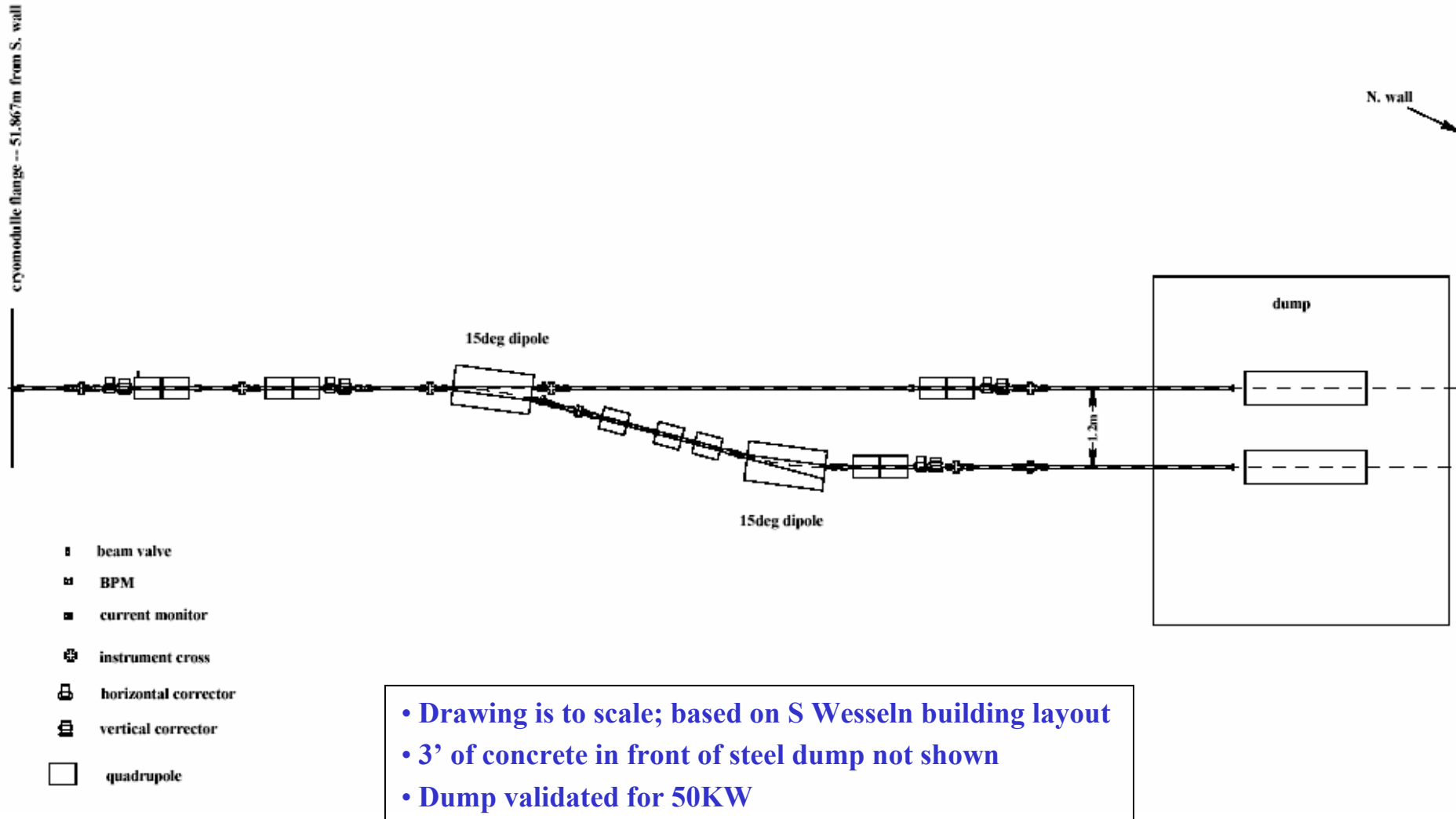
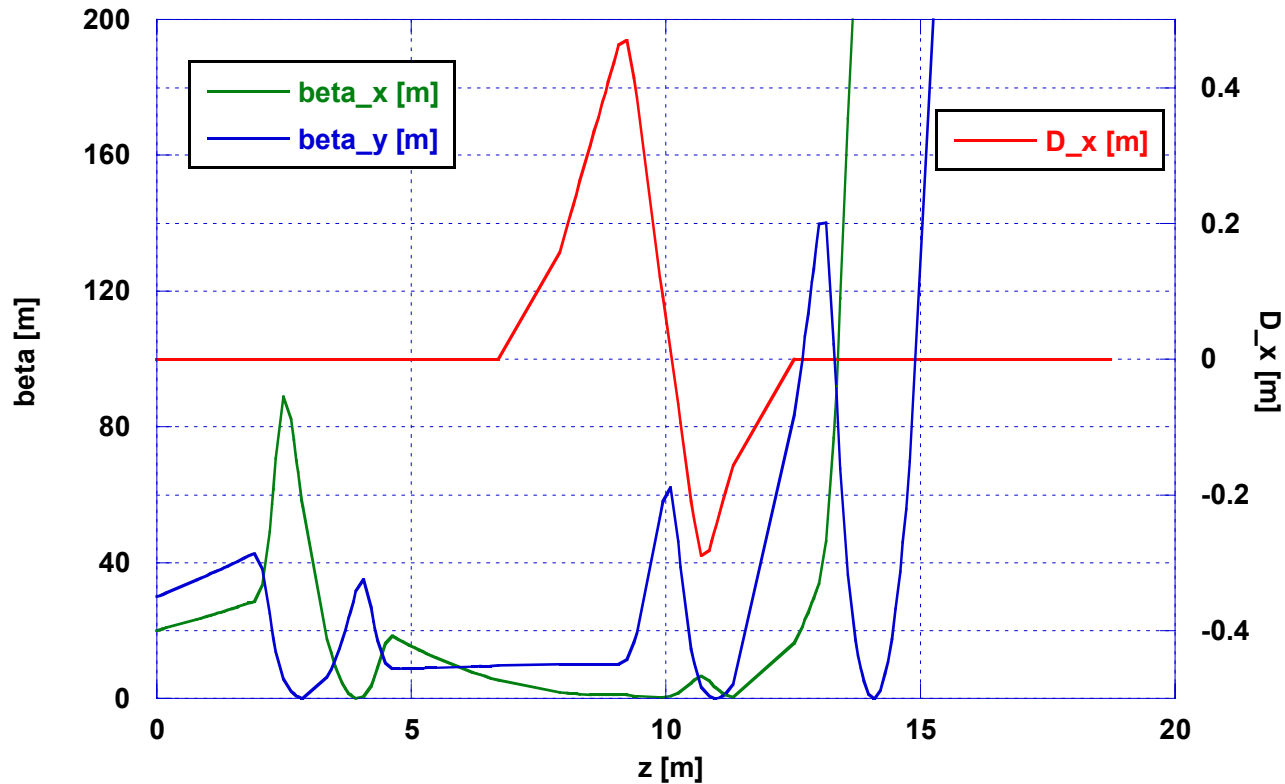


