INR Linac Diagnostics

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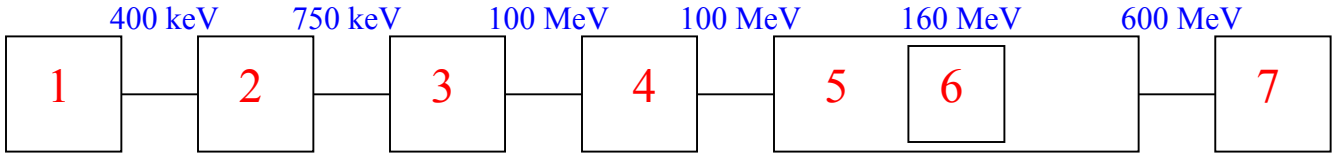
Basic Accelerator Parameters

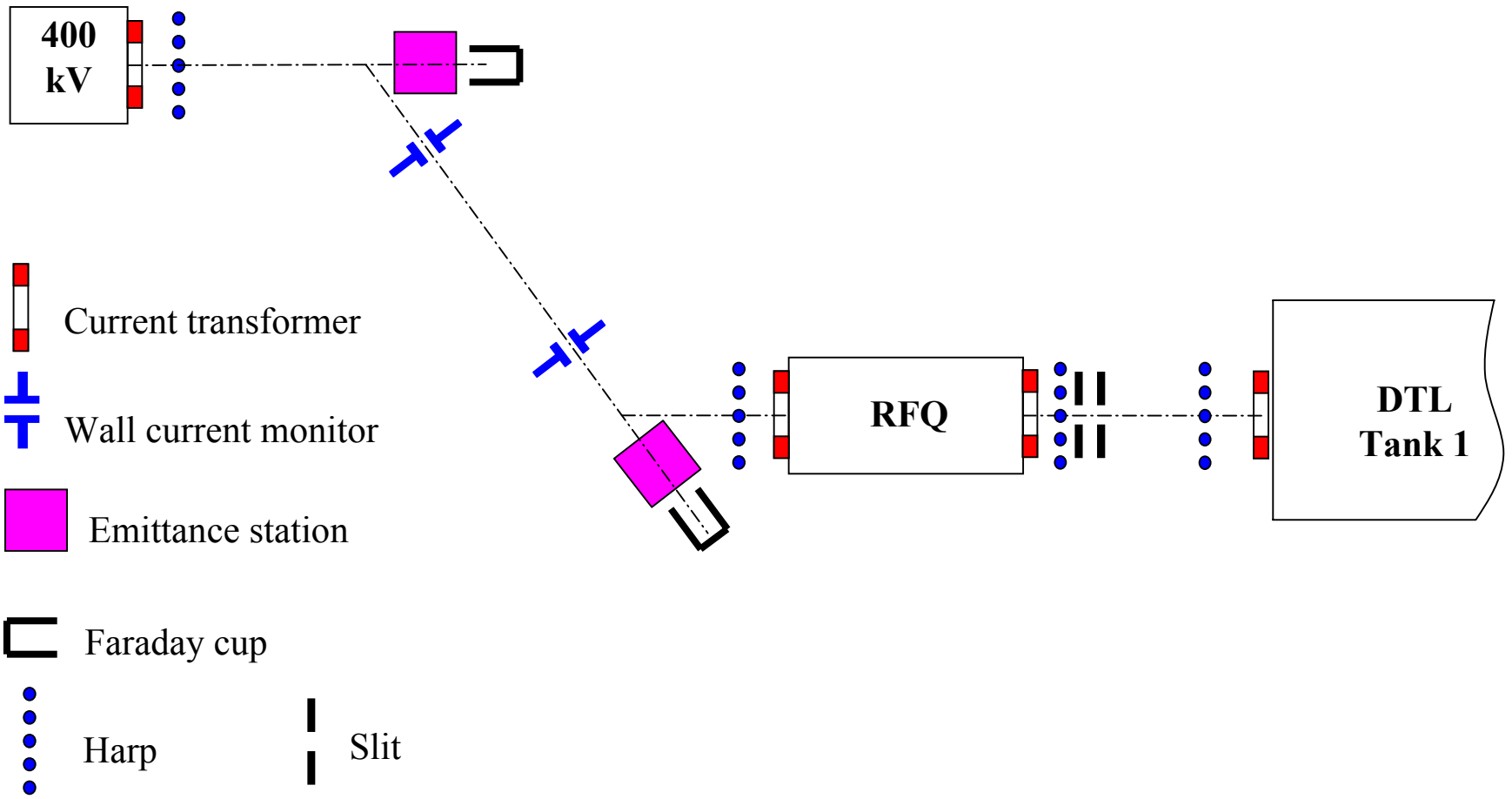
	Design	Obtained
Energy, MeV	600	500
Current, mA	50	15
Intensity, μA	500	150

