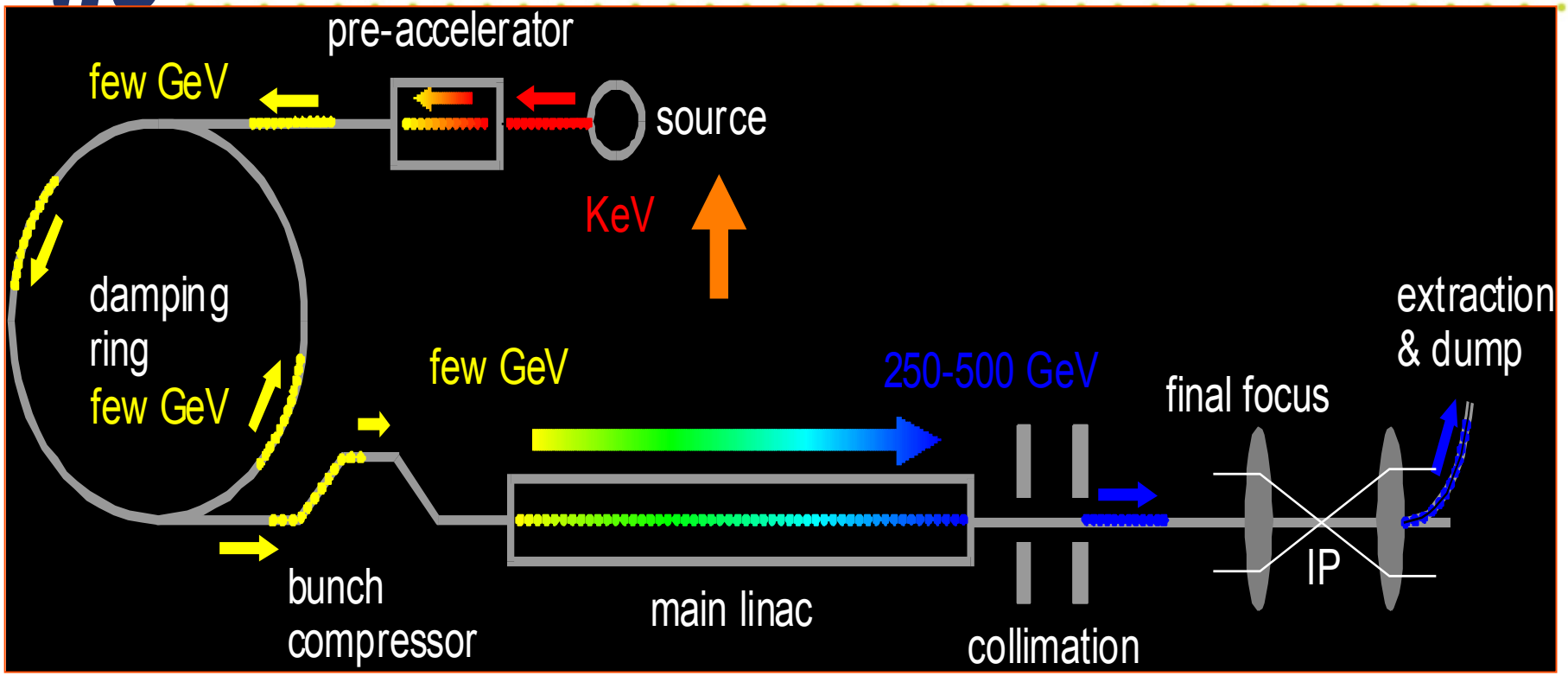
→ To be reported by K. Yokoya

ILC Accelerator: Sub-Systems

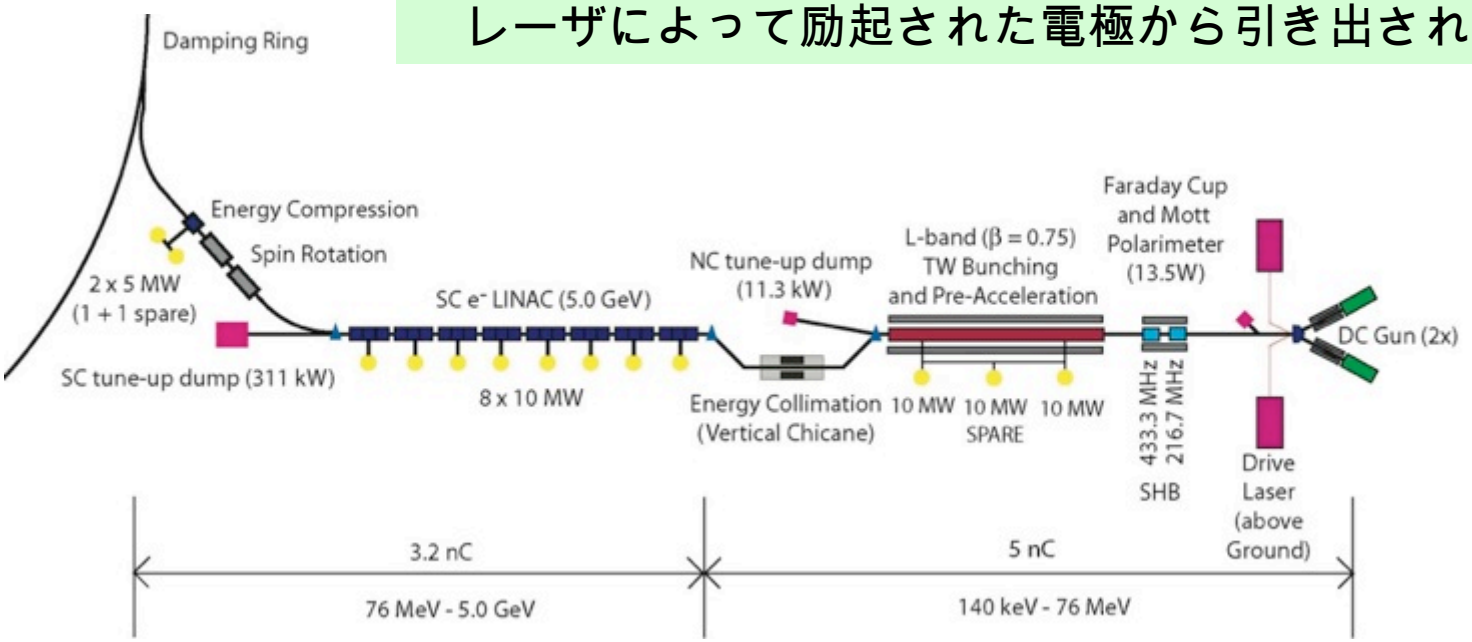


- Electron and Positron Sources (e-, e+) : 電子・陽電子源
- Damping Ring (DR): 減衰リング
- Ring to ML beam transport (RTML) : ビームトランスポート
- Main Linac (ML) : 主線形加速器
- Beam Delivery System (BDS) : ビーム伝達・最終収束システム)

