Discussion about the proposal of the international collaboration in the ILC preparatory phase

IDT WG2 should prepare the draft of the proposal of the international collaboration in the ILC preparatory phase by the end of 2020.

We have 2 major items for the proposals.
- *Long-term stability test of the fast kicker*
- *Long-term stability test of the IP beam size and position control.*

Technical Preparation   System design of ILC DR Injection/extraction kickers

➢ **Outline**

➢ **Goals of the technical preparation**:
   System design of the beam injection and extraction for the ILC DR, based on the existing hardware. *The specification of the DR beam injection/extraction are designed to meet the following parameters.*

Beam energy	5 GeV
Total number of bunch in DR	1312 bunches
Repetition rate	5 Hz

➢ **Items:**
   • *Fast kicker:* **System design, include the new PS development**
   • *Fast kicker:* **Long-term stability test at ATF**
   • *E-driven kicker: System design, include the new PS development*

➢ **Expected cost:**

➢ **Candidates:**

A		Fast kicker: System design; DR and LTR/RTL optics optimization					1	20	(KEK), …
A		Fast kicker: System design; extraction kicker based on FID pulser					2	200	(KEK)
A	Injection/extraction kickers	Fast kicker: System design; extraction kicker based on induction kicker							CERN, BSS-Bilbao, SLAC
A		Fast kicker: Long-term stability test at ATF					2	100	ATF (ATF3) collaboration
B		E-driven kicker: System design, include the induction kicker development							CERN, BSS-Bilbao

Technical Preparation   System design of the ILC final focus beamline

➢ **Outline**

➢ **Goals of the technical preparation**:

System design of the beam optics and hardware for the ILC final focus beamline, based on the established technologies . *The specification of the ILC final focus beamline is designed to meet the following parameters.*

Beam energy	125 GeV
Bunch population	2e10 bunches
IP beam size (H/V)	0.515 um / 7.66 nm
IP position stabilization	< 20% of IP beam size

➢ **Items:**

• *System design : beam optics and hardware optimization, include intensity dependence simulation.*

• **Beam test** *: 2nd order optics correction*

• **Beam test** *: Intensity dependence correction*

• **Beam test** *: Long-term stability test of IP beam size and position at ATF*

➢ **Expected cost:**   **Beam tests will be input for the system design !**

➢ **Candidates:**

| Final focus optics	System design : hardware optimization, include intensity dependence simulation							ATF (ATF3) collaboration
	Beam test : Intensity dependence correction							ATF (ATF3) collaboration
	Beam test : 2nd order optics correction							ATF (ATF3) collaboration
	Beam test : Long-term stability test at ATF							ATF (ATF3) collaboration

