



GDE Meeting ILC Conventional Facilities and Siting Workshop

June 3-7, 2008
JINR, Dubna, RUSSIA

Program Committee

Barry Barish
Mike Harrison
Brian Foster
Mitsuki Nozaki
Ewan Paterson
Marc Ross
Grigory Shirkov
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Shirkov G. - co-chairman
Trubnikov G. - scientific secretary
Kakurin S. - coordinator
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Meshkov I.
Tokareva N.
Shirkova E.
Polyakova Yu.
Hronek M.



Report from Dubna GDE Workshop

ILC Conventional Facilities & Siting

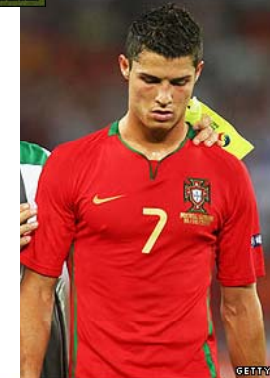
Nick Walker

ILC@DESY Project Meeting
20.06.08



Portugal 2 – Germany 3

EAT THAT
RONALDO!





Statistics

- 73 registered participants
 - **More than expected for this ‘thematic’ meeting**
 - **About nominal for GDE meeting**
 - **Good regional balance**
 - Noted attendance from UK and US 😊
- All presentations available here:
 - <http://ilcagenda.linearcollider.org/conferenceOtherviews.py?view=standard&confId=2321>



Programme

GDE Meeting - ILC Conventional Facilities and Siting Workshop from **Wednesday 04 June 2008 (08:00)** to **Saturday 07 June 2008 (13:00)** (Europe/Moscow) at **JINR, Dubna**

Description:

Material: [Bulletin](#) [Focus Group Information](#)

[Wednesday 04 June 2008](#) | [Thursday 05 June 2008](#) | [Friday 06 June 2008](#)

Wednesday 04 June 2008 [top](#)

09:00->12:30 Plenary Session (Convener: G. Shirkov (JINR)) (Location: Main Auditorium)

09:00	GDE Status/Update (30)	Slides	Barry Barish (Caltech)
09:30	Detector News/Update (30)	Slides	Sakue Yamada (KEK)
10:00	The Dubna shallow site (30)	Slides	Grigori Shirkov (Joint Institute for Nuclear Research)
10:30	break		
11:00	News from SCRF technology (30)	Slides	Akira Yamamoto (KEK)
11:30	CFS challenges for a linear collider (30)	Slides	John Andrew Osborne (CERN)
12:00	Scope and goals of the working groups (30)	Slides	Nicholas Walker (DESY)

12:30->16:00 Focus Group D/C (Convener: Ewan Paterson (SLAC)) (Location: Main Auditorium)

Description:
Joint meeting led by Focus Group D (Accelerator System Designs - Accelerator Systems)

12:30	Japan Sites (30)	Slides	Ryuhei Sugahara (KEK)
13:00	lunch		
14:00	FNAL Sites (30)	Slides	Victor Kuchler (Fermilab)
14:30	ILC v CLIC with possible shallow site (30)	Slides	John Andrew Osborne (CERN)
15:00	DESY Site (30)	Slides	Wilhelm Bialowons (Deutsches Elektronen-Synchrotron DESY)
16:00	break		

16:30->17:30 Focus Group D/C (Convener: Ewan Paterson (SLAC)) (Location: Main Auditorium)

Description:
Joint meeting led by Focus Group D (Accelerator System Designs - Accelerator Systems)

16:30	Dubna Site (30)	Slides	G. Trubnikov
17:00	Discussion (30)		

- 37 presentations
- Focused themes
- Ample time for discussion
 - Smaller groups were a benefit
- First “real” technical workshop of the TD phase
 - Very positive



PM Assumptions:

- There exists a **minimal design** that satisfies all scope requirements and facilitates cost comparisons for 'optional' features
 - **Not a trivial concept due to design optimization and consolidation already in RDR**
- The shallow machine is more cost-effective
 - **Effective reliability strategy for single tunnel layout NOT done for RDR – due to time / resource limitations**
 - **(Main reason for visiting Dubna)**
- The process can be done within the 'consensus – building' context established for RDR
 - **Our community must buy-in and participate**



The Workshop Structure

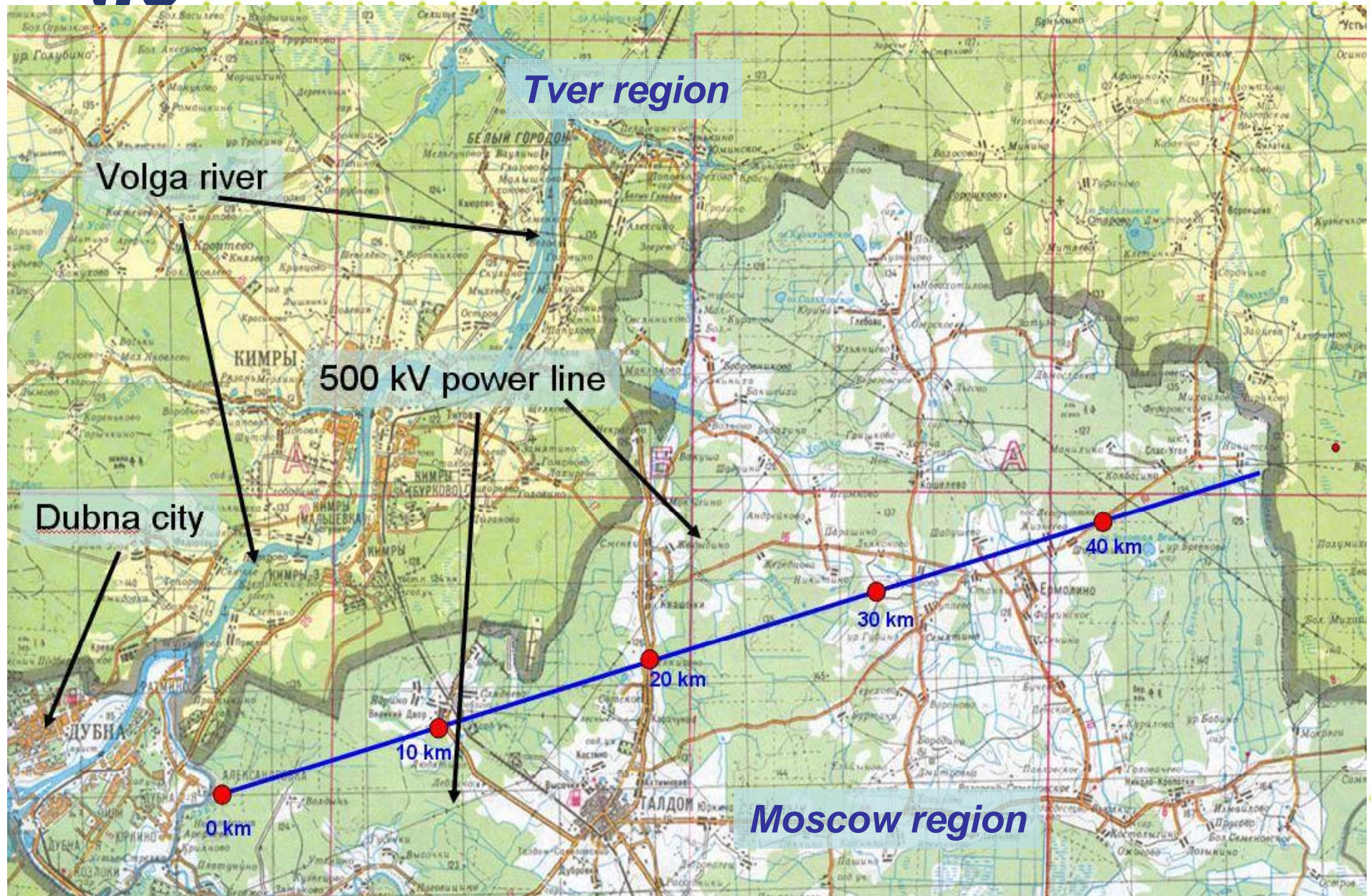
- Working Groups
 - A. **Shallow solutions:** Explore features and develop reduced-cost, shallow tunnel solutions. Both CLIC and ILC. Includes single tunnel.
J. Osborne -CERN, G. Shirkov -JINR
 - B. **Infrastructure:** Review infrastructure requirements and develop cost-effective solutions for accelerator infrastructure – power, water, air etc. Both CLIC and ILC.
A. Enomoto –KEK, G. Trubnikov –JINR
 - C. **Siting:** Examine possible sites and evaluate possible design differences that accommodate features. Includes staging, design modifications and upgrade issues.
E. Paterson –SLAC, N. Solyak –FNAL
 - D. **Accelerator Systems:** particular focus on the central injection complex, BDS and RTML.
A. Seryi –SLAC, M. Kuriki –KEK