NML Downstream Beamline Layout



Lattice Functions

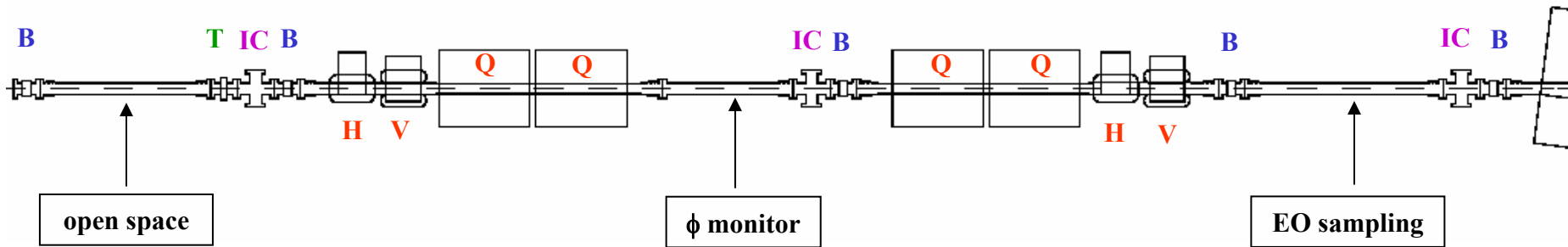


- Initial lattice functions: $\beta_{0x}=20, \alpha_{0x}=-2.0, \beta_{0y}=30, \alpha_{0y}=-3.0$
- All quads powered independently
- Beam energy = 570 MeV (2 cryomodules @ 31MV/m)
- Max beta = 140m (except near dump); for $\epsilon_N=30E-6, \sigma=2\text{mm}$
- Beta @ Be dump window = 3000m
- Solution is not unique; not optimized yet