Backup

Injection/extraction section

Spare space ??
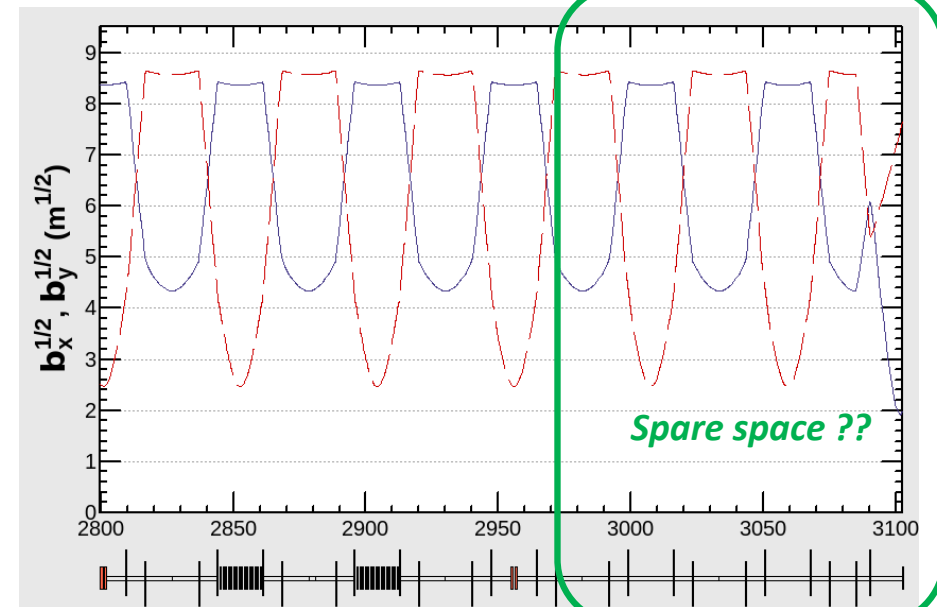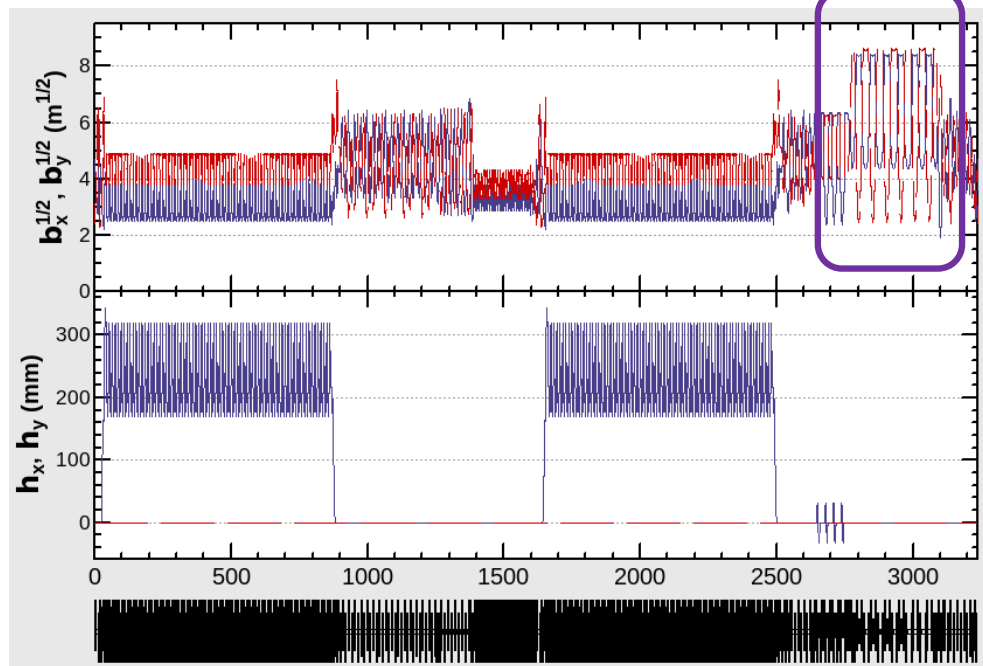
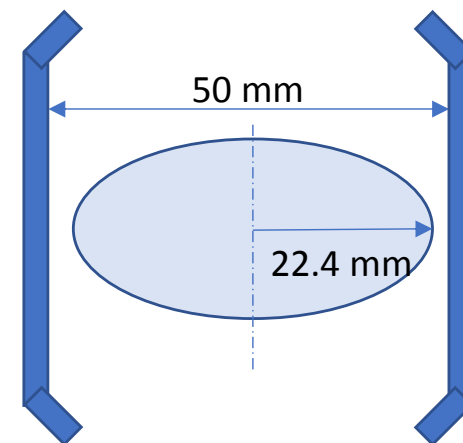Injection septum   Injection kickers   Extraction kickers   Extraction septum

