14th Meeting of DR/BDS/DUMP group

Date : 2021/04/20 (Wed)

Attendees : Karsten Buesser, Philip Burrows, Stephen Brooks, Angeles Faus-Golfe, Jenny List, Kiyoshi Kubo, Thomas Markiewicz, Shin Michizono, Toshiyuki Okugi, Brett Parker, Ivan Podadera, David L. Rubin, Ben Shephard, Fermado Sordo, Nobuhiro Terunuma, Andrzej Wolski, Mikhail Zobov

Topics : WBS for DR/RTML/BDS area systems (continued)

15th Meeting of DR/BDS/DUMP group

Date : 2021/05/12 (Wed)

Attendees : Karsten Buesser, Philip Burrows, Angeles Faus-Golfe, Andy Lankford, Andrea Latina, Kiyoshi Kubo, Shin Michizono, Toshiyuki Okugi, Ivan Podadera, David L. Rubin, Robert Ryne, Nikolay Solyak, Fermado Sordo, Nobuhiro Terunuma, Glen White, Jean-Luc Vay, Kaoru Yokoya, Mikhail Zobov

Topics : WBS for BDS area systems

Damping Ring

- List up all items for EDR related to DR
- Picked up the WP related items from the to-do-list of both area and technical systems and categorized.

DR area system

- 3WPs
- Remaining items of original area systems

Technical system

- Remaining items of original technical systems
- To be integrated the item of each technical category for all area systems

Work packages

WP-12

WP-13

WP-14

Items	Deliverables	Related area and technical systems
DR cell design, based on present ILC optics (WP-12)	Beam optics design	DR(WP-12)
DR cell design (further small emittancs) (WP-12)	Beam optics design	DR(WP-12)
Dynamic aperture survey (WP-12)	Beam optics design; Performance specification	DR(WP-12)
SC wiggler magnets (WP-12)	Component design; costing; power, cooling water	DR(WP-12)/SCmagnet
Design of PM (WP-12)	Component design; costing; power, cooling water	DR(WP-12)/PMmagnet
PM prototyping (WP-12)	Performance specification	DR(WP-12)/PMmagnet
NC magnets (WP-12)	Component design; costing; power, cooling water	DR(WP-12)/Magnet
Ion trapping and fast ion instability (WP-13)	Performance specification	DR(WP-13)
Electron cloud instability (WP-13)	Performance specification	DR(WP-13)
Fast FB system design (WP-13)	System design; costing	DR(WP-13)/Instrumentation
Fast FB test (WP-13)	Performance specification	DR(WP-13)/Instrumentation
Vacuum chambers to reduce SEY for positrin DR (WP-13)	Performance specification	DR(WP-13)/Vacuum (basic design was in TDR)
System design of fast injection/extraction system (WP-14)	System design;	DR(WP-14)
Fast kicker devices (WP-14)	Component design; costing;	DR(WP-14)
Fast kicker power supplies (WP-14)	Component design; costing; power, cooling water estimation	DR(WP-14)
System design of injection kicker for E-driven PS (WP-14)	System design;	DR(WP-14)
Injection kicker device for E-driven PS (WP-14)	Component design; costing;	DR(WP-14)
Injection kicker power supplies for E-driven PS (WP-14)	Component design; costing; power, cooling water estimation	DR(WP-14)/Source

Area system

Optics design and system integration

Beam dynamics and tuning

Fast kicker

Items	Deliverables	Related area and technical systems
DR cell design, based on present ILC optics (WP-12)	Beam optics design	DR(WP-12)
DR cell design (further small emittancs) (WP-12)	Beam optics design	DR(WP-12)
DR straight section optics design (for WP-14)	Beam optics design	DR
System design of the beam diagnostics	Beam optics design	DR
ILC lattice integration	Beam optics design	ADI/DR
Contact part with ADI for the beam optics issues	Beam optics design	DR/ADI
Integration of the hardware components in DR	Component counts; costing; power, cooling water estimation	DR/TechnicalSystems
System design of emergency abort	System design	ADI/BeamDump/CFS/DR
Dynamic aperture survey (WP-12)	Beam optics design; Performance specification	DR(WP-12)
Small emittance tuning	Performance specification	DR
Tolerance evaluation for each device	Performance specification	DR
Ion trapping and fast ion instability (WP-13)	Performance specification	DR(WP-13)
Electron cloud instability (WP-13)	Performance specification	DR(WP-13)
Spece charge effects	Performance specification	DR
Impedance driven instability	Performance specification	DR
Tune shift by quadrupole wake for E-driven PS	Performance specification	DR/Source
Contact part with ADI for the beam dynamics and tuning	Performance specification	DR/ADI
System design of fast injection/extraction system (WP-14)	System design;	DR(WP-14)
Fast kicker devices (WP-14)	Component design; costing;	DR(WP-14)
Fast kicker power supplies (WP-14)	Component design; costing; power, cooling water estimation	DR(WP-14)
System design of injection kicker for E-driven PS (WP-14)	System design;	DR(WP-14)
Injection kicker device for E-driven PS (WP-14)	Component design; costing;	DR(WP-14)
Injection kicker power supplies for E-driven PS (WP-14)	Component design; costing; power, cooling water estimation	DR(WP-14)/Source