Polarised e- Source
偏極電子源

- Laser-driven photo cathode (GaAs)
- DC gun
- Integrated into common tunnel with positron BDS

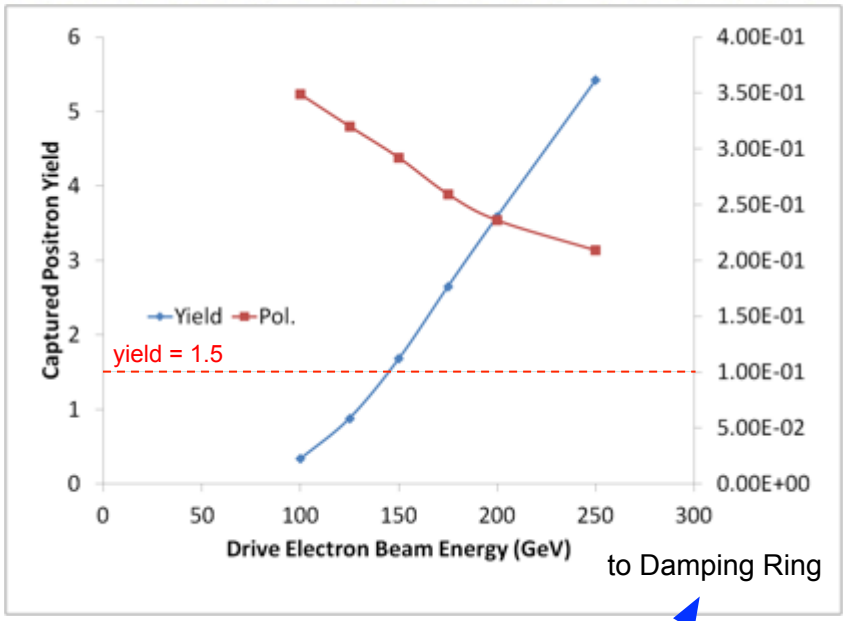
レーザによって励起された電極から引き出される電子

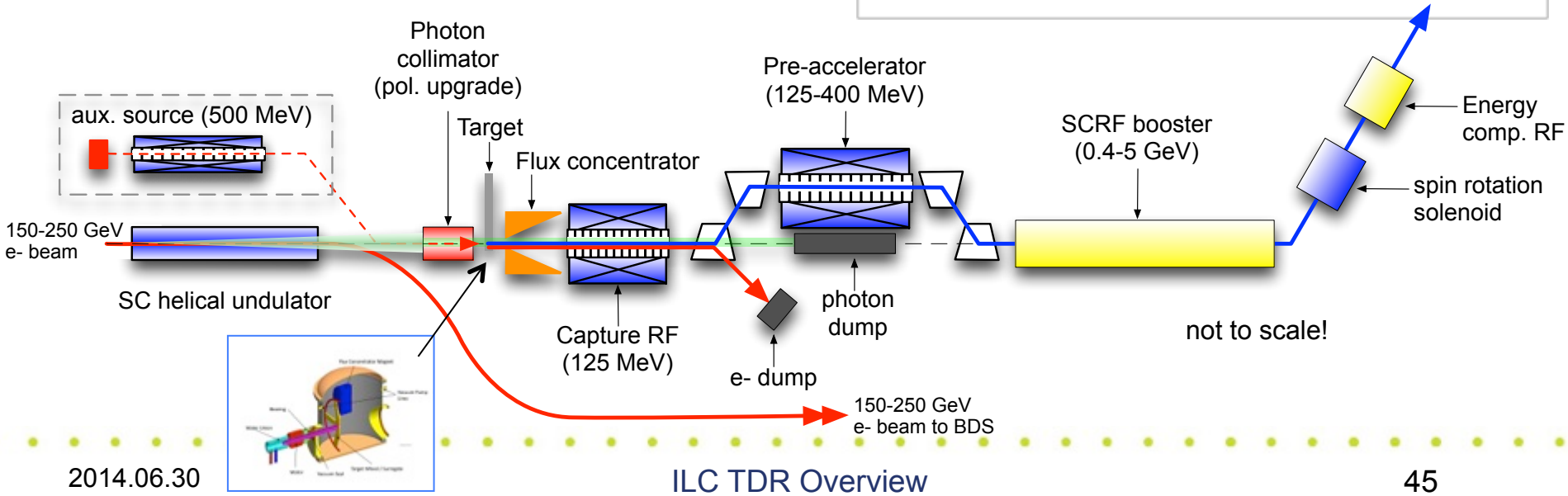


→ To be reported by K. Yokoya

Positron Source
陽電子源

- located at exit of electron Main Linac
- 147m (~230m) SC helical undulator
  - ヘリカルアンジュレーターによる円偏向ガンマ線
- driven by primary e- beam (150-250 GeV)
- produces ~30 MeV photons
- converted in thin target into e+e- pairs
  - → 偏極陽電子の発生