Injection septum

55.4 mm

50 mm

22.4 mm

Extraction septum

13.4 mm

50 mm

22.4 mm

Kickers

50 mm

22.4 mm

5
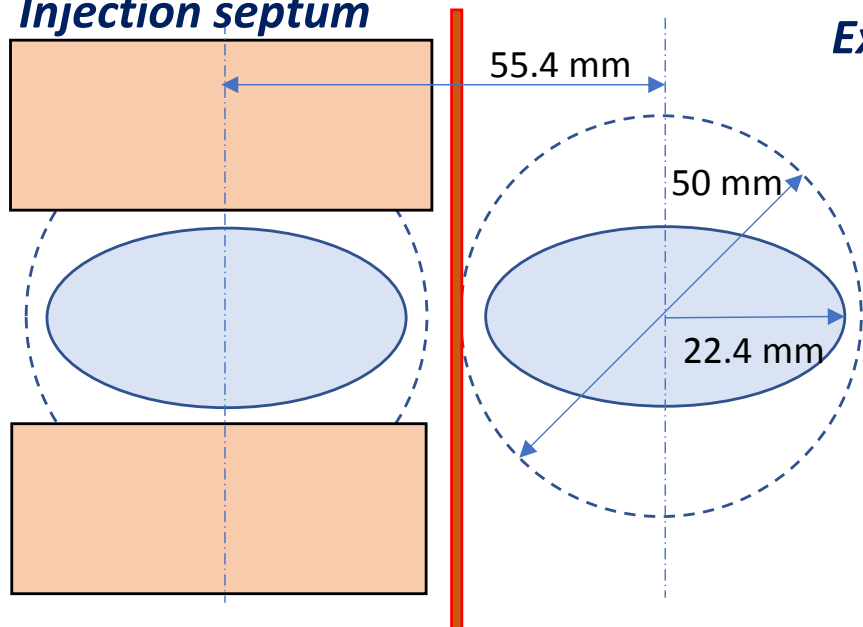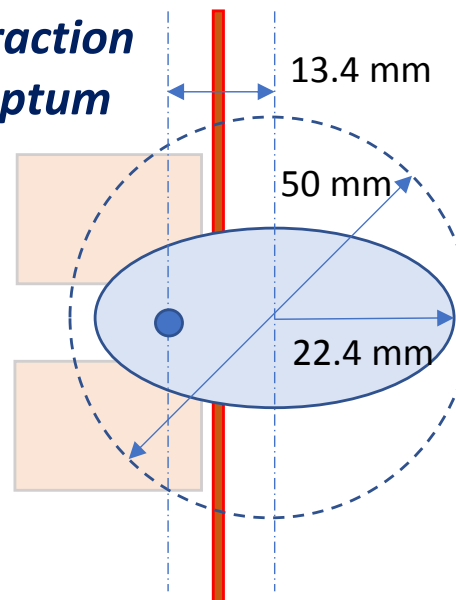
Summary of the ATF kicker test and ILC requirement

	ILC requirement	FPG5-3000M		FPG10-3000KN	
		ATF test	Scaled to ILC	ATF test	Scaled to ILC
Voltage		5 kV	+/-5 kV	+/- 10 kV	
Beam energy	5 GeV	1.3 GeV	**5 GeV**	1.3 GeV	**5 GeV**
Total kick angle	0.79 mrad	0.09 mrad	**0.74 mrad**	3.00 mrad	**1.71 mrad**
Number of kicker	33	1	33	2	20
Kick angle / 1 kicker	24 urad	90 urad	22 urad	1500 urad	78 urad
Length of stripline	0.3 m	0.3 m		0.6 m	
Gap of electrode	50 mm	24 mm	**50 mm**	11 mm	**50 mm**
Number of burst	1312 / 2625	**3000**		**60**	
Flat top		3 ns		6 ns	
Repetition rate	5 Hz	3.125 Hz	5 Hz	0.5 Hz	5 Hz

ATF kicker test 1 (FPG5-3000M ; 5kV, short pulse)
 Kick Angle ; **NOT ENOUGH**
 Burst Pulse Length ; **ENOUGH**

ATF kicker test 2 (FPG10-3000KN ; 10kV, long pulse)
 Kick Angle ; **ENOUGH**
 Burst Pulse Length ; **NOT ENOUGH**