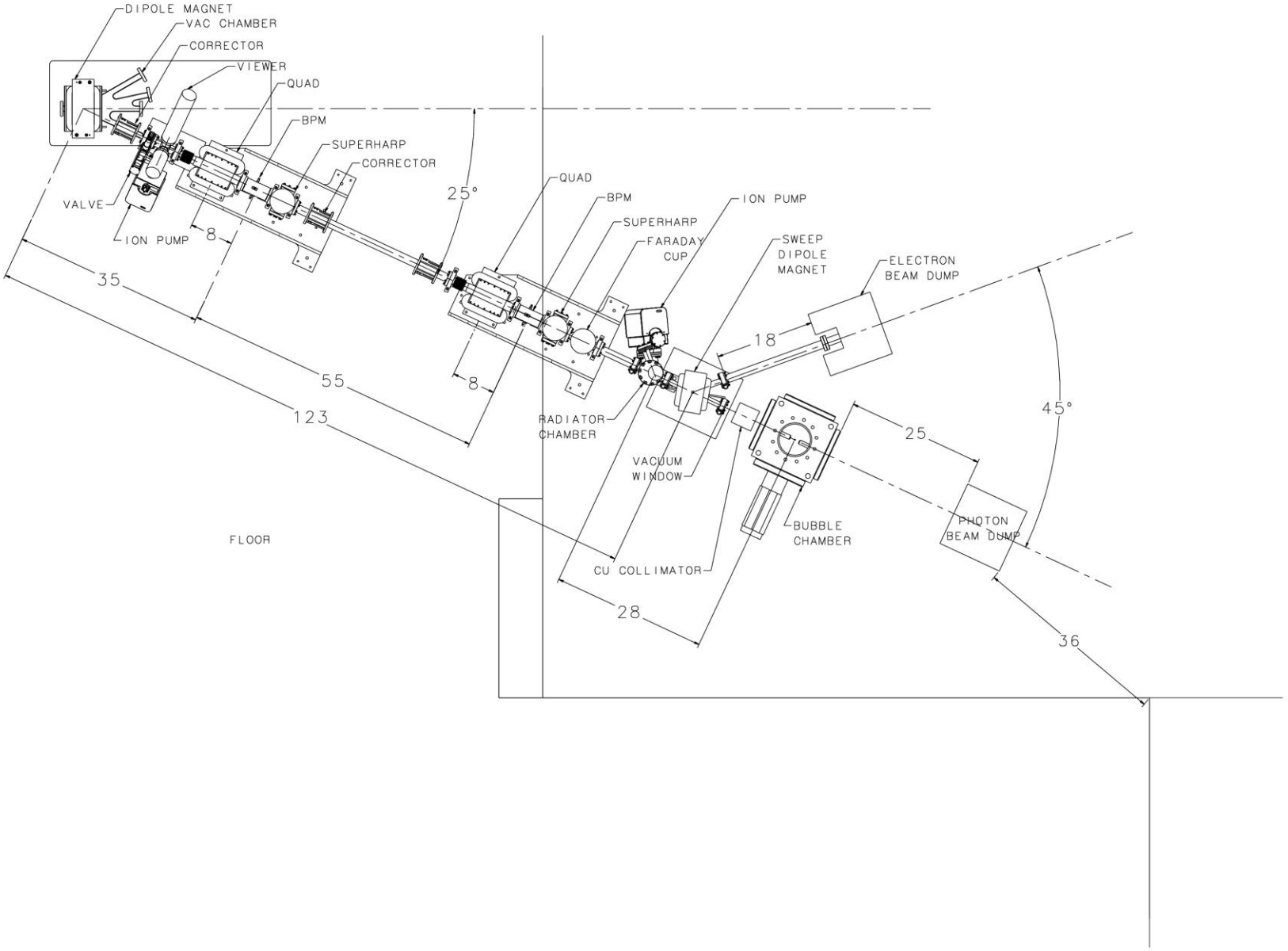


- High pressure system:
  I. Design Authority: Dave Meekins
  II. T = -5˚C
  III. P = 60 atm