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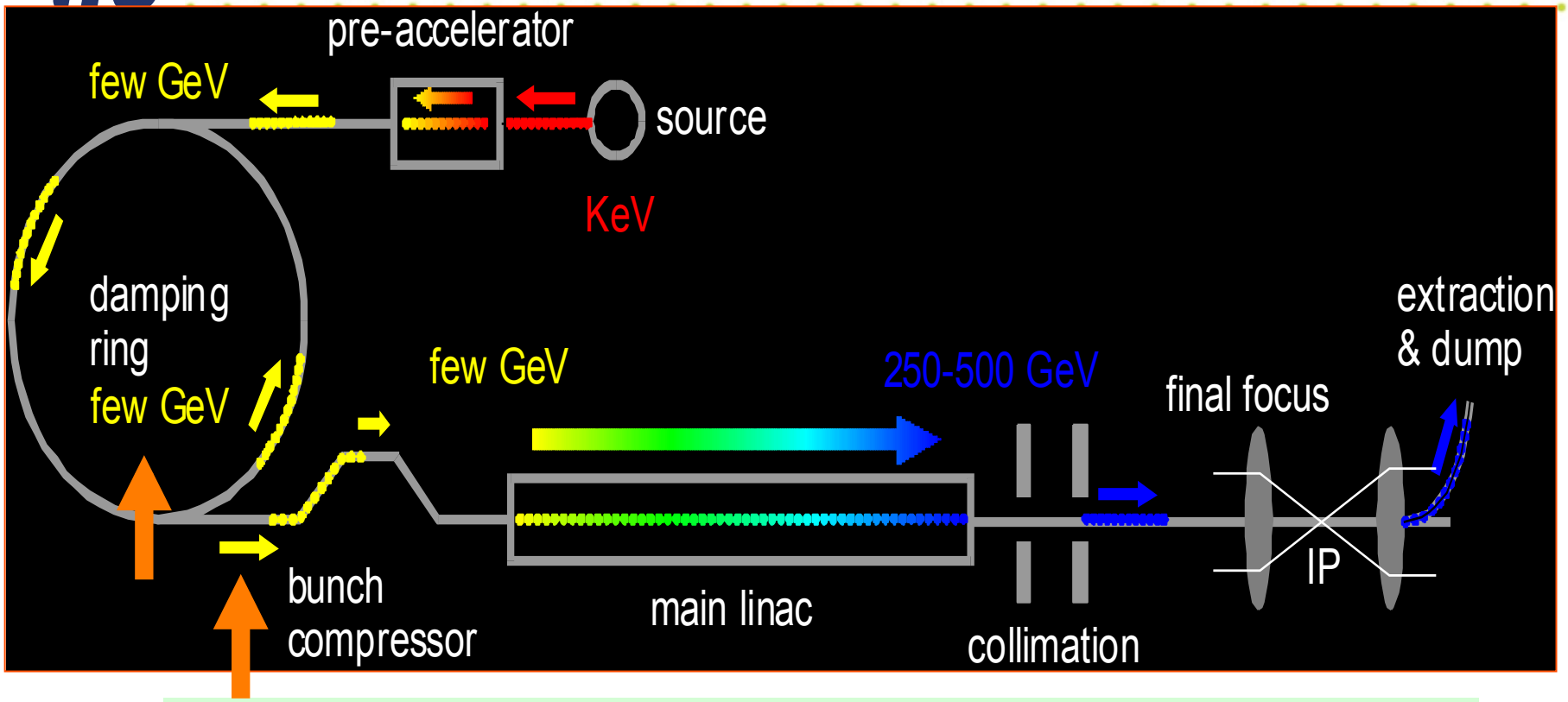

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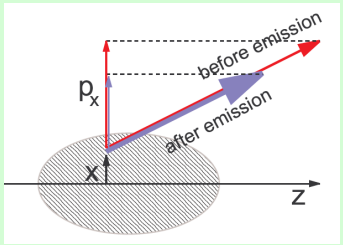
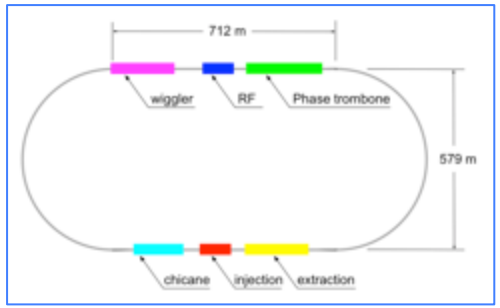
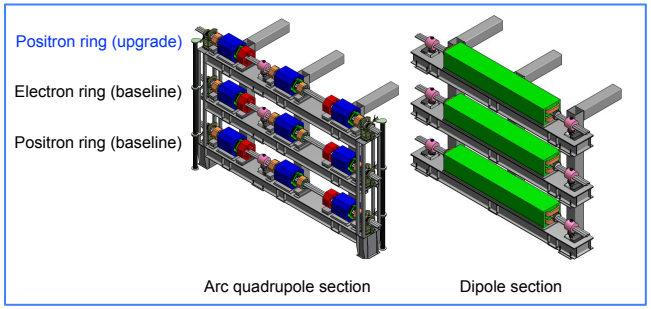
Damping Rings
減衰リング

- Concept
  - **Reduce eimittance with SR**（輻射によりエミッタンスを減少）
  - **Further reduction in short time, by using Wiggler**　（Wiggler 磁石を用いることで、さらに短時間で減少）
  - **All bunch in the DR, same time,**（一旦全てのバンチを収納）

- Requirements
  - $\gamma\varepsilon_x$ = 5.5 μm, $\gamma\varepsilon_y$ = 20nm
  - **Time for damping 200 (100) ms**
  - **1st step 1312 bunches, (2625) bunches**
  - **bunch-by-bunch injection/extraction**







Circumference		3.2	km
Energy		5	GeV
RF frequency		650	MHz
Beam current		390	mA
Store time		200 (100)	ms
Trans. damping time		24 (13)	ms
Extracted emittance	x	5.5	μm
(normalized)	y	20	nm
No. cavities		10 (12)	
Total voltage		14 (22)	MV
RF power / coupler		176 (272)	kW
No.wiggler magnets		54	
Total length wiggler		113	m
Wiggler field		1.5 (2.2)	T
Beam power		1.76 (2.38)	MW