Global Design Effort

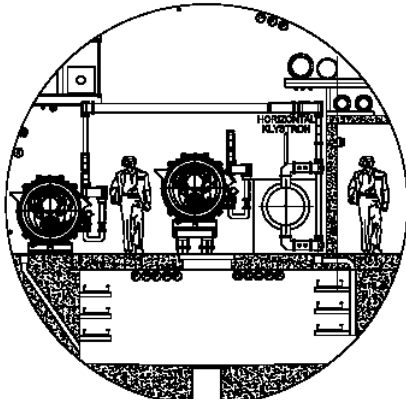
Strong focus on cost reduction by design modification



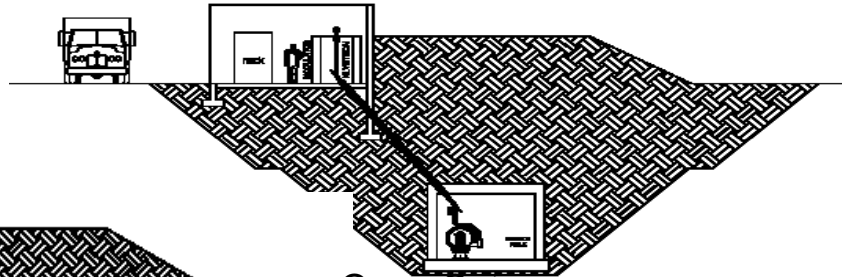
Layout of ILC in the Moscow Region