Accelerator consists of:



1. 400 kV injector.
2. Injection line.
3. Low Energy Part (100 MeV, 5 DTL Tanks)
4. Transition region from Low Energy Part to High Energy Part
5. High Energy Part (100-600 MeV, 27 Disk and Washer Cavities)
6. Intermediate Extraction and Matching Region (160 MeV)
7. Matching Region (600 MeV)

Injection line diagnostics layout

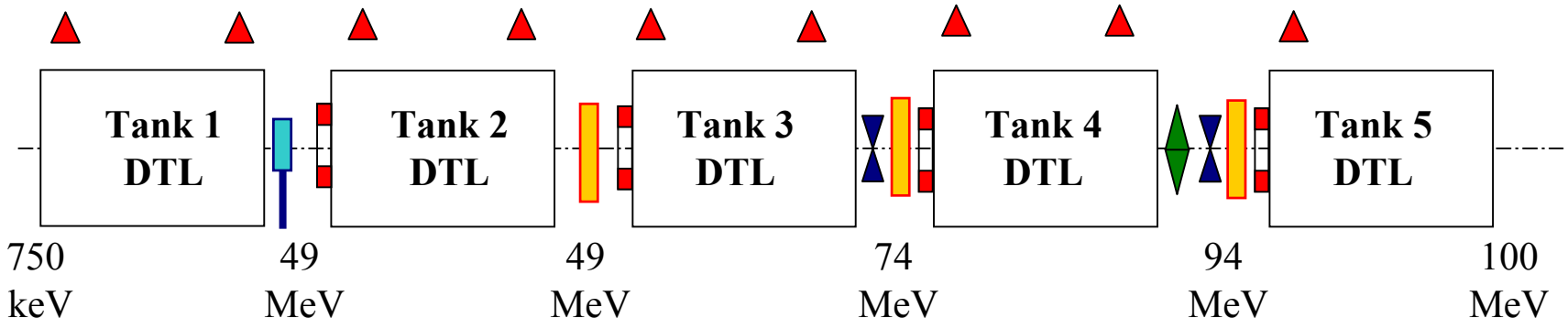


Injection line diagnostics

#	Detector	Quant.	Purpose
1	Current Transformer	4	Current
2	Wall current monitor	2	**Current for short (<1μs) pulses**
3	Emittance station	2	Emittance
4	Faraday cup	2	Current
5	Harp	4	Position, profile, emittance
6	Slit	1h+1v	Emittance

We need 2 more Current transformers and 1 residual gas ionization monitor.