Technical system

Instrumentation

Magnet

RF

Vacuum

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Items	Deliverables	Related area and technical systems
Fast FB system design (WP-13)	System design; costing	DR(WP-13)/Instrumentation
Fast FB test (WP-13)	Performance specification	DR(WP-13)/Instrumentation
Beam position monitors	costing	Instrumentation/DR
Beam current monitor	costing	Instrumentation/DR
Tune monitor	costing	Instrumentation/DR
Beam size/profile monitors	costing	Instrumentation/DR
Slow orbit FB	Component design; costing	Instrumentation/DR
Polarimeters	Component design; costing	Instrumentation/CFS/DR
Cabling and monitor station	Component counts; costing; power, cooling water estimation	Instrumentation/CFS/DR
SC cavities, cryostat, He transfer	Component design; costing	SCRF/DR
RF source, waveguide	Component design; costing; power, cooling water estimation	HLRF/DR
LLRF	Component design; costing	LLRF/DR
SC wiggler magnets (WP-12)	Component design; costing; power, cooling water estimation	DR(WP-12)/SCmagnet
Cryostat, He transfer	Component design; costing	SCmagnet/DR
Power supplies, and cabling for SC magnet	Component counts; costing; power, cooling water estimation	SCmagnet/DR
Design of PM (WP-12)	Component design; costing; power, cooling water estimation	DR(WP-12)/PMmagnet
PM prototyping (WP-12)	Performance specification	DR(WP-12)/PMmagnet
NC magnets (WP-12)	Component design; costing; power, cooling water estimation	DR(WP-12)/Magnet
Power supplies, and cabling for NC magnet	Component counts; costing; power, cooling water estimation	Magnet/DR
Vacuum chambers to reduce SEY for positrin DR (WP-13)	Performance specification	DR(WP-13)/Vacuum (basic design was in TDR)
Regular vacuum components (pump etc.)	Component counts; costing; cooling water estimation	Vacuum/DR
Impedance calculations	Performance specification	Vacuum/DR
Photon stopper from wigglers	Component design; costing; cooling water estimation	Vacuum/CFS/DR
System design of DR alignment system	System design	Alignment/CFS/DR
Magnet support	System design; costing	Alignment/Magnet/DR
Chamber support	System design; costing	Alignmet/ADI/CFS/DR
Cryogenics	System design; costing; power, cooling water estimation	Cryo/CFS/SCRF/SCmagnet/DR
Cooling water system and distribution	System design; costing; cooling water estimation	CFS/Magnet/Vacuum/HLRF/DR
Magnet power supply station	System design	CFS/Magnet/DR
System design of device installation procedures	System design	CFS/SCRF/SCmagnet/Magnet/DR

Resource of technical preparation

Resource of EDR

WBS of DR area system in the Pre-Lab period

(A) Workpackage oriented

- Easy to manage the resources in Pre-Lab period.

(B) Work item oriented (all WP items belong to area system)

- Some items in are/technical systems are moved to the WP groups.
  (Works for SC wiggler/cryostat/PS are in same group.)
- Representative of WPs will cover some group leaders in area system.
- Easy to manage the design work in Pre-Lab period.

(C) Work item oriented (some WP items will do technical system)

- All of magnet design will be done in the technical system, not area system.
- The resource of WP-12 will be managed by area system,
  and divided to magnet group in the technical system.
- Easy to manage the design work of the technical system.

(A) Workpackage oriented

Damping Rings

System cordinator (Area systems)		Items	Deliverables	Resource
Group Leader	Optics design System design Beam dynamics Beam tuning System integration	DR straight section optics design (for WP-14)	Beam optics design	EDR
		System design of the beam diagnostics	Beam optics design	EDR
		ILC lattice integration	Beam optics design	EDR
		Small emittance tuning	Performance specification	EDR
		Tolerance evaluation for each device	Performance specification	EDR
		Spece charge effects	Performance specification	EDR
		Impedance driven instability	Performance specification	EDR
		Tune shift by quadrupole wake for E-driven PS	Performance specification	EDR
		Integration of the hardware components in DR	Component counts; costing; power, cooling water estimation	EDR
		Contact part with ADI for the beam optics issues	Beam optics design	EDR
		Contact part with ADI for the beam dynamics and tuning	Performance specification	EDR
Representative for WP-12	WP-12	DR cell design, based on present ILC optics (WP-12)	Beam optics design	TP-WP12
		DR cell design (further small emittancs) (WP-12)	Beam optics design	TP-WP12
		Dynamic aperture survey (WP-12)	Beam optics design; Performance specification	TP-WP12
		SC wiggler magnets (WP-12)	Component design; costing; power, cooling water	TP-WP12
		Design of PM (WP-12)	Component design; costing; power, cooling water	TP-WP12
		PM prototyping (WP-12)	Performance specification	TP-WP12
		NC magnets (WP-12)	Component design; costing; power, cooling water	TP-WP12
Representative for WP-13	WP-13	Ion trapping and fast ion instability (WP-13)	Performance specification	TP-WP13
		Electron cloud instability (WP-13)	Performance specification	TP-WP13
		Fast FB system design (WP-13)	System design; costing	TP-WP13
		Fast FB test (WP-13)	Performance specification	TP-WP13
		Vacuum chambers to reduce SEY for positrin DR (WP-13)	Performance specification	TP-WP13
Representative for WP-14	WP-14	System design of fast injection/extraction system (WP-14)	System design;	TP-WP14
		Fast kicker devices (WP-14)	Component design; costing;	TP-WP14
		Fast kicker power supplies (WP-14)	Component design; costing; power, cooling water estimation	TP-WP14
		System design of injection kicker for E-driven PS (WP-14)	System design;	TP-WP14
		Injection kicker device for E-driven PS (WP-14)	Component design; costing;	TP-WP14
		Injection kicker power supplies for E-driven PS (WP-14)	Component design; costing; power, cooling water estimation	TP-WP14
	(Technical systems)	Items	Deliverables	Resource
	DR magnets (Hardware)	Cryostat, He transfer	Component design; costing	EDR
		Power supplies, and cabling for SC magnet	Component counts; costing; power, cooling water estimation	EDR
		Power supplies, and cabling for NC magnet	Component counts; costing; power, cooling water estimation	EDR
		Magnet support	System design; costing	EDR

(B) Work item oriented (all WP items belong to area system)