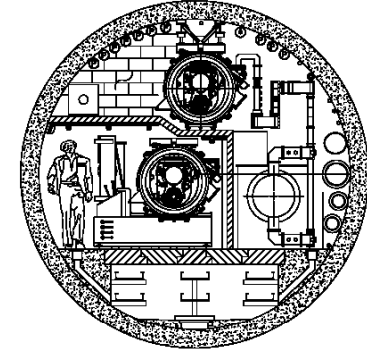
Some Potential Cross-Sections



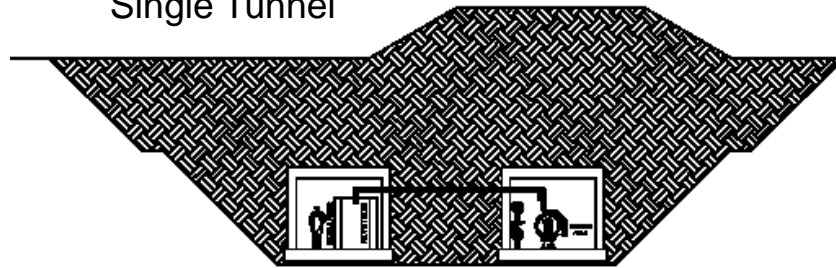
Single Tunnel



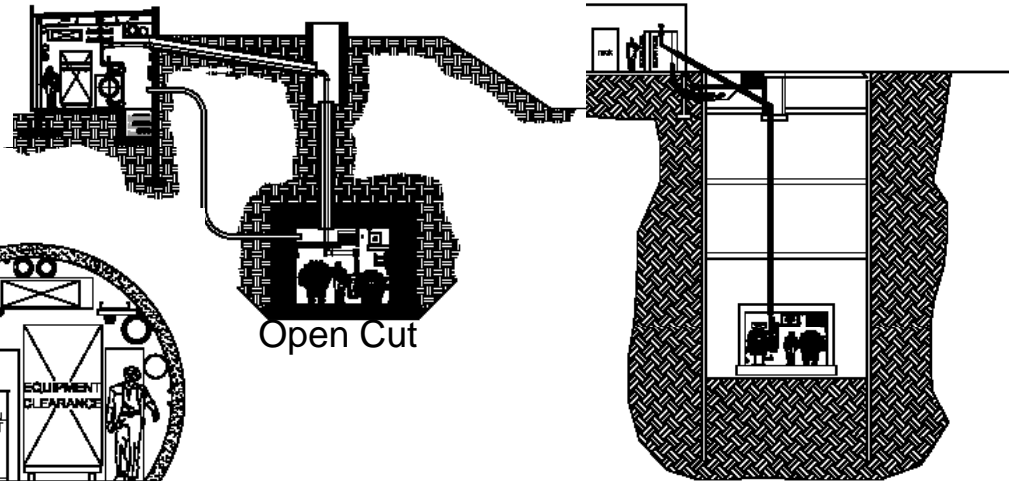
Open Cut



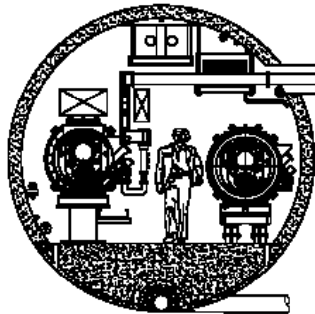