Assumed Components

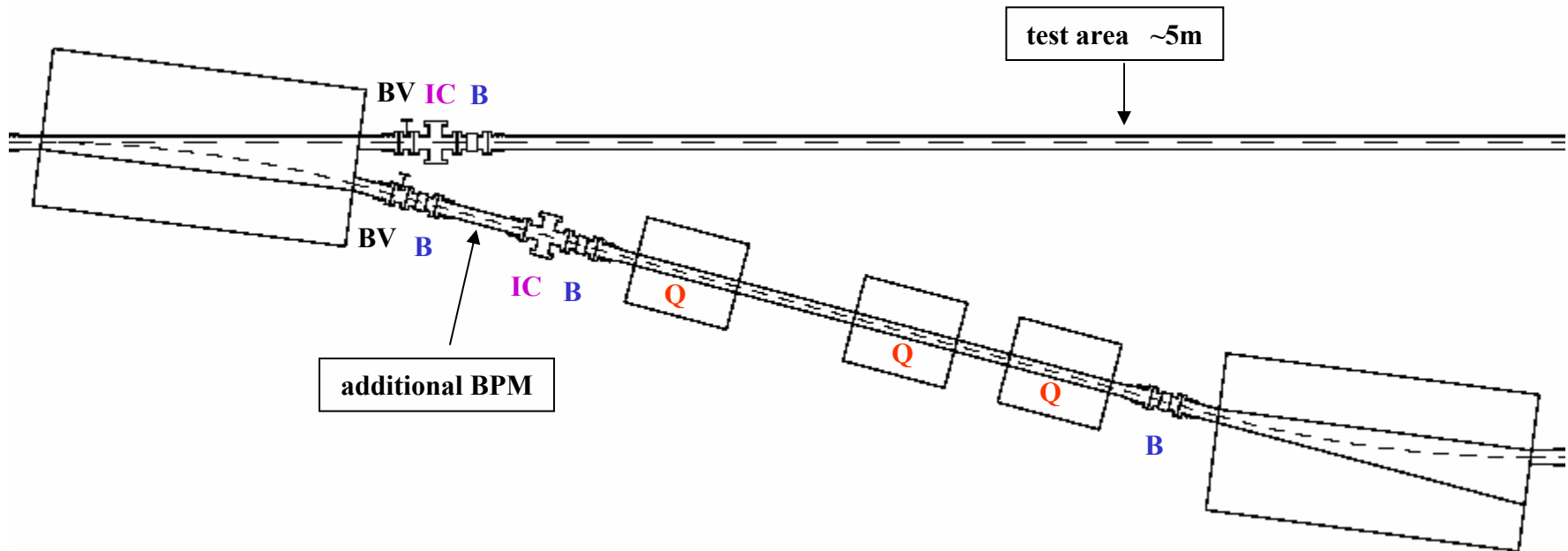
- **Quadrupole:** Efremov-designed TQB for TTF
- **H/V Corrector:** Efremov-designed for TTF
- **Spectrometer Dipole:** new design; 1.2m long; 15° bend; 0.4T @ 570 MeV; good field aperture = 12cm; open aperture = 26cm
- **BPM:** Wendt-designed button type with CF flanges
- **Toroid:** same slot length as BPM
- **Instrument cross:** standard 4, 5, or 6-way cross with CF flanges; used for vacuum devices also
- **Bellows:** edge-welded bellows with $\sim\pm 3$ mm transverse motion
- **Beampipe:** 2" OD; 1.75" OD in quads
- **Modular design**