Damping Ring Area System

System cordinator	(Area systems)	Items	Deliverables	Resource
Group Leader	System design Beam tuning System integration	System design of the beam diagnostics	Beam optics design	EDR
		ILC lattice integration	Beam optics design	EDR
		Small emittance tuning	Performance specification	EDR
		Tolerance evaluation for each device	Performance specification	EDR
		System design of emergency abort	System design	EDR
		Integration of the hardware components in DR	Component counts; costing; power, cooling water estimation	EDR
		Contact part with ADI for the beam optics issues	Beam optics design	EDR
		Contact part with ADI for the beam dynamics and tuning	Performance specification	EDR
Representative for WP-12 Group Leader	WP-12 Optics design DR magnets (Hardware)	DR cell design, based on present ILC optics (WP-12)	Beam optics design	TP-WP12
		DR cell design (further small emittancs) (WP-12)	Beam optics design	TP-WP12
		DR straight section optics design (for WP-14)	Beam optics design	EDR
		Dynamic aperture survey (WP-12)	Beam optics design; Performance specification	TP-WP12
		SC wiggler magnets (WP-12)	Component design; costing; power, cooling water	TP-WP12
		Cryostat, He transfer	Component design; costing	EDR
		Power supplies, and cabling for SC magnet	Component counts; costing; power, cooling water estimation	EDR
		Design of PM (WP-12)	Component design; costing; power, cooling water	TP-WP12
		PM prototyping (WP-12)	Performance specification	TP-WP12
		NC magnets (WP-12)	Component design; costing; power, cooling water	TP-WP12
		Power supplies, and cabling for NC magnet	Component counts; costing; power, cooling water estimation	EDR
		Magnet support	System design; costing	EDR
Representative for WP-13 Group Leader	WP-13 Beam dynamics	Ion trapping and fast ion instability (WP-13)	Performance specification	TP-WP13
		Electron cloud instability (WP-13)	Performance specification	TP-WP13
		Fast FB system design (WP-13)	System design; costing	TP-WP13
		Fast FB test (WP-13)	Performance specification	TP-WP13
		Vacuum chambers to reduce SEY for positrin DR (WP-13)	Performance specification	TP-WP13
		Spece charge effects	Performance specification	EDR
		Impedance driven instability	Performance specification	EDR
		Tune shift by quadrupole wake for E-driven PS	Performance specification	EDR
Representative for WP-14	WP-14	System design of fast injection/extraction system (WP-14)	System design;	TP-WP14
		Fast kicker devices (WP-14)	Component design; costing;	TP-WP14
		Fast kicker power supplies (WP-14)	Component design; costing; power, cooling water estimation	TP-WP14
		System design of injection kicker for E-driven PS (WP-14)	System design;	TP-WP14
		Injection kicker device for E-driven PS (WP-14)	Component design; costing;	TP-WP14
		Injection kicker power supplies for E-driven PS (WP-14)	Component design; costing; power, cooling water estimation	TP-WP14
	(Technical systems)	Items	Deliverables	Resource

(C) Work item oriented (some WP items in technical system)

Damping Ring Area System

System cordinator	(Area systems)	Items	Deliverables	Resource
Group Leader	System design Beam tuning System integration	System design of the beam diagnostics	Beam optics design	EDR
		ILC lattice integration	Beam optics design	EDR
		Small emittance tuning	Performance specification	EDR
		Tolerance evaluation for each device	Performance specification	EDR
		System design of emergency abort	System design	EDR
		Integration of the hardware components in DR	Component counts; costing; power, cooling water estimation	EDR
		Contact part with ADI for the beam optics issues	Beam optics design	EDR
		Contact part with ADI for the beam dynamics and tuning	Performance specification	EDR
Representative for WP-12 Group Leader	WP-12 Optics design DR magnets (Hardware)	DR cell design, based on present ILC optics (WP-12)	Beam optics design	TP-WP12
		DR cell design (further small emittancs) (WP-12)	Beam optics design	TP-WP12
		DR straight section optics design (for WP-14)	Beam optics design	EDR
		Dynamic aperture survey (WP-12)	Beam optics design; Performance specification	TP-WP12
Representative for WP-13 Group Leader	WP-13 Beam dynamics	Ion trapping and fast ion instability (WP-13)	Performance specification	TP-WP13
		Electron cloud instability (WP-13)	Performance specification	TP-WP13
		Fast FB system design (WP-13)	System design; costing	TP-WP13
		Fast FB test (WP-13)	Performance specification	TP-WP13
		Vacuum chambers to reduce SEY for positrin DR (WP-13)	Performance specification	TP-WP13
		Spece charge effects	Performance specification	EDR
		Impedance driven instability	Performance specification	EDR
		Tune shift by quadrupole wake for E-driven PS	Performance specification	EDR
Representative for WP-14	WP-14	System design of fast injection/extraction system (WP-14)	System design;	TP-WP14
		Fast kicker devices (WP-14)	Component design; costing;	TP-WP14
		Fast kicker power supplies (WP-14)	Component design; costing; power, cooling water estimation	TP-WP14
		System design of injection kicker for E-driven PS (WP-14)	System design;	TP-WP14
		Injection kicker device for E-driven PS (WP-14)	Component design; costing;	TP-WP14
		Injection kicker power supplies for E-driven PS (WP-14)	Component design; costing; power, cooling water estimation	TP-WP14
	(Technical systems)	Items	Deliverables	Resource
	DR magnets (Hardware)	SC wiggler magnets (WP-12)	Component design; costing; power, cooling water	TP-WP12
		Cryostat, He transfer	Component design; costing	EDR
		Power supplies, and cabling for SC magnet	Component counts; costing; power, cooling water estimation	EDR
		Design of PM (WP-12)	Component design; costing; power, cooling water	TP-WP12
		PM prototyping (WP-12)	Performance specification	TP-WP12
		NC magnets (WP-12)	Component design; costing; power, cooling water	TP-WP12
		Power supplies, and cabling for NC magnet	Component counts; costing; power, cooling water estimation	EDR
		Magnet support	System design; costing	EDR

Part of WP12 resources

Opinion of Andy Lankford

- Any of the three structures is manageable during the Pre-lab phase.
- I think that one of the work item oriented structures (B) or (C) will work best. I believe that the decision between (B) and (C) needs to be consistent with how the division between area systems and technical systems for other area systems.
- If the DR magnets are going to be designed by the magnet technical system to DR area system specification, then I would think that (C) is better than (B).
- Also, if the SC wiggler magnet design, cryostat design, and wiggler power supply design are split among technical systems, then I believe that the coordination of these designs should probably live in the DR area system (or possibly the magnet technical system).
- Another consideration is how the RTL WBS is defined. I think that there should be a consistent philosophy to the structure for both DR and RTL (and probably BDS as well).