Single Tunnel



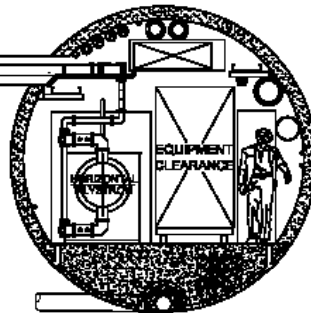
Open Cut Twin Enclosures



Open Cut



Twin
Tunnels



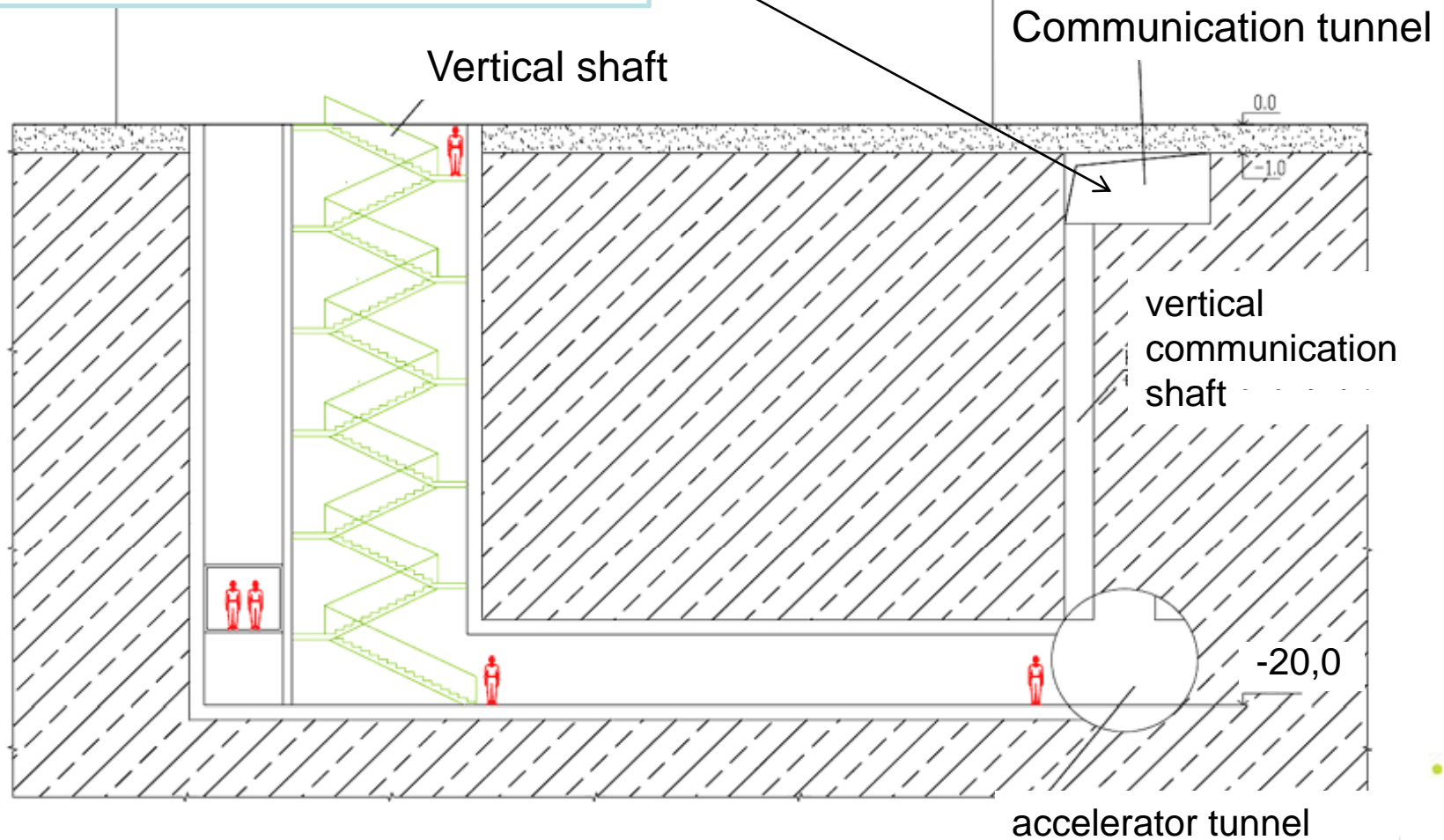
Braced Excavation



DUBNA