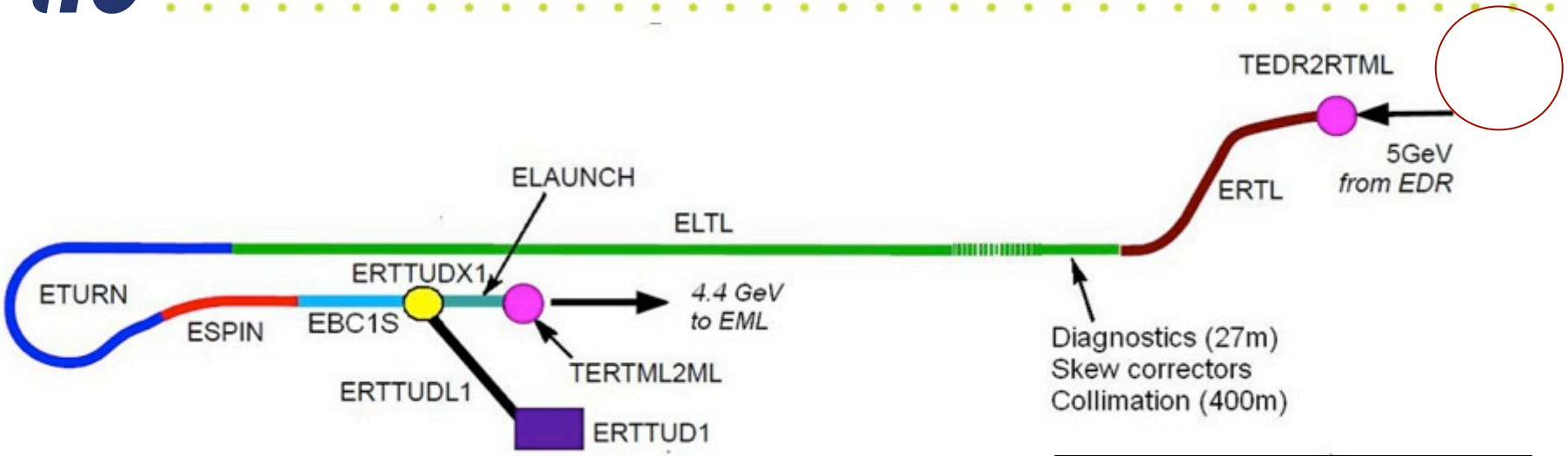
Values in () are for 10-Hz mode

Many similarities to modern 3rd-generation light sources

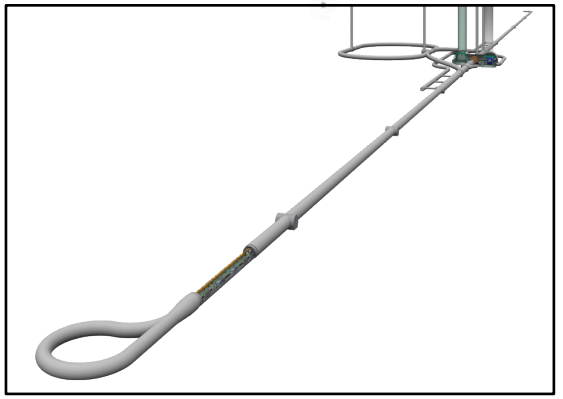
→ To be presented by K. Yokoya

RTML (Ring To Main Linac)

DR からML へのビーム輸送



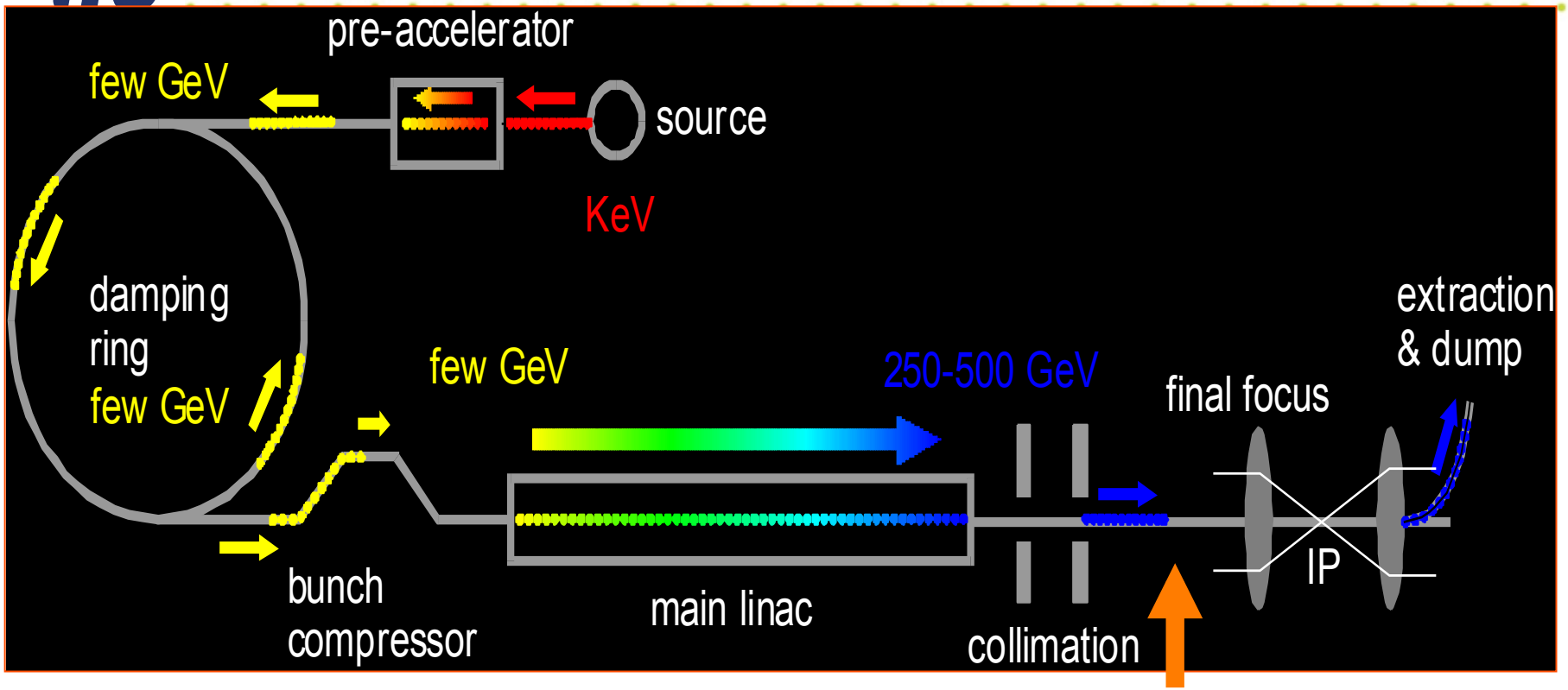
- **RTML:** DRからMLへのビームの輸送
- **Spin Rotation:** スピンの回転
- **Bunch compression:** バンチ長の圧縮
- **Interim Beam Dump :** ビームの中途ダンプ



