# Bubble Chamber Planning Meeting

04 September 2013

# Agenda

1. Bubble Chamber progress at Argonne
2. Superheated Liquids to be used in the experiment
3. Computer Center support: mailing list, group disk, wiki page
4. Beamline Layout
5. Bubble Chamber cost estimate: procurement and labor
6. Error Analysis

# Superheated Liquids

I. List of superheated liquids to be used in the experiment:

| $N_2O$ Target | $^{16}O$ | $^{17}O$ | $^{18}O$ |
|---|---|---|---|
| Natural Target | 99.757% | 0.038% | 0.205% |
| $^{16}O$ Target | | Depleted > 5,000 | Depleted > 5,000 |
| $^{17}O$ Target | | Enriched > 10% | Depleted > 5,000 |
| $^{18}O$ Target | | Depleted > 5,000 | Enriched > 10% |

# Beamline Layout

I. Will not install BPM on Spectrometer line

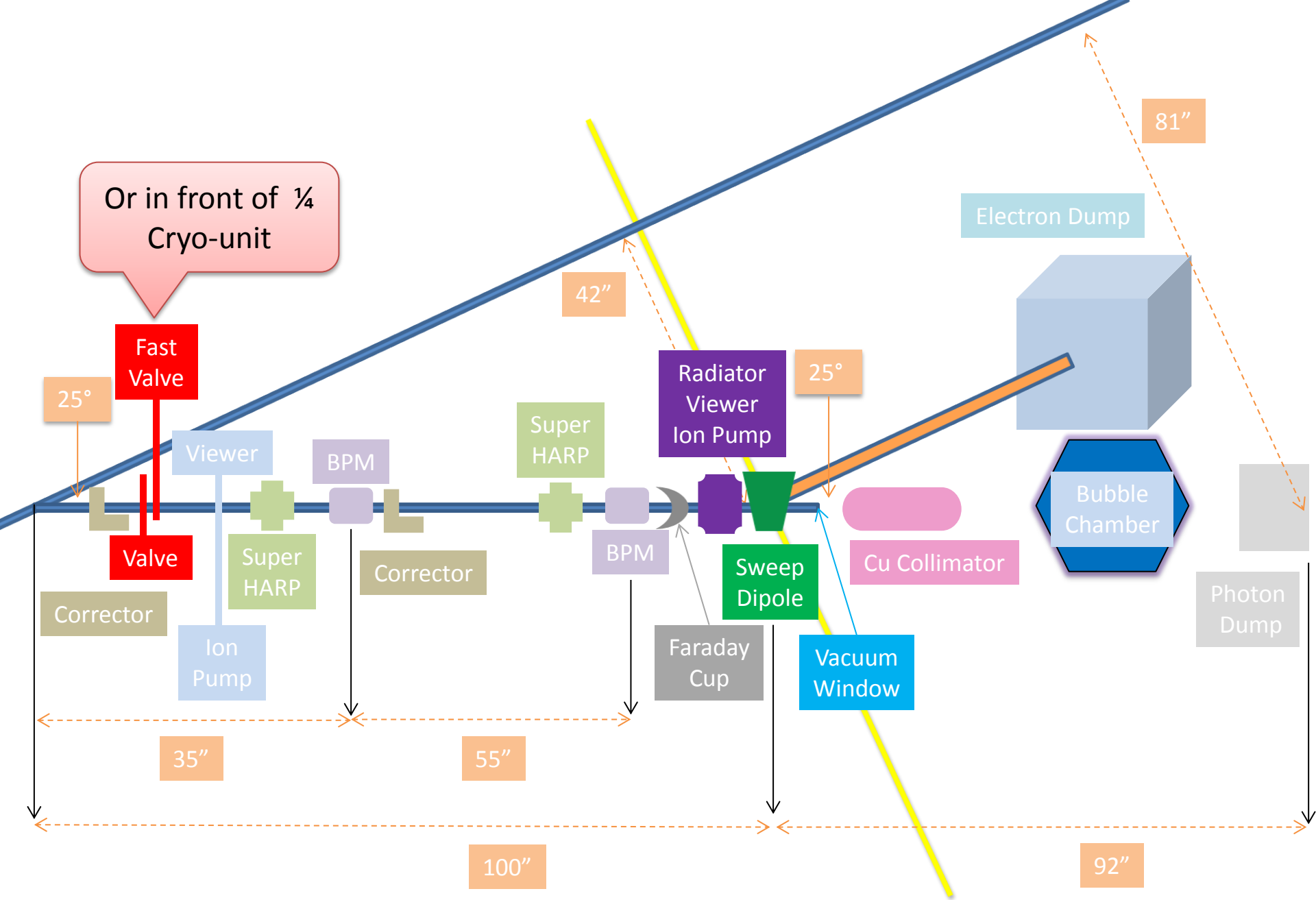
II. 2 Super Harps to measure beam profile and absolute beam position (no need for Quads)