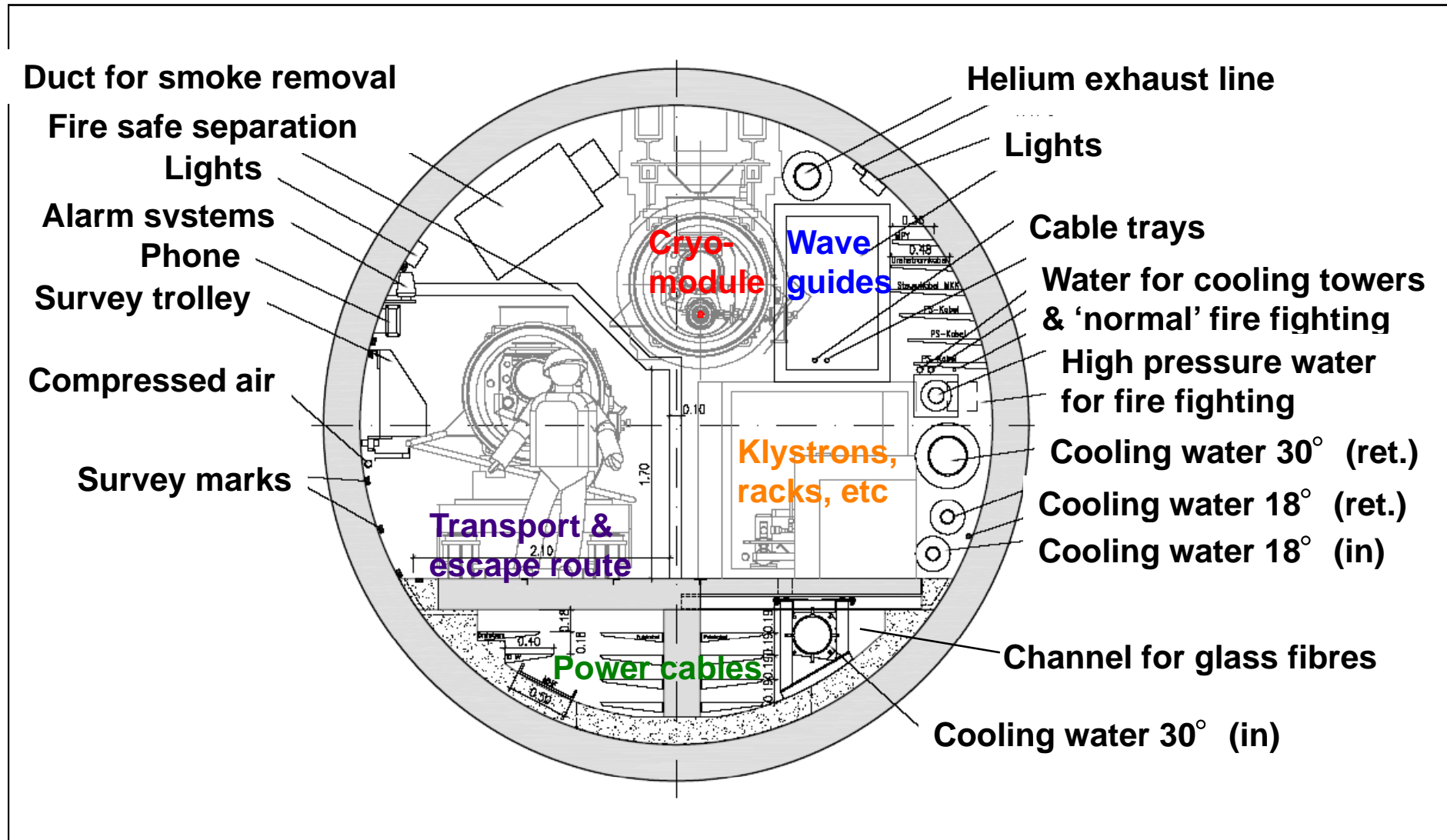
Proposed typical cross section Beam tunnel 20m below surface

GSPI (Moscow) estimates cost of surface "communication" tunnel 10% of cost of underground (TBM) tunnel