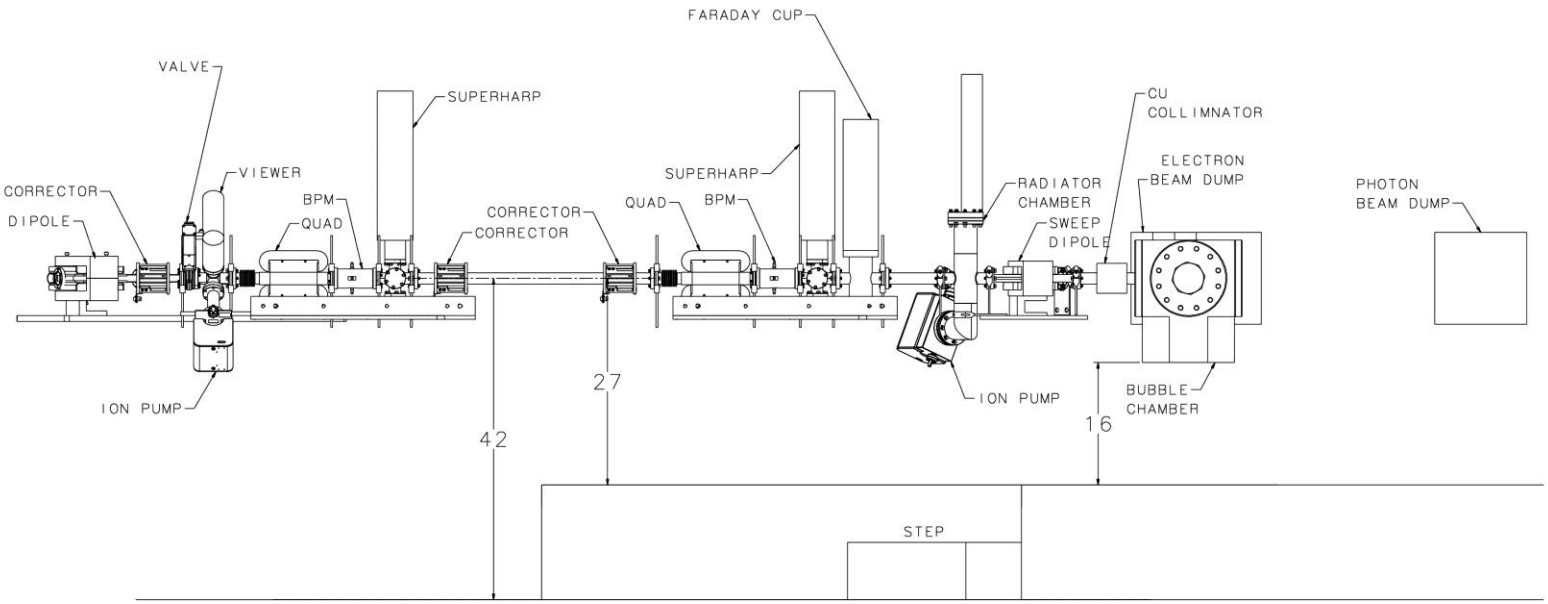
- Buffer liquid: Mercury
  I. Closed system
  II. Volume: 135 mL




NOTICE


DIPOLE MAGNET
VAC CHAMBER
CORRECTOR
VIEWER
QUAD
BPM
SUPERHARP
CORRECTOR
VALVE
ION PUMP
8
35
55
123
25°
QUAD
BPM
SUPERHARP
FARADAY CUP
ION PUMP
SWEEP DIPOLE MAGNET
ELECTRON BEAM DUMP
18
8
RADIATOR CHAMBER
VACUUM WINDOW
CU COLLIMATOR
28
25
45°
BUBBLE CHAMBER
PHOTON BEAM DUMP
36
FLOOR

VIEW A



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