10 km を越えるとても長いビームライン。地磁気の影響も考える必要がある。

→ To be reported by K. Yokoya

ILC Accelerator: Sub-Systems



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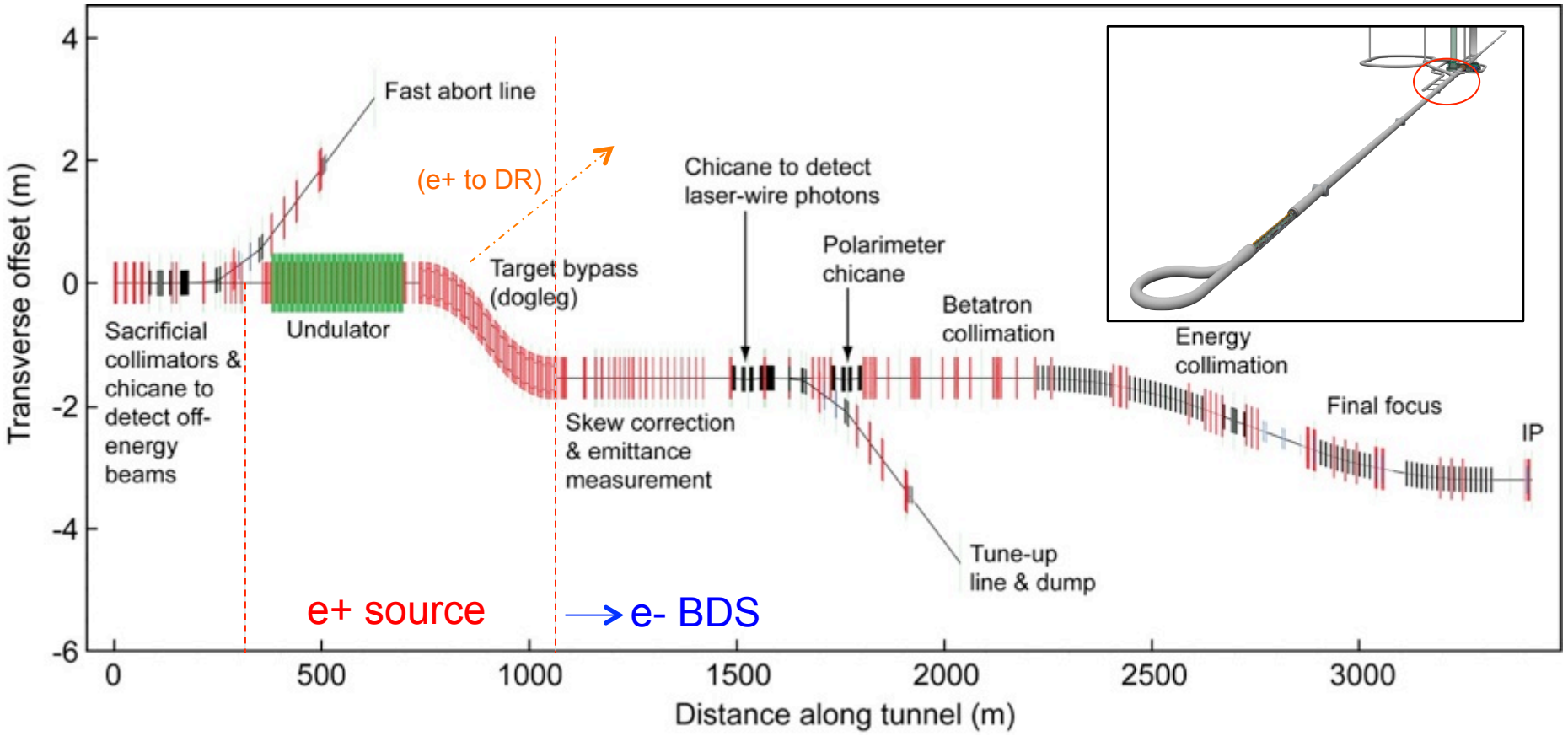
BDS and MDI

(Beam Delivery System and Machine-Detector Interface)

