

WG2 : Total 37 abstracts

<b>Beam Dynamics</b>	<b>Beam Diagnostics</b>	<b>Instrumentation</b>	<b>Controls &amp; Misc.</b>
15	9	9	2

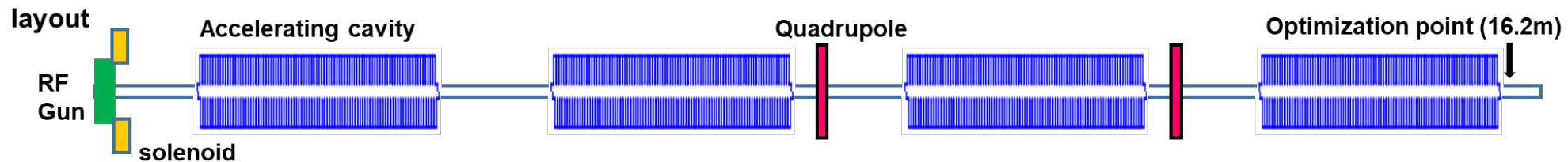
<b>Contributed Talks</b>	<b>Poster</b>	<b>Paper submission plan</b>
8 (3 students)	29 (2 no show)	13

Related to :

- Korea-4GSR : Simulation, Estimation, Diagnostics
- PAL-XFEL : New Beamline
- RAON : Commissioning, Beam diagnostics,
- KOMAC : Upgrading, Test beamline
- Small scaled system : Ion sources, UED, EBIT, ...

## Design Optimization using MOGA Design of Injector of 4GSR : 200 MeV, Single-/Multi-bunch modes

- can handle multi-objective functions simultaneously and save time to get the optimum solutions ; 3 objectives, 7 constraints, **6 variables**
- Find the optimized solutions  $\Rightarrow$  Check with beam tracking  $\Rightarrow$  Error study  $\Rightarrow$  Select the best design



## Investigation of ID Effects

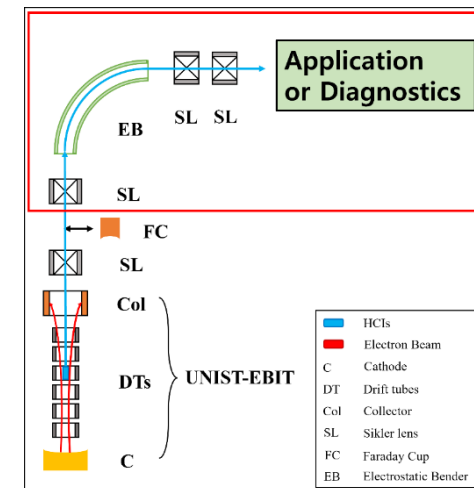
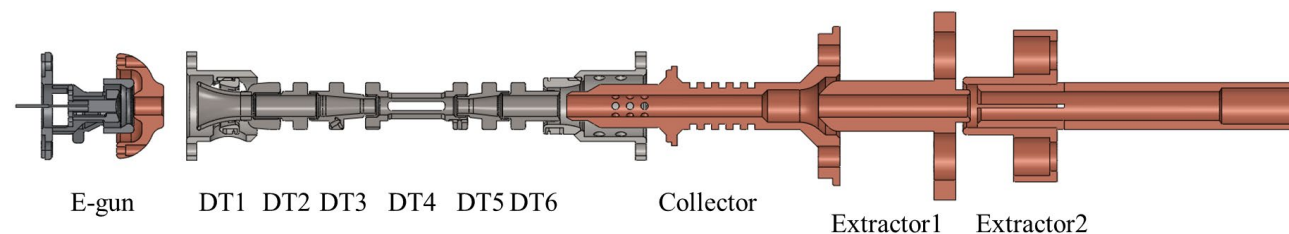
- Estimate ID effects on Ring parameters analytically
- Estimate Required RF voltage due to IDs
- Estimation of emittance reduction with Damping wigglers – issues for realization

## Study of Multi-bunch instability due to the resistive wall wake-mbtrack2-cuda

- parallel calculation for both multi-bunches & macro-particles using GPU
- uniformly filled or with separated gaps, with or without Harmonic cavity

## Highly charged ion extraction in UNIST-EBIT

- Measured current traces for different trap opening durations with 0.16 ms integration time.



Scheme of UNIST-EBIT Upgrade

## 4GSR Beam Diagnostics

- development for multi-purpose electronics: BbB electronics
- Diagnostic Beamlines and hutches

CODE	Type	Meas. Target	LINAC	LTB	BR	BTS	SR
1	BPM (BTN, STRL*)	Beam Position	10	7	120	6	288
2	BPRM (YAG/OTR)	2D Profile, Emittance, Energy	7	7		3	
3	X-ray Diagnostic Hutch	Beam Size, Emittance, Energy Spread					1
4	Visible light /Diagnostic Hutch	Beam Size, Emittance, Bunch Length, Purity			1		3
5	Beam Loss Monitor(FAST-PMT)	Beam Loss			5		30
6	Beam Loss Monitor(SLOW-Scintillating Fiber)	Beam Loss	1	1	4	1	14
7	ICT	Pulse Beam Current	2	1		2	
8	DCCT	DC Beam Current			1		2
9	FCT	Filling Pattern			1		1
10	PBPM	Photon Beam Position					30
11	Tune Monitor	Tune			1		1
12	Faraday Cup	Beam Current	1				
13	TFS/LFS	Multi-bunch Feedback					2
Numbers in total			21	16	133	12	370

