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Memo

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subject: ERL Low Power Test: List of Magnets and Beam Instrumentation

Low energy part

Electron beam is generated at the photocathode in SRF Gun. Beam is accelerated to 3 MeV then beam is guided by 4 dipole magnets through zigzag injection line to 5 cell SRF cavity (Fig. 1).

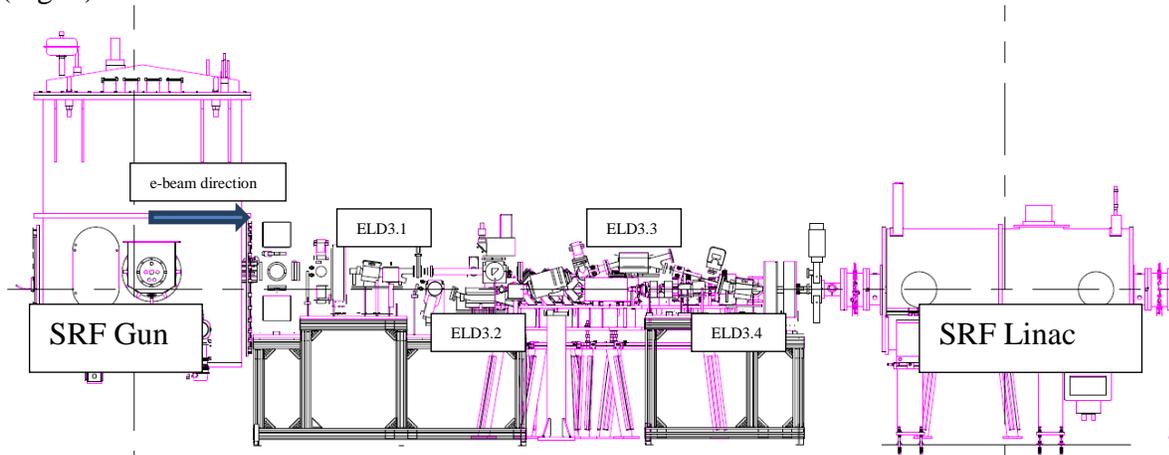


Figure 1: ERL low energy (injection line) layout.

Table 1: List of the Dipole Magnets

Name	Type	Power supply	Current 3 MeV		Bending angle E=3 MeV		Bending angle E=1 MeV	
			Nom.	Max.	Nom.	Max.	Nom.	Max.
ELD3.1	7C15	Shim Amplifier 892	8.1 A	10 A	-15°	-19°	-15°	-57°
ELD3.2	7C30	Shim Amplifier 892	9.1 A	10 A	+30°	33	+30°	+99
ELD3.3	7C30	Shim Amplifier 892	9.1 A	10 A	-30°	-33	-30°	-99
ELD3.4	7C15	Shim Amplifier 892	8.1A	10 A	+15°	+19°	+15°	+57°

(Positive bending angle points to the ceiling, negative bending angle points to the floor.)

High Energy Part

There are three quadrupoles (ERL main quadrupoles type 6Q12) installed at high energy downstream of SRF linac (Fig 2). Maximum gradient 0.3 kGauss/cm, integrated gradient 4.5 kGauss, minimum focal length at energy of 20 MeV is 14.8 cm, inner diameter 6cm.

The chevron dipole before the beam stop (Fig. 2) will not be energized during the low energy test. The dipole will be disconnected from power supply.