Beam Delivery System

- List up all items for EDR related to BDS
- Picked up the WP related items from the to-do-list of both area and technical systems and categorized.

BDS area system

- 2WPs
- MDI related items
- Remaining items of original area systems

Technical system

- Remaining items of original technical systems
- To be integrated the item of each technical category for all area systems

Work packages

WP-15

WP-16

MDI

Items	Deliverables	Related area and technical systems
Correction of higher order optics aberration (WP-15)	Performance specification	BDS(WP-15)
Beam tuning study with machine learning technique (WP-15)	Performance specification	BDS(WP-15)
ATF3 beam test (WP-15)	Performance specification	BDS(WP-15)
Short range static wakefield effect (WP-15)	Performance specification	BDS(WP-15)
Short range dynamic wakefield effect (WP-15)	Performance specification	BDS(WP-15)
System desing of the intra-train orbit FB (WP-15)	Performance specification	BDS(WP-15)
Cavity BPMs (WP-15)	Performance specification; Costing	BDS(WP-15)/Instrumentation
IP intra-train FB (WP-15)	Performance specification; Costing	BDS(WP-15)/Instrumentation
Upstream intra-train FB (WP-15)	Performance specification; Costing	BDS(WP-15)/Instrumentation
Wakefield minimization for vacuum components (WP-15)	System design; Performance specification; Costing	BDS(WP-15)/Vacuum
QD0 SC magnet and cryostat package (WP-16)	Component design; Costing; Power estimation	BDS(WP-16)/SCmagnet/MDI
Service cryostat,a and He transfer to FD package (WP-16)	Component design; Costing; Power estimation	BDS(WP-16)/SCmagnet/MDI
QD0 vibration test (WP-16)	Performance specification	BDS(WP-16)/SCmagnet/MDI
Polarimeters	Performance specification; Costing	BDS(MDI)/Instrumentation/ADI/MDI
Energy spectrometers	Performance specification; Costing	BDS(MDI)/Instrumentation/ADI/MDI
Anti-DID (detector solenoid)	Component design	BDS(MDI)/Scmagnet/MDI
System design of push-pull scheme	System design	BDS(MDI)/CFS/ADI/MDI
System design of Packman	System design	BDS(MDI)/CFS/ADI/MDI

Area system

Optics design and system integration

Beam dynamics and tuning

Items	Deliverables	Related area and technical systems
Optics design of final focus beam line (for WP-15)	Beam optics design	BDS
Optics design for QD0 package design (for WP-16)	Beam optics design	BDS/SC magnet/MDI
Optics design for QF1 package design (for WP-16)	Beam optics design	BDS/SC magnet/MDI
Optics design for Crab cavity (for WP-3)	Beam optics design	BDS/SCRF/MDI/ADI
Optics design of beam diagnostic system	Beam optics design	BDS
Optics design of beam collimation system	Beam optics design	BDS
Optics design of mail beam dump line	Beam optics design	BDS
Optics design of tuning beam dump line	Beam optics design	BDS
System design of the beam diagnostics	System design	BDS
System design of Muon collimation	System design	BDS/MDI/ADI
ILC lattice integration	Beam optics design	ADI/BDS
Contact part with ADI for the beam optics issues	Beam optics design	BDS/ADI
Integration of the hardware components in DR	Component counts; Costing; Power, cooling water estimation	BDS/TechnicalSystems
System design of emergency abort	System design	ADI/BeamDump/CFS/BDS
L* and crossing angle	System design	ADI/CFS/MDI/BDS
Correction of higher order optics aberration (WP-15)	Performance specification	BDS(WP-15)
Beam tuning study with machine learning technique (WP-15)	Performance specification	BDS(WP-15)
Tolerance evaluation for each device	Performance specification	BDS
Effect of the ground motion	Performance specification	BDS
Long range static wakefield effect (resisitive wall)	Performance specification	BDS
Vacuum chamber diameter and magnet bore design	Performance specification	BDS
ATF3 beam test (WP-15)	Performance specification	BDS(WP-15)
Short range static wakefield effect (WP-15)	Performance specification	BDS(WP-15)
Short range dynamic wakefield effect (WP-15)	Performance specification	BDS(WP-15)
System desing of the intra-train orbit FB (WP-15)	Performance specification	BDS(WP-15)
Collimation and detector background evaluation (incl. Muon)	Performance specification	BDS/MDI/ADI
Radiation loss evaluation in dump line	Performance specification; System design	BDS/ADI/CFS
S2E simulation (BDS part)	Performance specification; System design	ADI/BDS
Contact part with ADI for the beam dynamics and tuning	Performance specification	ADI/BDS