ビーム伝達システム、加速器・測定器・接続



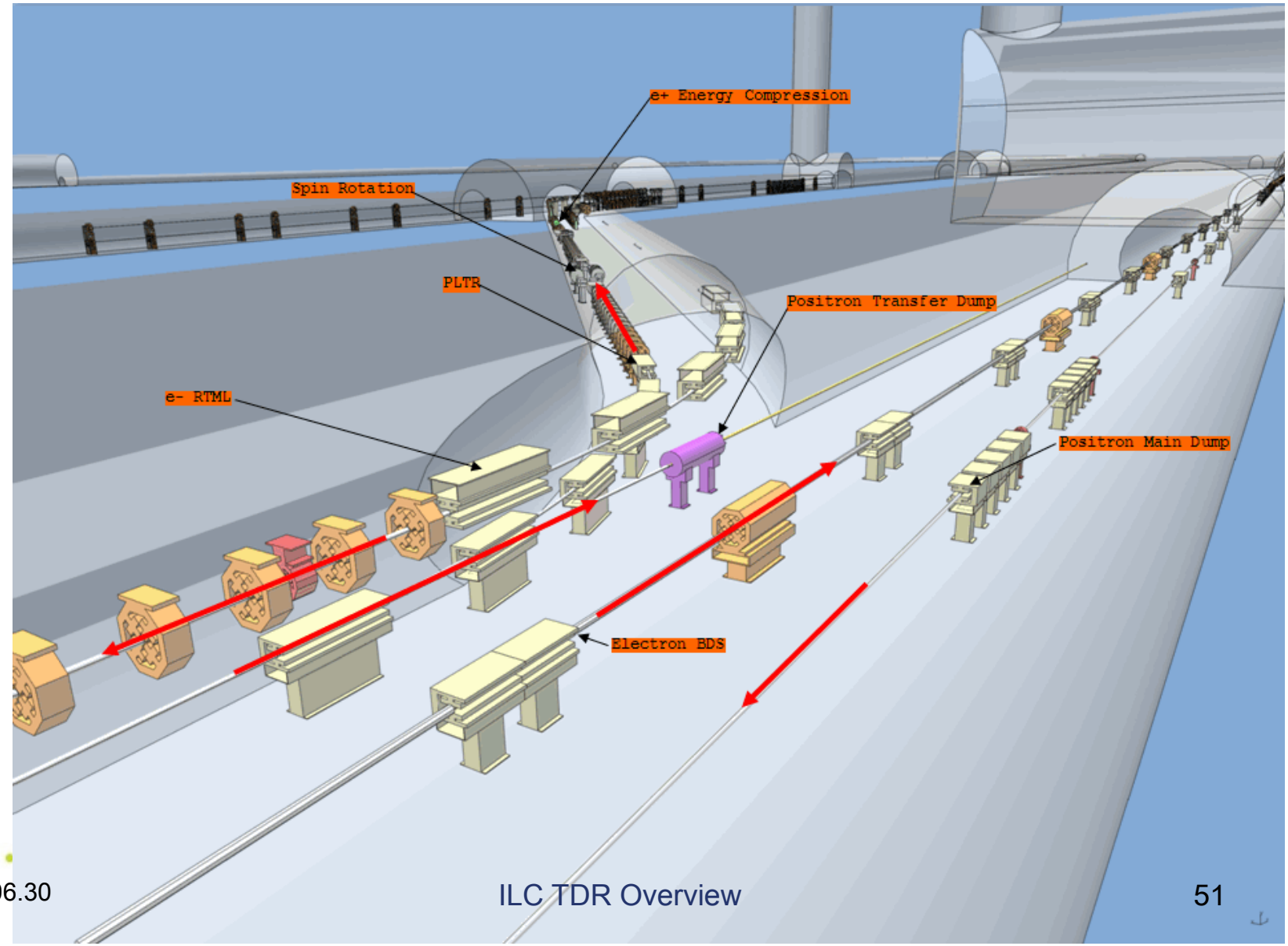
e- Beam Delivery System

→ To be reported by K. Yokoya

→ To be reported by A. Emonoto, M. Miyahara

3D View of Target Region

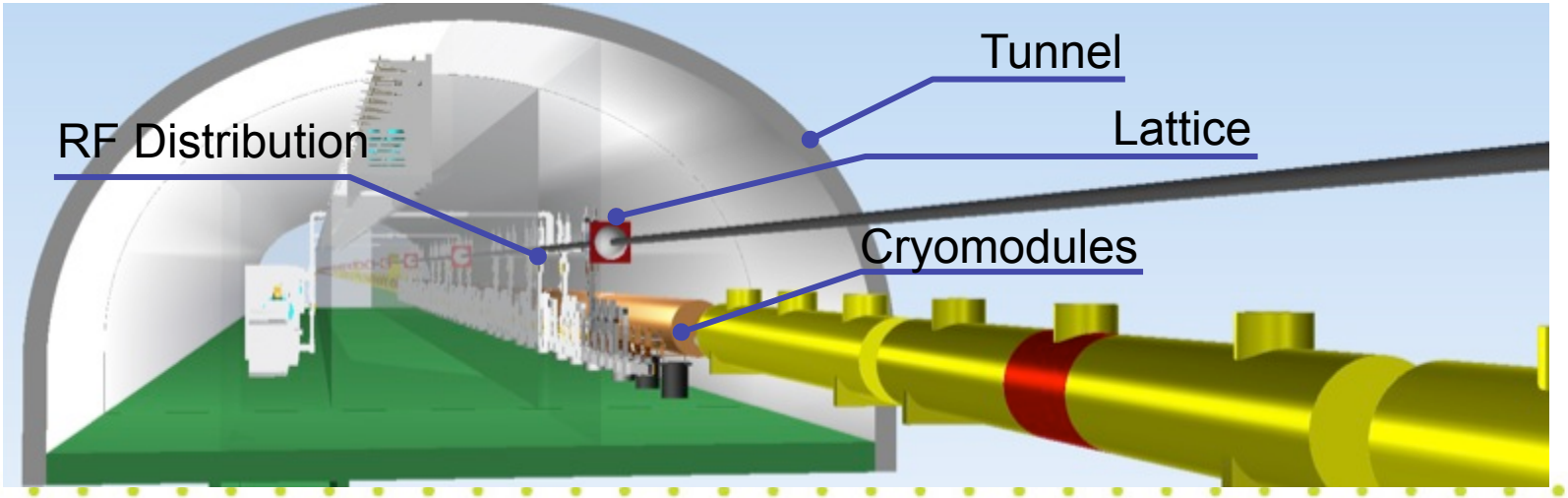
陽電子源・BDS、中央領域



→ To be reported by A. Emonoto, M. Miyahara

Engineering Data Management (EDMS)

- Collaborative engineering:
  - Design integration, visualisation, traceability, configuration management
- Design integration:
  - Geology, Civil engineering, accelerator design, experimental groups
- Different user groups in remote:
  - ILC Community, Planning team, local team, sub-contractors
- Standardization:
  - Names, procedures, formats, conventions, design rules