## Test Beamline of 100 MeV proton linac (KOMAC)

- Slow/fast beam profiles, beam position, currents
- Wire scanner, BPM, ACCT, Faraday cup, Scintillating plate (chromox) & CCD camera
- Transverse emittance (Quad scan), momentum spread

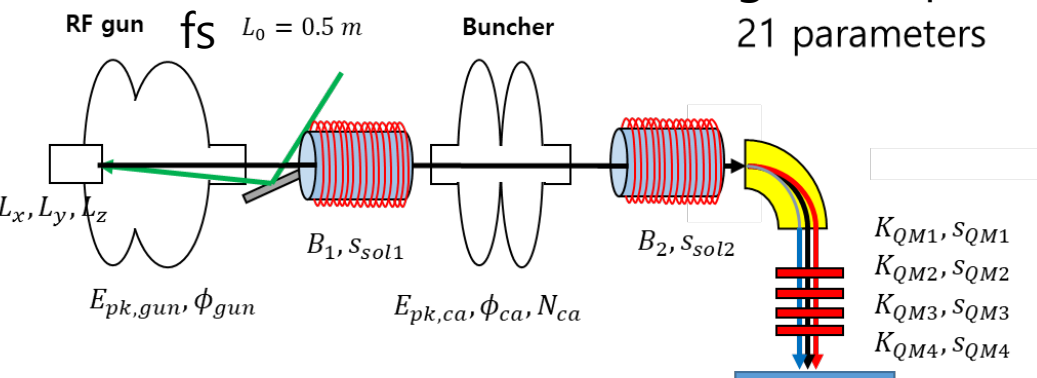
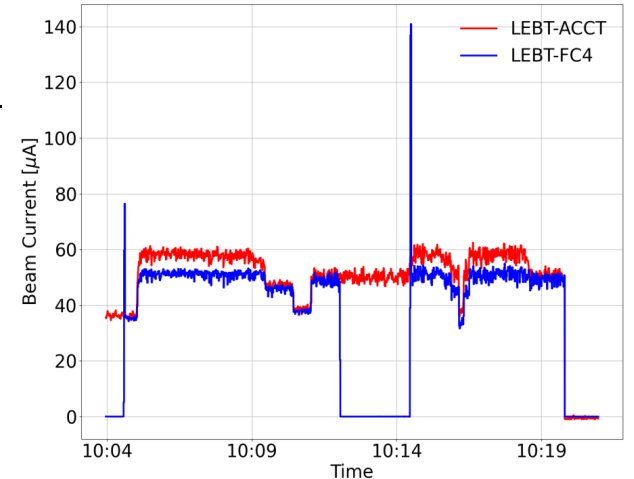
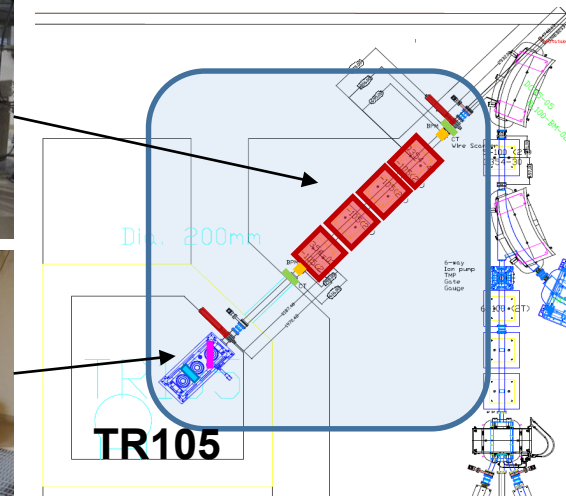
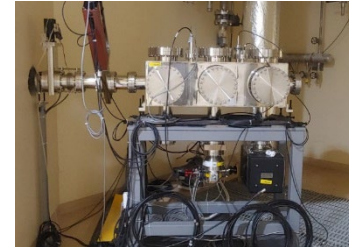
## Comparison of Beam characteristics using

### Ar and Ne beams in RAON Injector ECR, LEBT, RFQ, MEBT

- Ar ions : Allison data → Track input data
- How to improve RFQ transmission of Ne ions → Orbit correction, Select using a Slit, RFQ set value
- Injector beam commissioning : Ar, Ne, O, proton in 2023 and RI in 2204

## UED : How to improve the time resolution

- Gun + Magnetic Optics scheme (KAERI) → 31 fs
- Gun + Buncher + Magnetic Optics option can reach a resolution of 23



$$\Delta t = \sqrt{\tau_e^2 + \tau_{ph}^2 + \sigma_{ToF}^2}$$

$$\sqrt{(25fs)^2 + (19fs)^2 + (7.8fs)^2} = 31fs$$

$$\Rightarrow \sqrt{(7fs)^2 + (19fs)^2 + (7.8fs)^2} = 23fs$$