Technical system

Instrumentation

Magnet

RF

Vacuum

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Items	Deliverables	Related area and technical systems
Cavity BPMs (WP-15)	Performance specification; Costing	BDS(WP-15)/Instrumentation
IP intra-train FB (WP-15)	Performance specification; Costing	BDS(WP-15)/Instrumentation
Upstream intra-train FB (WP-15)	Performance specification; Costing	BDS(WP-15)/Instrumentation
Beam current monitor	Costing	Instrumentation/BDS
Beam size/profile monitors (laserwire)	Performance specification; Costing	Instrumentation/BDS
Polarimeters	Performance specification; Costing	BDS(MDI)/Instrumentation/ADI/MDI
Energy spectrometers	Performance specification; Costing	BDS(MDI)/Instrumentation/ADI/MDI
Laser station for polarimeters and laser wire monitors	System design; Costing; Power, cooling water estimation	Instrumentation/CFS/BDS/MDI
Cabling and monitor station	Component counts; Costing; Power, cooling water estimation	Instrumentation/CFS/BDS
Crab cavities, cryostat (WP-3)	Component design; Costing; Power estimation	SCRF(WP-3)/BDS
Crab cavity LLRF (WP-3)	System design; Costing;	SCRF(WP-3)/LLRF/BDS
He transfer for crab cavity	System design; Costing;	SCRF(WP-3?)/BDS
RF source, waveguide for crab cavity	Component design; Costing; Power, cooling water estimation	HLRF/SCRF(WP-3)/BDS
QD0 SC magnet and cryostat package (WP-16)	Component design; Costing; Power estimation	BDS(WP-16)/SCmagnet/MDI
Service cryostat,a and He transfer to FD package (WP-16)	Component design; Costing; Power estimation	BDS(WP-16)/SCmagnet/MDI
QD0 vibration test (WP-16)	Performance specification	BDS(WP-16)/SCmagnet/MDI
QF1 SC magnet and cryostat package	Component design; Costing; Power estimation	SCmagnet/MDI/BDS
He transfer line (from cryogenics to service cryostat)	Component design; Costing; Power estimation	SCmagnet/MDI/BDS
Power supplies, and cabling for SC magnet	Costing; Power, cooling water estimation	SCmagnet/BDS
Anti-DID (detector solenoid)	Component design	BDS(MDI)/Scmagnet/MDI
NC magnets	Costing; Power, cooling water estimation	Magnet/BDS
Power supplies, and cabling for NC magnet	Component counts; Costing; Power, cooling water estimation	Magnet/BDS
Wakefield minimization for vacuum components (WP-15)	System design; Performance specification; Costing	BDS(WP-15)/Vacuum
Vacuum components (pipe, bellows, pump etc.)	Component counts; Costing	Vacuum/BDS
BDS Collimater (spoiler, absorber)	System design; Performance specification; Costing	BDS/CFS
MPS collimators	System design; Performance specification; Costing	BDS/CFS/MDI
Muon spoiler and muon wall	Component design; Costing; Cooling water estimation	BDS/Magnet/MDI
Beam sweeper for dump, cabling and PS	Component design; Costing; Power, cooling water estimation	BeamDump/Magnet/BDS
Tuning beam dump	Component design; Costing; Cooling water estimation	BeamDump/CFS/ADI/BDS
Main beam dump	Component design; Costing; Cooling water estimation	BeamDump/CFS/ADI/BDS
System design of BDS alignment system	System design	Alignment/CFS/BDS
Alignment for two beamlines around detector area	System design	Alignment/MDI/CFS/BDS
Magnet support	System design; Costing	Alignment/Magnet/BDS
Chamber support	System design; Performance specification; Costing	Alignmrnt/Vacuum/BDS
Cryogenics	System design; Costing; Power, cooling water estimation	Cryo/CFS/SCRF/SCmagnet/BDS
Cooling water system and distribution	System design; Costing; Cooling water estimation	CFS/Magnet/Vacuum/HL RF/BDS
Magnet power supply station	System design	CFS/Magnet/SCmagnet/BDS
System design of device installation procedures	System design	CFS/SCRF/SCmagnet/Magnet/BDS
System design of push-pull scheme	System design	BDS(MDI)/CFS/ADI/MDI
System design of Packman	System design	BDS(MDI)/CFS/ADI/MDI

Resource of technical preparation

Resource of EDR

WBS of BDS area system in the Pre-Lab period

(A) Workpackage oriented

- Easy to manage the resources in Pre-Lab period.

(B) Work item oriented (all WP items belong to area system)

- Representative of WPs will cover some group leaders in area system.
- Easy to manage the design work in Pre-Lab period.

(A) Workpackage oriented

Beam Delivery System Area System

System cordinator	(Area systems)	Items	Deliverables	Resource
Group Leader	System design System integration	Optics design of final focus beam line (for WP-15)	Beam optics design	EDR
		Optics design for QD0 package design (for WP-16)	Beam optics design	EDR
		Optics design for QF1 package design (for WP-16)	Beam optics design	EDR
		Optics design for Crab cavity (for WP-3)	Beam optics design	EDR
		Optics design of beam diagnostic system	Beam optics design	EDR
		Optics design of beam collimation system	Beam optics design	EDR
		Optics design of mail beam dump line	Beam optics design	EDR
		Optics design of tuning beam dump line	Beam optics design	EDR
		System design of the beam diagnostics	System design	EDR
		System design of Muon collimation	System design	EDR
		ILC lattice integration	Beam optics design	EDR
		Integration of the hardware components in DR	Component counts; Costing; Power, cooling water estimation	EDR
		System design of emergency abort	System design	EDR
		L* and crossing angle	System design	EDR
		Contact part with ADI for the beam optics issues	Beam optics design	EDR
Group Leader	Beam dynamics	Tolerance evaluation for each device	Performance specification	EDR
		Effect of the ground motion	Performance specification	EDR
		Long range static wakefield effect (resisitive wall)	Performance specification	EDR
		Vacuum chamber diameter and magnet bore design	Performance specification	EDR
		Collimation and detector background evaluation (incl. Muon)	Performance specification	EDR
		Radiation loss evaluation in dump line	Performance specification; System design	EDR
		S2E simulation (BDS part)	Performance specification; System design	EDR
		Contact part with ADI for the beam dynamics and tuning	Performance specification	EDR
Representative for WP-15	WP-15	Correction of higher order optics aberration (WP-15)	Performance specification	TP-WP15
		Beam tuning study with machine learning technique (WP-15)	Performance specification	TP-WP15
		ATF3 beam test (WP-15)	Performance specification	TP-WP15
		Short range static wakefield effect (WP-15)	Performance specification	TP-WP15
		Short range dynamic wakefield effect (WP-15)	Performance specification	TP-WP15
		System desing of the intra-train orbit FB (WP-15)	Performance specification	TP-WP15
		Cavity BPMs (WP-15)	Performance specification; Costing	TP-WP15
		IP intra-train FB (WP-15)	Performance specification; Costing	TP-WP15
		Upstream intra-train FB (WP-15)	Performance specification; Costing	TP-WP15
		Wakefield minimization for vacuum components (WP-15)	System design; Performance specification; Costing	TP-WP15
Representative for WP-16	WP-16	QD0 SC magnet and cryostat package (WP-16)	Component design; Costing; Power estimation	TP-WP16
		Service cryostat,a and He transfer to FD package (WP-16)	Component design; Costing; Power estimation	TP-WP16
		QD0 vibration test (WP-16)	Performance specification	TP-WP16
Group Leader	MDI	Polarimeters	Performance specification; Costing	EDR
		Energy spectrometers	Performance specification; Costing	EDR
		Anti-DID (detector solenoid)	Component design	EDR
		System design of push-pull scheme	System design	EDR
		System design of Packman	System design	EDR
	(Technical systems)	Items	Deliverables	Resource
	BDS magnets (Hardware)	QF1 SC magnet and cryostat package	Component design; Costing; Power estimation	EDR
		He transfer line (from cryogenics to service cryostat)	Component design; Costing; Power estimation	EDR
		Power supplies, and cabling for SC magnet	Costing; Power, cooling water estimation	EDR
		NC magnets	Costing; Power, cooling water estimation	EDR
		Power supplies, and cabling for NC magnet	Component counts; Costing; Power, cooling water estimation	EDR
	BDS Dump and collimator	BDS Collimater (spoiler, absorber)	System design; Performance specification; Costing	EDR
		MPS collimators	System design; Performance specification; Costing	EDR
		Muon spoiler and muon wall	Component design; Costing; Cooling water estimation	EDR
		Beam sweeper for dump, cabling and PS	Component design; Costing; Power, cooling water estimation	EDR