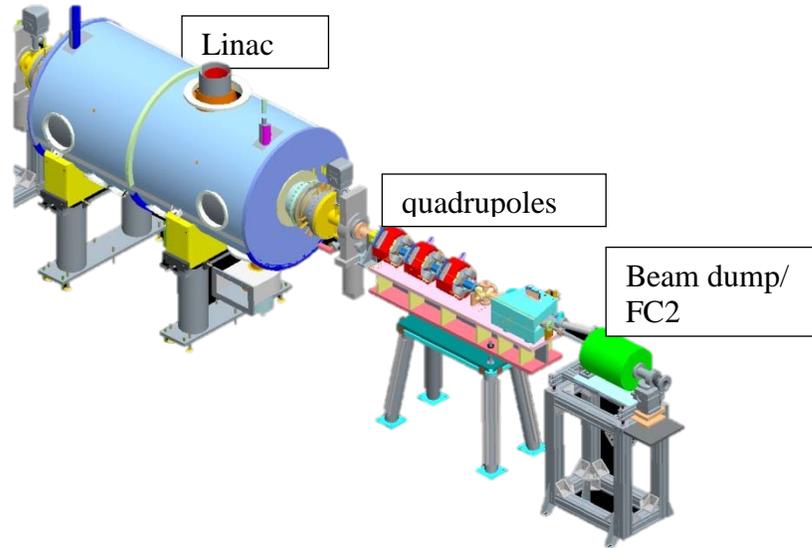


Figure 2: High energy part of low power ERL test layout.

Instrumentation

Full list of ERL beam instrumentation can be found [1].

Below are the schematic layout and the table of intrusive beam instrumentation used for low power test.

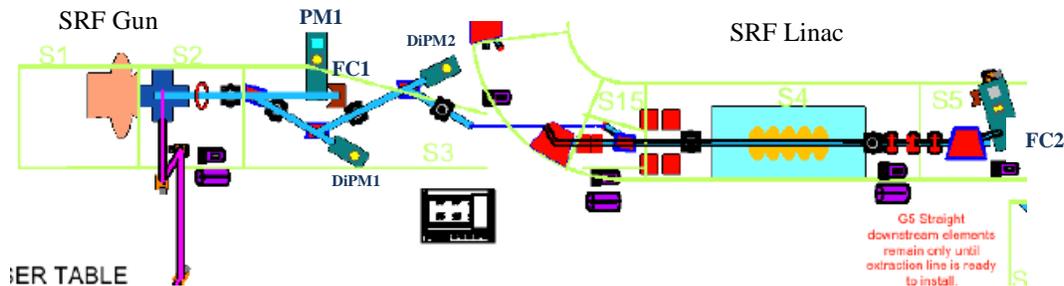


Figure 3: Low power ERL test: beam instrumentation location.

Table 3: List of Intrusive Beam Instrumentation

Name	Material	Function	Location (see Fig.3)	
PM1 (Fig4) [2]	100µm YAG:Ce	Beam profile monitor	Low energy straight line	Sector 3

Faraday Cup FC1 (Fig4)	Stainless CF Flange	Current/charge measurements	Low energy straight line	Sector 3
Beam Stop/FC2	Stainless steel	Current/charge measurements	High Energy Straight line	Sector 5

The dipole based beam profile monitors (DiPM1, DiPM2) will not be installed for the low power beam ERL test.

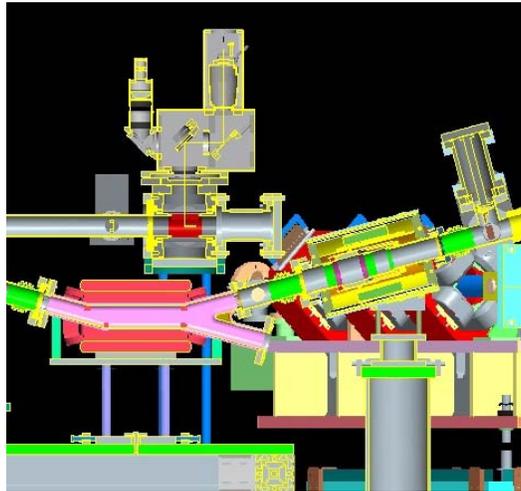


Figure 4: Low energy Faraday Cup (FC1) and low energy beam profile monitor assembly.

References

- [1] [ERL instrumentation Wiki](#)
- [2] [ERL Low energy beam profile monitor manual.](#)