



## *ILC Accelerator Design & Integration Meeting*

# 出張報告

榎本收志

2009.6.1



## 報告内容

- 5月27日(水)
  - ILC/XFEL 3-D Design Collaboration Meeting
  - European XFEL建設状況の見学
  - European XFEL建設マネージメントについてのインタビュー
- 5月28日(木)
  - CFS Session
- AD&I会議全般



## ILC/XFEL 3-D Design Collaboration Meeting

- 5月27日(水) 9:00-13:00
- 出席者
  - ILC側: N.Walker, E.Paterson, V.Kuchler, J.Osborne, A.Enomoto, T.Shidara
  - XFEL側: L.Hagge 他2名
- 議論内容
  - 座標の取り方
    - 原点、座標の向き、エリアの分割をどうするか、電子エリアと陽電子エリアの混在する部分の扱い
    - →AD&Iの議論を待ってN.Walkerがまとめる
  - PBS(Part Breakdown Structure)
    - Lattice→Civil Engineering Structure →Technical Area Group

## European XFEL建設状況の見学

- 5月27日(水) 14:00-15:30
- 出席者
  - ILC側: E.Paterson, V.Kuchler, J.Osborne, A.Enomoto, T.Shidara
  - XFEL側: L.Hagge 他2名
- 見学内容
  - DESY, Osdorf, Schenefeld 3サイトでの建設の進捗状況説明
  - DESYサイト(Injector) 建設現場の見学→開削工事中





European XFEL建設マネジメントについて

- 5月27日(水) 16:00-17:15
  - 口頭報告



## CFS Session

- 5月28日(木) 14:00-15:30
  - V.Kuchler (FNAL)
  - T.Lacowski (FNAL)
- 5月28日(木) 16:00-17:00
  - A.Enomoto(KEK)



## V. Kuchler

### CFS Proposed Points-of-Contact

#### Electron Source

Axel Brachman & John Sheppard - Tom Lackowski  
(supported by M+W Zander)

#### Positron Source

Jim Clarke - John Osborne

#### Damping Ring

Susanna Guiducci - Tom Lackowski

#### Ring to Main Linac

Nikolay Solyak - Vic Kuchler (supported by M+W Zander)

#### Main Linac

Chris Adolphsen (Klystron Cluster) - Tom Lackowski  
Shigeki Fukuda (DRFS) - Atsushi Enomoto








#### Beam Delivery System

Andrei Seryi - John Osborne



T. Lacowski

Configuration Matrix

							
	DEEP		NEAR SURFACE				
	Twin Deep Tunnels	Single Deep Tunnel	Twin Near Surface Tunnels	Near Surface Tunnel, at Surface Gallery	Single near Surface Tunnel	Enclosure in Open Cut, Cont. Gallery	Enclosure & Cont. Gallery in Open Cut
EXCAVATION	TBM	TBM	TBM	TBM & OPEN CUT	TBM	OPEN CUT	OPEN CUT
No of TUNNELS	TWO-TUNNEL	ONE-TUNNEL	TWO-TUNNEL	TWO-TUNNELS	ONE-TUNNEL	ONE-TUNNEL	TWO-TUNNELS
SHAFT SOIL	VARIES	VARIES	VARIES	VARIES	SOFT / SLURRY	NA	NA
TUNNEL SOIL	ROCK	ROCK	COHESIVE SOIL or ROCK	COHESIVE SOIL -Low permeability	Saturated Sand & Gravel	SOILS VARIES	SOILS VARIES
SERVICE SPACE	SECOND TUNNEL	SURFACE BUILDINGS	SECOND TUNNEL	CONTINUOUS SERVICE GALLERY	AT CAMPUSES	CONTINUOUS SERVICE GALLERY	CONTINUOUS SERVICE GALLERY
ILC Technology	DISTRIBUTED RF	CLUSTERED RF	DISTRIBUTED RF	DISTRIBUTED RF	CLUSTERED RF	DISTRIBUTED RF	DISTRIBUTED RF
SIMILAR TO	RDR Sample Sites	RDR & CLIC	RDR	Dubna ILC	XFEL	Project X	Project X
ACCESS	Vertical shaft	Vertical shaft	Vertical shaft	Vertical shaft	Vertical shaft	Hatch	Hatch

- **Electrical power levels remains constant. Clustered RF reduces electrical distribution.**