Diagnostic Section



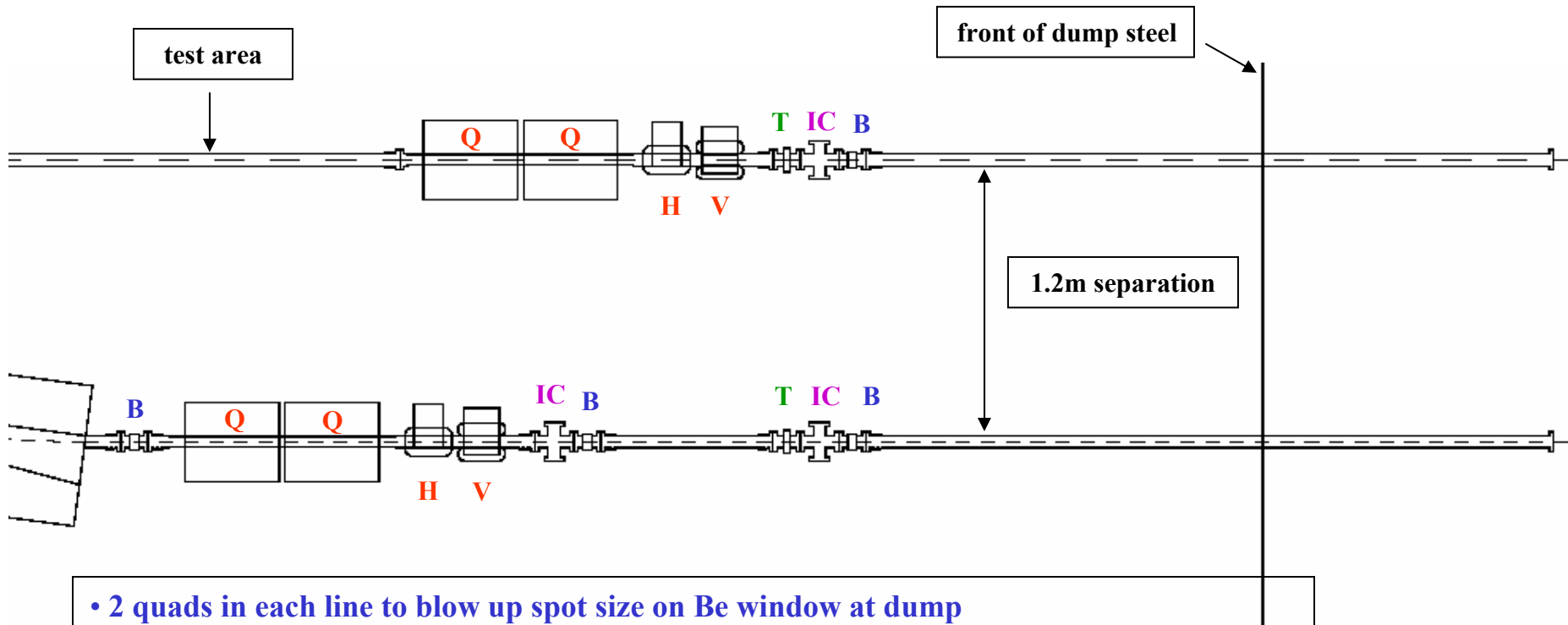
- 4 quads allows matching between d.s. cryomodule and d.s. of spectrometer
- 2 BPMs measure position and angle d.s. of cryomodule; 2 BPMs measure position and angle going into spectrometer; 1 additional BPM for redundancy
- 3 instrument crosses for OTR; also used for vacuum devices
- 2 correctors in each plane to correct position and angle error at d.s. end of cryomodule
- space reserved for ϕ monitor and EO sampling
- 1 toroid for beam current measurement
- u.s. beam valve is part of the cryomodule

Dispersive Section



- dispersion at 2nd BPM is ~0.4m
- 2 BPMs u.s. and d.s. of spectrometer magnet to measure position and angle
- BVs downstream of spectrometer magnet isolate vacuum from diagnostic section
- 3 quads allow for cancellation of dispersion d.s. of 2nd spectrometer magnet and control vertical beta function
- No steering correction in this section (although there is space available)
- Space reserved for more accurate BPM R&D
- Spectrometer bend is 15° (could be as large as 25°)

Dump Sections



- 2 quads in each line to blow up spot size on Be window at dump
- 2 correctors in each line to center beam on Be window at dump
- Be window can probably be used for OTR (VS)
- 3 ft of concrete in front of dump not shown
- Is 1.2m separation between beamlines adequate? (room for crab cavity, for example?)
- More beam control and diagnostics required in test section?

Installed Component Count

- **Quadrupole: 11**
- **Corrector: 4 H, 4V**
- **15° Dipole: 2**
- **BPM: 13**
- **Toroid: 3**
- **Instrument Cross: 8**
- **ϕ monitor: 1**
- **EO sampling device: 1**
- **Beam valves: 2 (not counting 1 in cryomodule)**