III. Fast Valve to protect from vacuum failure: on our beamline or just in front of ¼ Cryo-unit

IV. Do we want vacuum pipe to connect vacuum window to chamber?

V. Beam Properties at Radiator:

| | |
|---|---|
| Beam Kinetic Energy, (MeV) | 3.0 – 8.5 |
| Beam Current (μA) | 0.01 – 100 |
| Absolute Beam Energy | 0.1% |
| Relative Beam Energy | 0.1% |
| Energy Resolution (Spread), $\sigma_T/T$ | 0.06% |
| Beam Size, $\sigma_{x,y}$ (mm) | 1 – 2 |


Or in front of ¼ Cryo-unit
Fast Valve
25°
Valve
Viewer
Ion Pump
Corrector
Super HARP
BPM
Corrector
Super HARP
BPM
Radiator Viewer Ion Pump
Sweep Dipole
Faraday Cup
42"
25°
Cu Collimator
Vacuum Window
Electron Dump
Bubble Chamber
81"
Photon Dump
35"
55"
100"
92"

# Cost Estimate

I. Radiator motion and Sweep Dipole must be in FSD

II. BCM0L02 and Electron Dump in Beam Loss Accounting (BLA)

III. New beamline components: 2 Super Harps + Fast Valve

IV. Summary of labor cost by group:

| Group | Labor |
|---|---|
| Survey & Alignment | 3 wks x 2 |
| Magnet Test | 1 wk x 2 |
| Engineering Design | 12 wks |
| Software | 3 wks x 2 |
| EES | 6 wk x 2 |
| EH&Q | 4 wks |

| Item | Material Procurement | Shop | Labor |
|---|---|---|---|
| New Dipole Magnet | Dipole Magnet ($8,000)<br>Hall Probe ($2,000) | | Mapping (1 week)<br>EESDC (1 week)<br>Alignment (2 days) |
| New Power Supply | Power Supply ($5,000) | | Software (2 weeks) |
| New Beamline | 2 Super Harps and Fast Valve ($30,000) | Pipes + Pedestals ($20,000) | Design (6 weeks)<br>Alignment (1 week)<br>Software (4 weeks)<br>EES (5 weeks) |
| Radiator (cooled ladder, FSD) | 0.02 and 0.10 mm Cu foils ($2,000) | $4,000 | Design (2 week)<br>Alignment (2 days) |
| Sweep Dipole | | | |
| Electron Dump | Pure Cu ($5,000) | Dump + Pipes ($15,000) | Design (2 week)<br>Alignment (1 day) |
| Cu Collimator | Pure Cu ($5,000) | Collimator + Stand ($5,000) | Design (1 week)<br>Alignment (1 day) |
| Photon Dump & Stand | Pure Al ($3,000) | $4,000 | Design (1 week)<br>Alignment (1 day) |
| Safety Review | | | 4 weeks |
| Install | | | 6 weeks |
| Bubble Chamber | | | Alignment (1 week) |
| Total | $60,000 | $48,000 | $60,000 |
| Total (with overhead) | $75,000 | $60,000 | $90,000 |