DTL diagnostics layout



Current transformer

Wire scanner

Beam loss monitor
(protection)
(protection)

Current 3rd harmonic monitor

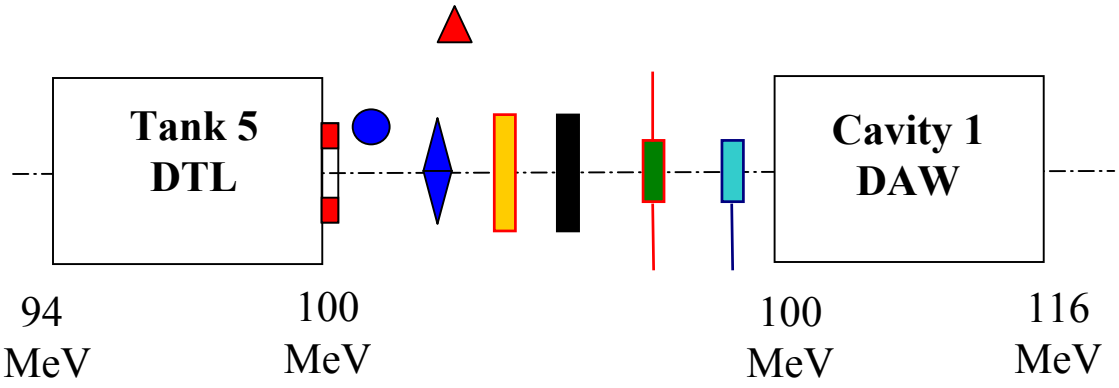
Current 1st harmonic monitor

Beam position monitor

DTL diagnostics

#	Detector	Quant.	Purpose
1	Current Transformer	4	Current
2	Wire Scanner	1	Profile, position
3	Current 3rd Harmonic Monitor	3	Beam phase, current, energy
4	Beam Position Monitor (TM_{110})	2	Beam position
5	Current 1st harmonic monitor	1	Beam phase (energy shift compensation)
6	Beam loss monitor (protection)	9	Loss protection system
7	Neutron detectors	3	Neutron detection

Layout of diagnostics in Transition region (100 MeV)



Current transformer

Wire scanner

Current 3rd harmonic monitor

Beam loss monitor (protection)

Bunch shape monitor

Current 5st harmonic monitor

Beam loss monitor

Degrador-collector

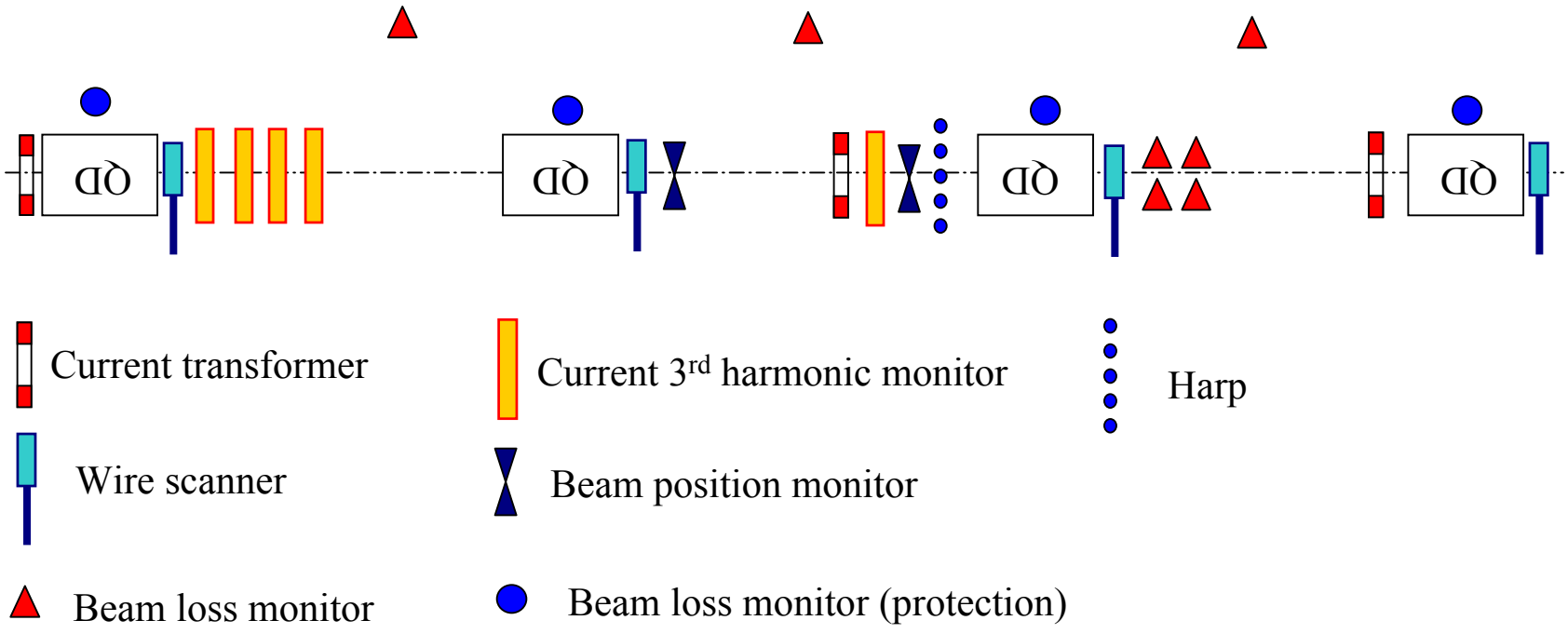
Diagnostics in Transition Region (100 MeV)