(B) Work item oriented

Beam Delivery System Area System

System cordinator	(Area systems)	Items	Deliverables	Resource
Group Leader	System design Optics design System integration	Optics design of final focus beam line (for WP-15)	Beam optics design	EDR
		Optics design for QD0 package design (for WP-16)	Beam optics design	EDR
		Optics design for QF1 package design (for WP-16)	Beam optics design	EDR
		Optics design for Crab cavity (for WP-3)	Beam optics design	EDR
		Optics design of beam diagnostic system	Beam optics design	EDR
		Optics design of beam collimation system	Beam optics design	EDR
		Optics design of mail beam dump line	Beam optics design	EDR
		Optics design of tuning beam dump line	Beam optics design	EDR
		System design of the beam diagnostics	System design	EDR
		System design of Muon collimation	System design	EDR
		ILC lattice integration	Beam optics design	EDR
		Integration of the hardware components in DR	Component counts; Costing; Power, cooling water estimation	EDR
		System design of emergency abort	System design	EDR
		L* and crossing angle	System design	EDR
		Contact part with ADI for the beam optics issues	Beam optics design	EDR
Group Leader	Beam dynamics	Tolerance evaluation for each device	Performance specification	EDR
		Effect of the ground motion	Performance specification	EDR
		Collimation and detector background evaluation (incl. Muon)	Performance specification	EDR
		Radiation loss evaluation in dump line	Performance specification; System design	EDR
		S2E simulation (BDS part)	Performance specification; System design	EDR
		Contact part with ADI for the beam dynamics and tuning	Performance specification	EDR
Representative for WP-15 Group Leader	WP-15 Beam tuning Collective effect	Correction of higher order optics aberration (WP-15)	Performance specification	TP-WP15
		Beam tuning study with machine learning technique (WP-15)	Performance specification	TP-WP15
		ATF3 beam test (WP-15)	Performance specification	TP-WP15
		Short range static wakefield effect (WP-15)	Performance specification	TP-WP15
		Short range dynamic wakefield effect (WP-15)	Performance specification	TP-WP15
		System desing of the intra-train orbit FB (WP-15)	Performance specification	TP-WP15
		Cavity BPMs (WP-15)	Performance specification; Costing	TP-WP15
		IP intra-train FB (WP-15)	Performance specification; Costing	TP-WP15
		Upstream intra-train FB (WP-15)	Performance specification; Costing	TP-WP15
		Wakefield minimization for vacuum components (WP-15)	System design; Performance specification; Costing	TP-WP15
		Long range static wakefield effect (resisitive wall)	Performance specification	EDR
		Vacuum chamber diameter and magnet bore design	Performance specification	EDR
Representative for WP-16 Group Leader	WP-16 Final Focus Magnets	QD0 SC magnet and cryostat package (WP-16)	Component design; Costing; Power estimation	TP-WP16
		Service cryostat,a and He transfer to FD package (WP-16)	Component design; Costing; Power estimation	TP-WP16
		QD0 vibration test (WP-16)	Performance specification	TP-WP16
		QF1 SC magnet and cryostat package	Component design; Costing; Power estimation	EDR
		He transfer line (from cryogenics to service cryostat)	Component design; Costing; Power estimation	EDR
		Power supplies, and cabling for SC magnet	Costing; Power, cooling water estimation	EDR
Group Leader	MDI	Polarimeters	Performance specification; Costing	EDR
		Energy spectrometers	Performance specification; Costing	EDR
		Anti-DID (detector solenoid)	Component design	EDR
		System design of push-pull scheme	System design	EDR
		System design of Packman	System design	EDR
	(Technical systems)	Items	Deliverables	Resource
	BDS magnets (Hardware)	NC magnets	Costing; Power, cooling water estimation	EDR
		Power supplies, and cabling for NC magnet	Component counts; Costing; Power, cooling water estimation	EDR
	BDS Dump and collimator	BDS Collimater (spoiler, absorber)	System design; Performance specification; Costing	EDR
		MPS collimators	System design; Performance specification; Costing	EDR
		Muon spoiler and muon wall	Component design; Costing; Cooling water estimation	EDR
		Beam sweeper for dump, cabling and PS	Component design; Costing; Power, cooling water estimation	EDR

Should BDS collimator and Muon spoiler be managed by dump group ??