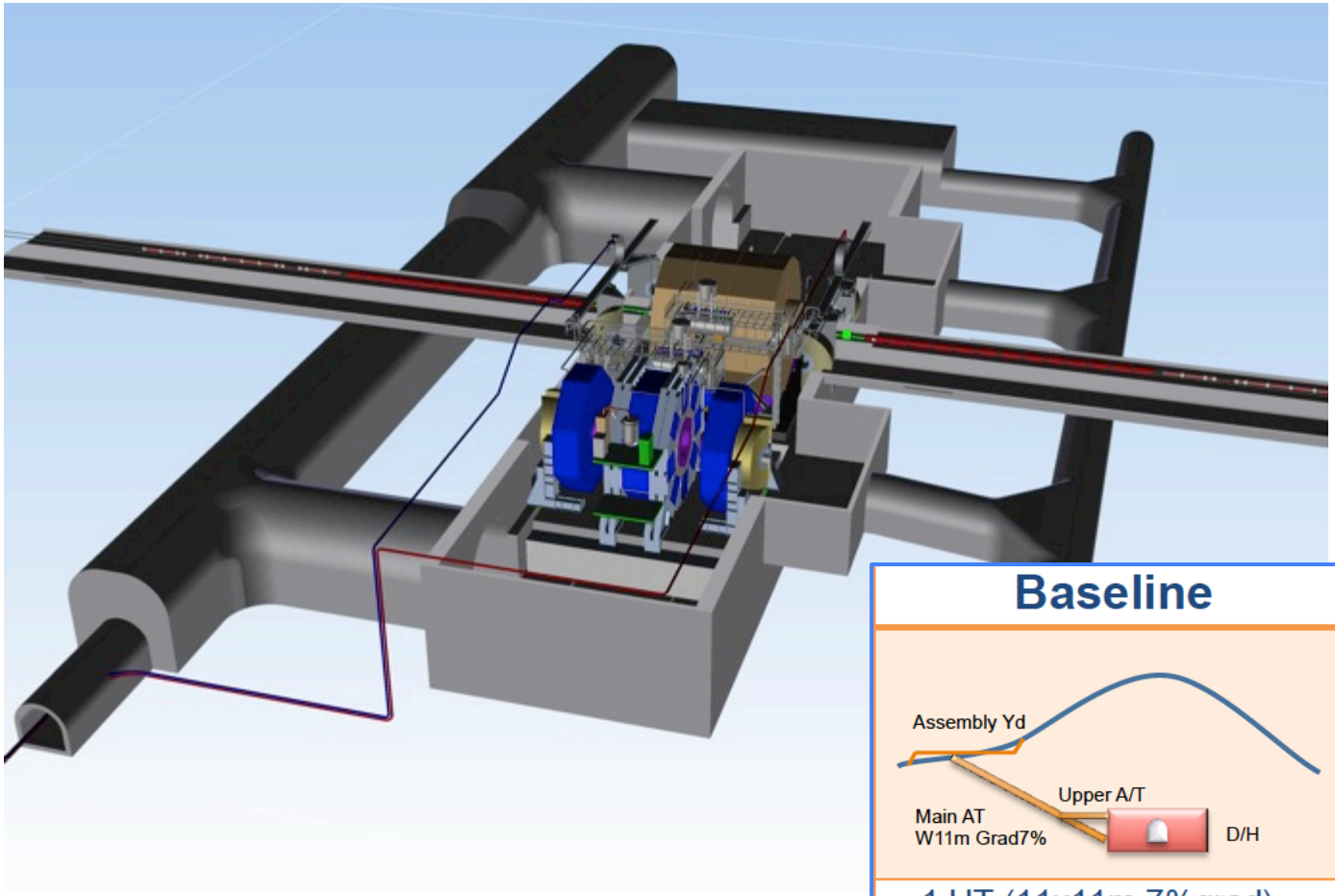


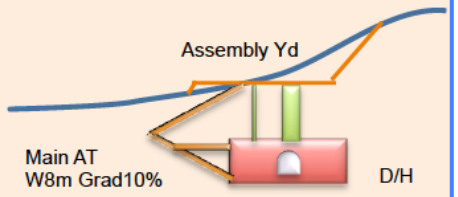
Outline

- Introduction
- Accelerator R&D
- Accelerator Baseline Design,
- Detectors
- Energy Staging
- Schedule
- Summary

→ To be reported by A. Enomoto and M. Miyahara

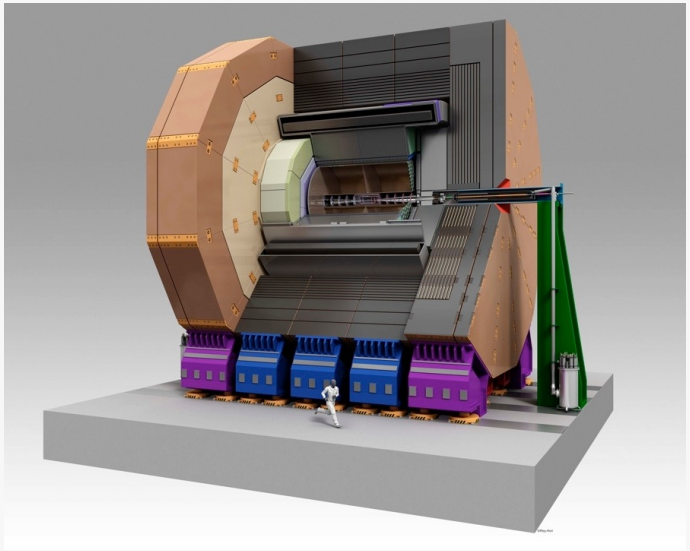
MDI (Detector Hall)
検出器ホール



Baseline	Hybrid-A
	
• 1 HT (11x11m 7%grad) • Detector assembling is inside of DH	• 1 HT (8.0x7.5m 10%gradl) • 2 VS (D18m, D10m) • Detectors assembling is on-ground.