#	Detector	Quant.	Purpose
1	Current Transformer	1	Current
2	Wire Scanner	1	Profile, position, emittance
3	Current 3rd Harmonic Monitor	1	Beam phase, current, energy
4	Bunch shape monitor	1	Bunch shape, long.emittance, long. halo
5	Current 5st harmonic monitor	1	RF reference
6	Beam loss monitor	1	Beam losses
7	Beam loss monitor (protection)	1	Loss protection system
8	Degrador-collector	1	Phase scan of DTL cavities
9	Neutron detector	1	Neutrons

Diagnostics of High Energy Part (100-600 MeV, 27 Disk and Washer Cavities)

#	Detector	Quant.	Purpose
1	Current Transformer	20	Current
2	Wire Scanner	4*3=12	Profile, position, emittance
3	Current 3rd Harmonic Monitor	24+2*4=34	Beam phase, current, energy
4	Beam Position Monitor (TM_{110})	2*5+2*4=18	Beam position
5	Beam loss monitor	49	Beam losses
6	Beam loss monitor (protection)	108	Loss protection system
7	Neutron detectors	18	Neutrons

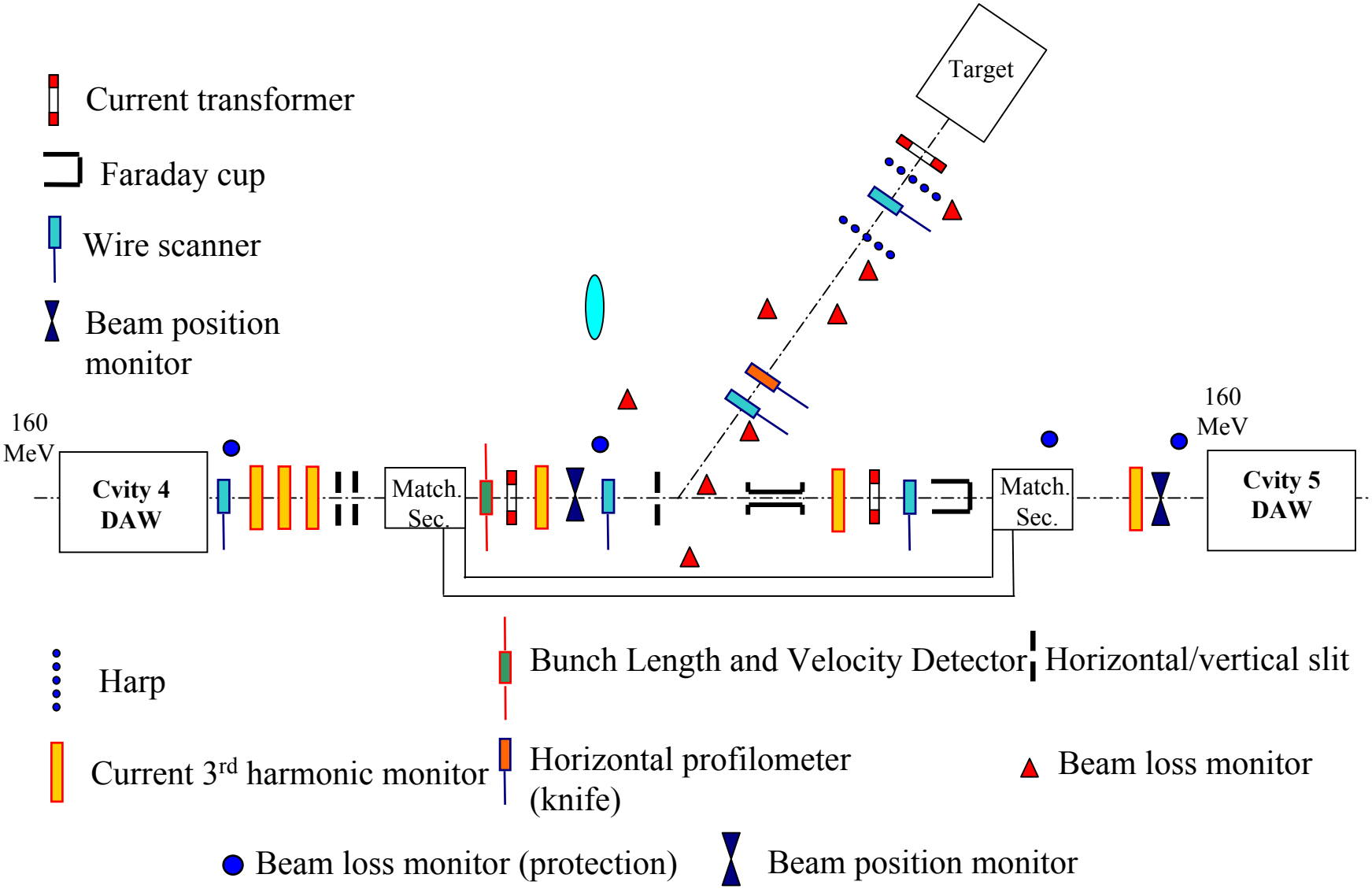
Layout of diagnostics at Matching Region (600 MeV)



Matching Region (600 MeV)

#	Detector	Quant.	Purpose
1	Current Transformer	3	Current