Discussion of WBS for BDS area systems

- Angeles presented that both structures (WP oriented, Work item oriented) are manageable during the Pre-lab phase.
  But, there should be a consistent philosophy of WBS to the structure for BDS as well.

- Kersten presented the topics in Pre-Lab phase as a point of MDI.
  - Topics with direct impact on physics
  - Topics with impact on detector design
  - CFS topics with impact on detector design, assembly, maintenance
  - Topics with indirect impact on MDI

✓ BDS spoiler should belong to the same group to WP-15.
  BDS absorber should be designed in DUMP system (Angeles, Nobuhiro).

✓ S2E for polarization should also be considered (Jenney).

✓ Luminosity monitor (incoherent pair monitor) should be added to BDS instrumentation (Karsten).
  - Luminosity monitor is a task to be considered as a part of detector design.
  - Polarimeter and energy spectrometer are treated in MDI group in BDS area system.

✓ Detector solenoid and Anti-DID are tasks to be considered as a part of detector design (Karsten).

Technical system

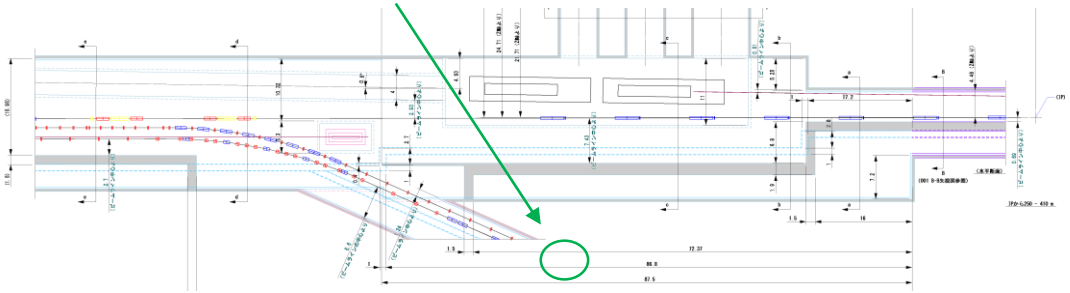
Magnet technical system for DR/RTML/BDS area system

- Source and ML (bunch compressor and warm section) also have NC magnets.
- Source also has SC undulators.
- We'd better to consider how to make WBS by taking account of Source and ML area system, too.

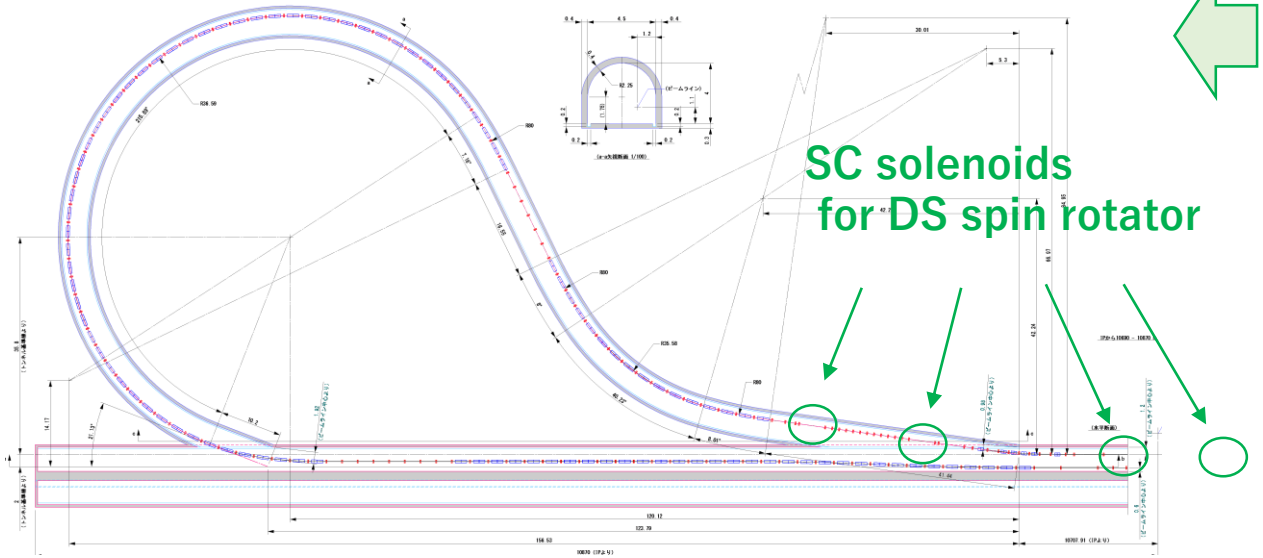
Other NC and MC magnets ??

Better to be managed by DR area system ?