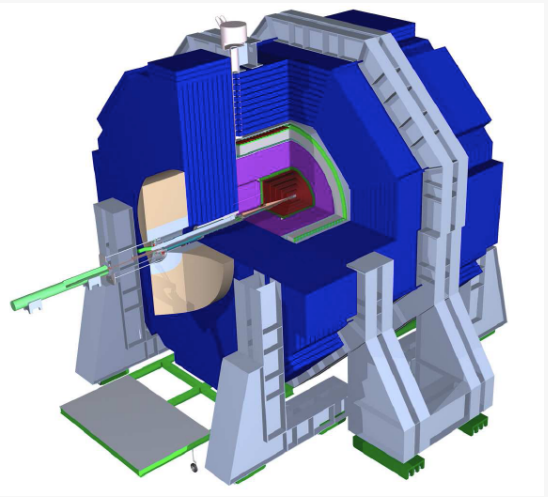
2 Detector Concepts: Detailed Baseline Design

ILD



- Large R with TPC tracker
  - 32 countries, 151 institutions, ~700 members
  - Most members from Asia and Europe
  - B=3.5T, TPC + Si trackers
  - ECal: R=1.8m

SiD

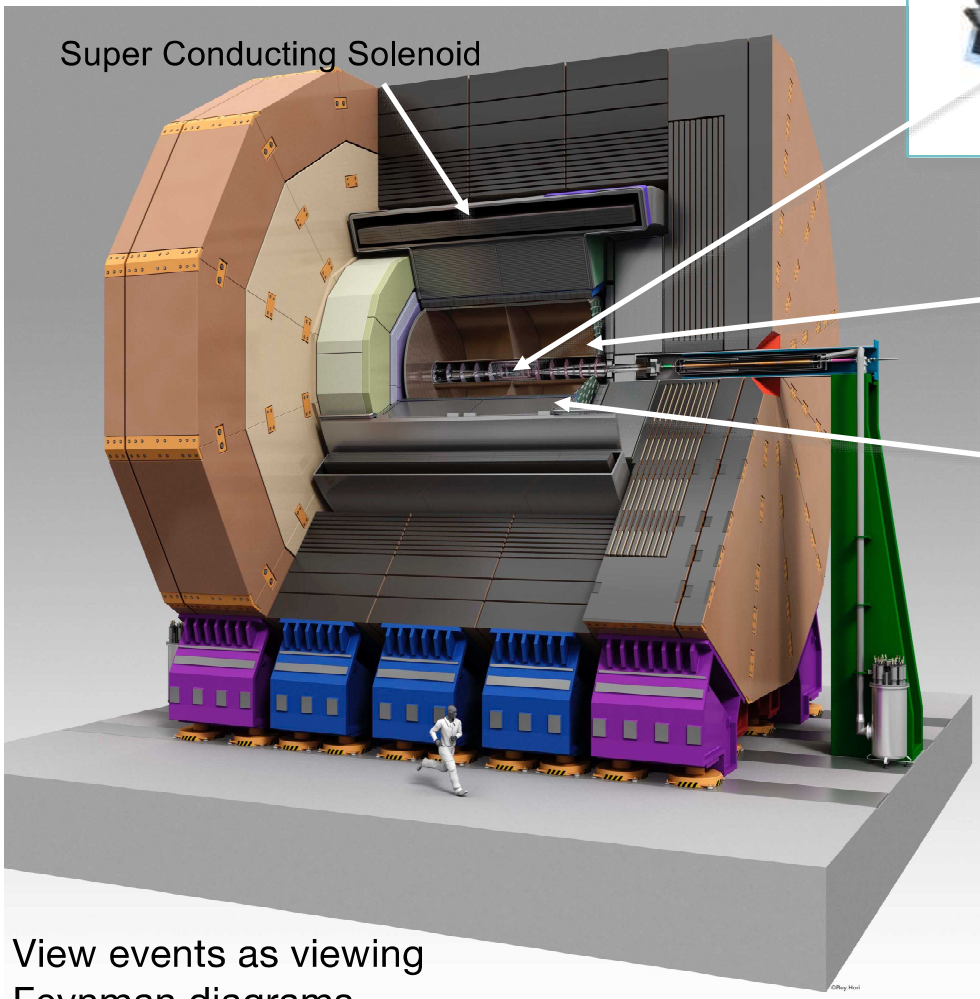


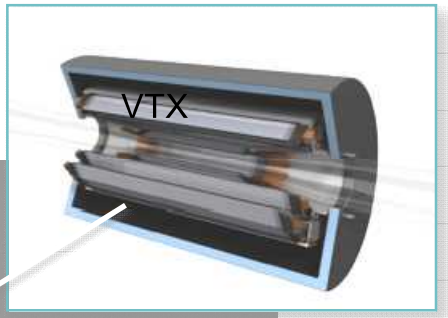
- High B with Si strip tracker
  - 18 countries, 77 institutions, ~240 members
  - Mostly American
  - B=5T, Si only tracker
  - ECal : R=1.27m

Both detector concepts are optimized for

Particle Flow Analysis

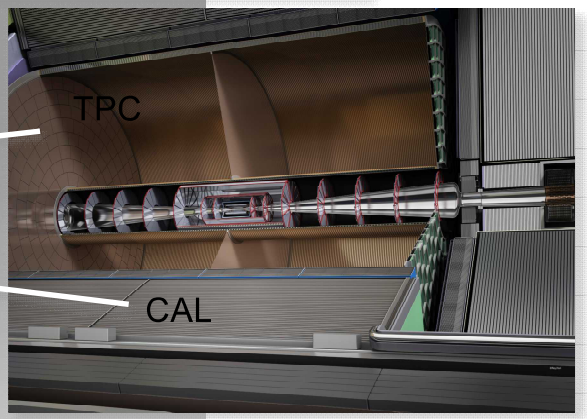
International Large Detector





Vertex Detector

detects production and decay points of unstable particles and identifies b- and c-quarks.



Time Projection Chamber

measures momenta of charged particles

Calorimeter

measures energies of neutral particles

Performance Goal as compared to LHC detectors

Vertex resolution	2-7 times better
Momentum resolution	10 times better
Jet energy resolution	2 times better

The key is ultra high granularity!

Detector	ILD	ATLAS	Granularity
Vertex Det.	5×5μm²	400×50μm²	x 800
Tracker	1×6mm²	13mm²	x 2.2
EM Calorimeter	Silicon: 5×5mm² Scintillator: 5×45mm²	39×39mm²	x 61 x 7

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View events as viewing Feynman diagrams