# Pros and Cons on CFS compared with RDR

CF Items	RDR	RF Cluster	Distributed RF
Civil	Tunnel: $\phi$ 4.5m, 22.3 km x 2 Penetration: $\phi$ 0.43m x 10 m x 560 $\phi$ 0.3m x 10 m x 2 x 560 Safety path: 1.2m x 2.2m x 20m X48 Sloped tunnel: 7m x 6.5m x ~1,270m x 6 Cavern: 16m X18m X120m x 6 Surface building: 4,300m <sup>2</sup>	<Pros> Half long tunnel Eliminated penetrations Smaller shaft-base caverns <Cons> Four additional shafts / tunnels Larger surface area and buildings Fire compartments / refuge areas	<Pros> Half long tunnel Eliminated penetrations --- <Cons> Fire compartments / refuge areas Larger tunnel diameter ? Fire compartments / refuge areas
Electricity	RF: 76 MW Conventional Power: 58.09 MW Emergency Power: 0.4 MW	<Pros> Reduced tunnel maintenance electricity <Cons> ~10% more electricity for klystron	<Pros> Reduced tunnel maintenance electricity <Cons> ---
Process Cooling Water	LCW: 56 MW Chilled water: 21 MW	<Pros> Eliminated tunnel LCW Skids <Cons> Reduced size but stainless pipe for LCW ~10% more heat loads for klystron	<Pros> --- <Cons> --- ---
HVAC		<Pros> Eliminated tunnel fan coil and chilled water <Cons> HVAC for four additional shafts / tunnels	<Pros> --- <Cons> ---
Other Areas		<Pros> Reduced safety equipment <Cons> Increased piped utilities for fire suppression	<Pros> Reduced safety equipment <Cons> Increased piped utilities for fire suppression



## Pros and Cons compared with RDR

CF Items	RDR	RF Cluster	Distributed RF
Safety	Opposite tunnel is the refuge area when troubles occurred. Escape paths connect two tunnels at every 500 m.	<p>&lt;Pros&gt; High-power equipment moved to surface</p> <p>&lt;Cons&gt; Need smoke exhaust ducts and refuge areas at every 600 m (US regulation) Or Need fire/smoke compartment at a proper distance</p>	<p>&lt;Pros&gt; Lower-voltage equipment</p> <p>&lt;Cons&gt; Need smoke exhaust ducts and refuge areas at every 600 m (US regulation) Or Need fire/smoke compartment at a proper distance</p>
Availability	Service tunnel accessible even during operation.	<p>&lt;Pros&gt; More surface equipment</p> <p>&lt;Cons&gt; Some tunnel equipment not accessible</p>	<p>&lt;Pros&gt; ---</p> <p>&lt;Cons&gt; Some tunnel equipment not accessible</p>
Construction		<p>&lt;Pros&gt;s Less underground Civil E works</p> <p>&lt;Cons&gt; More surface works</p>	<p>&lt;Pros&gt; Less underground Civil E works</p> <p>&lt;Cons&gt; -</p>
Risks		High-power treatment	

## Standards for Safety Equipment of Public Facilities vs. KEK Accelerators

Items		Public Facility		KEK Accelerator		Remarks
		Road tnl.	Infra t	Tunnel	Hall	
Alarm	Emergency Call	■	×	○	●	
	Emergency Button	■	×	○	●	
	Fire Alarm	■	×	○	●	
	Emergency Alarm	■	×	×	●	
Fire Fighting	Fire extinguish eq.	■	▲	▲	●	▲ Fire Fighting Regulation
	Hydrant	■	×	×	●	
Escape	Smoke exhaust Or Escape way	■	×	×	●	○* Escape-way within 300m without smoke exhaust
	Escape-way Sign	■	×	○	●	
Others	Broadcast	■	×	×	●	
	Sprinkler	■	×	×	●*	●* connectable water pipe
	Surveillance camera	■	×	○	●	
	Fire compartment		▲	▲	●	▲ Fire Fighting Regulation

■Regulations for Road Tunnel ●Japanese Construction Standard ○Spontaneous by KEK



## AD&I会議全般

- Re-baselineによるRDRの扱い
  - Two baselines with two difference costs
  - Two configurations with two ...  
(N. Walker)
  - 私はこの考え方でよいのではないかと思う