2	Wire Scanner	4	Profile, position, emittance
3	Current 3rd Harmonic Monitor	5	Beam phase, current, energy
4	Beam Position Monitor (TM_{110})	2	Beam position
5	Beam loss monitor	3+4	Beam losses
6	Beam loss monitor (protection)	4	Loss protection system
7	Neutron detectors	1	Neutrons

Diagnostics at Intermediate Extraction and Matching Region (160 MeV)



Intermediate Extraction and Matching Region (160 MeV)

#	Detector	Quant.	Purpose
1	Current Transformer	3	Current
2	Wire Scanner	5	Profile, position, emittance
3	Current 3rd Harmonic Monitor	6	Beam phase, current, energy
4	Beam Position Monitor (TM_{110})	2	Beam position
5	Horizontal profilometer (knife)	1	Energy spectrum
6	Vertical slit	2	Energy spectrum, needle beam forming
7	Horizontal slit	1	Needle beam forming
8	Bending magnet	1	Energy spectrum, beam extraction
9	Bunch Length and Velocity Detector	1	Bunch Shape, absolute energy
10	Faraday cup	1	Beam absorber, current
11	Harp	2	Profile, position
12	Beam loss monitor	7	Beam losses
13	Beam loss monitor (protection)	5	Loss protection system
14	Neutron detectors	1	Neutrons