SC solenoids for upstream spin rotator



DR

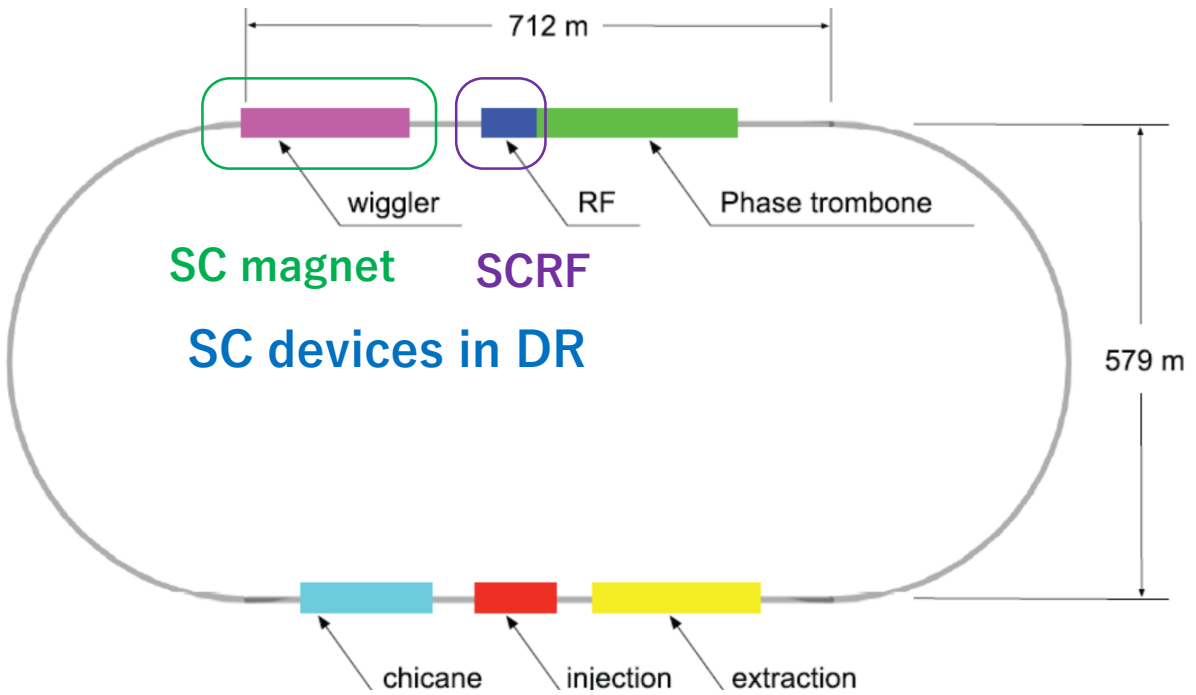


SC solenoids for DS spin rotator

To do list for magnet technical system

Damping ring	Items	
DR magnets	SC wiggler magnets (WP-12)	SC
	Cryostat, He transfer	SC
	Power supplies, and cabling for SC magnet	SC
	Design of PM (WP-12)	PM
	PM prototyping (WP-12)	PM
	NC magnets (WP-12)	NC
	Power supplies, and cabling for NC magnet	NC
DR cryogenics	Cryogenics	SC (commont to DR SCRF)
RTML	**Items**	
RTML magnets	SC solenoid magnet and cryostat for spin rotators	SC
	He transfer	SC
	Power supplies, and cabling for SC magnet	SC
	NC magnets	NC
	Power supplies, and cabling for NC magnet	NC
RTML cryogenics	Cryogenics	SC
BDS	**Items**	
BDS magnets	QDO SC magnet and cryostat package (WP-16)	SC
	Service cryostat,a and He transfer to FD package (WP-16)	SC
	QD0 vibration test (WP-16)	SC
	QF1 SC magnet and cryostat package	SC
	He transfer line (from cryogenics to service cryostat)	SC (common to crab cavity)
	Power supplies, and cabling for SC magnet	SC
	NC magnets	NC
	Power supplies, and cabling for NC magnet	NC
BDS cryogenics	Cryogenics	SC (common to crab cavity)

SC technologies for DR/RTML/BDS area system



Damping ring		Specifications	Component	
	DR SC RF system	f=650MHz, V=6.1MV/m (N=10/ring)	SC cavities, cryostat	
		P=2 MW	RF source, waveguide	
			LLRF	
		T=4.5 K	He transfer line	
	DR SC magnets	B=2.16T, L=1.875m, Gap =7.6cm (N=30/ring)	SC wiggler magnets	WP-12
			Cryostat	
			Power supplies, and cabling	
		T=4.5 K	He transfer line	
	DR cryogenics	for SC RF and SC wiggler	Cryogenics	
RTML		Specifications	Component	
	RTML SC magnets	B=5T, L=5.2m (N=1/beamline)	SC solenid and cryostat at LTR line	
		B=5T, L=2.6m (N=4/beamline)	SC solenid and cryostat at turn-around end	
			Power supplies, and cabling	
		No temperature discription	He transfer line	
	RTML cryogenics	for 4 SC solenoid locations	Cryogenics	
BDS		Specifications	Component	
	BDS SC RF system		SC crab cavities, cryostat	WP-3
			LLRF	WP-3
			RF source, waveguide	
			He transfer line	
	BDS SC magnets	T=1.9K	QD0 SC magnet and cryostat package	WP-16
		T=1.9K	QF1 SC magnet and cryostat package	WP-16
		T=4.5 K => 1.9 K	Service cryostat,a and He transfer to FD package	WP-16
		T=4.5K	He transfer line (from cryogenics to service cryostat)	
			Power supplies, and cabling	
	BDS cryogenics	for crab cavities and FD package	Cryogenics	

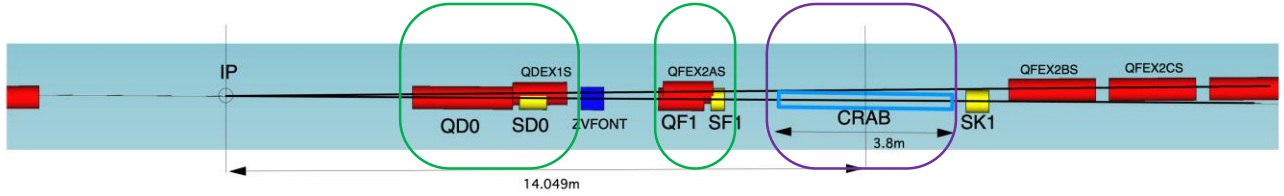
SC devices in BDS

SC magnet

QD0 package QF1 package

SCRF

Crab cavity



Cryogenics and He transfer lines should be common for the SC magnets and SCRF.

It is very important how to coordinate the SC technology. But, I think it is not matter for our group.

Next group meeting

Date and time : **June 9th (WED) 22:00 JST**

➢ Continuous discussion of WBS in Pre-Lab period.
- WBS of the BDS area system from WP-16 (Brett)
- WBS of the DR area system.

✓ Are there any other items that should be included in the to-do-list?
✓ What items in the list would be more efficient to handle in the same group as WP?

➢ HR in the Pre-Lab period.