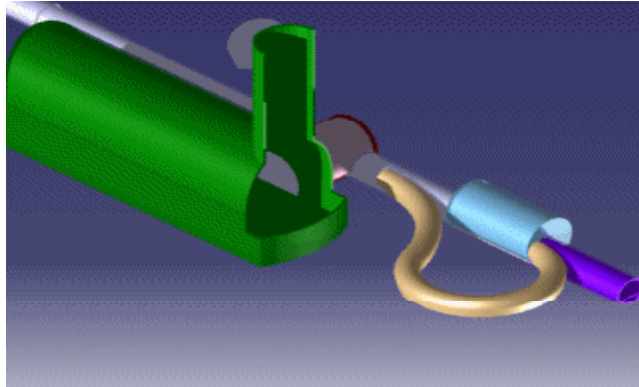




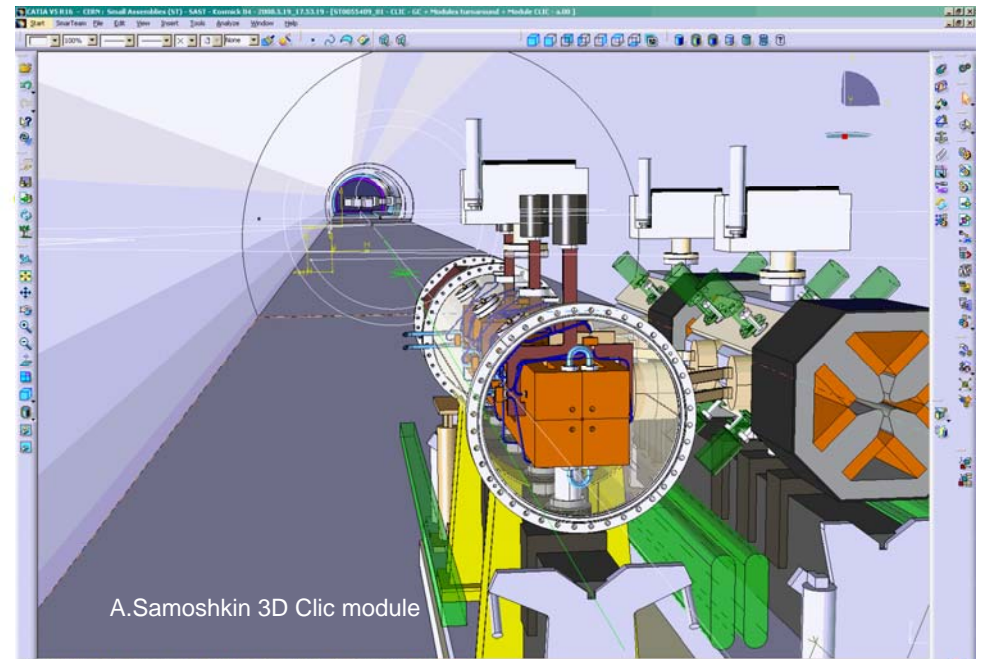
XFEL Tunnel cross-section



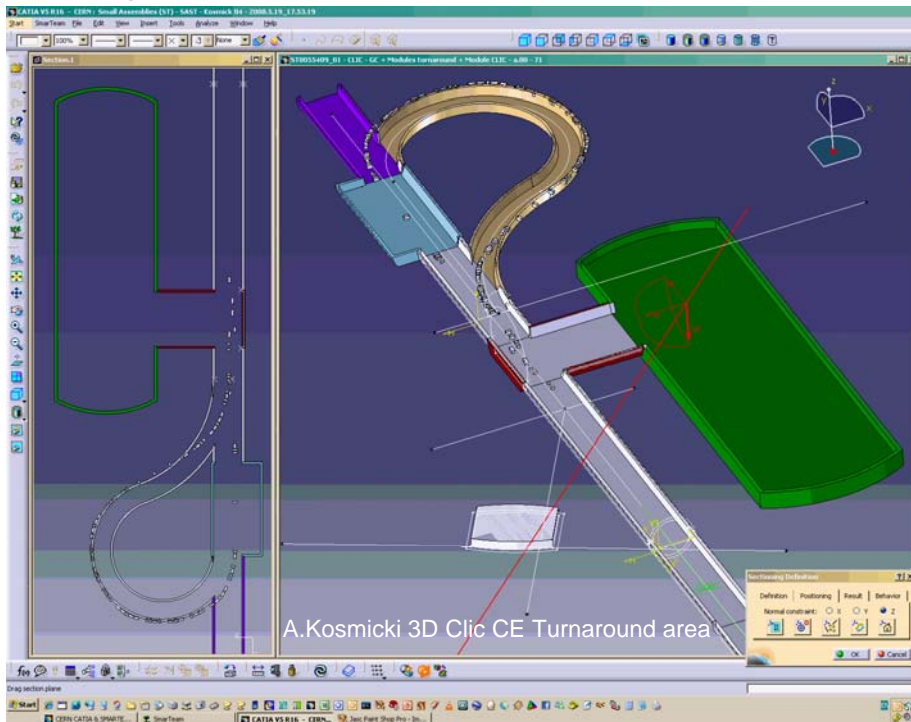
ilc CLIC Tunnel



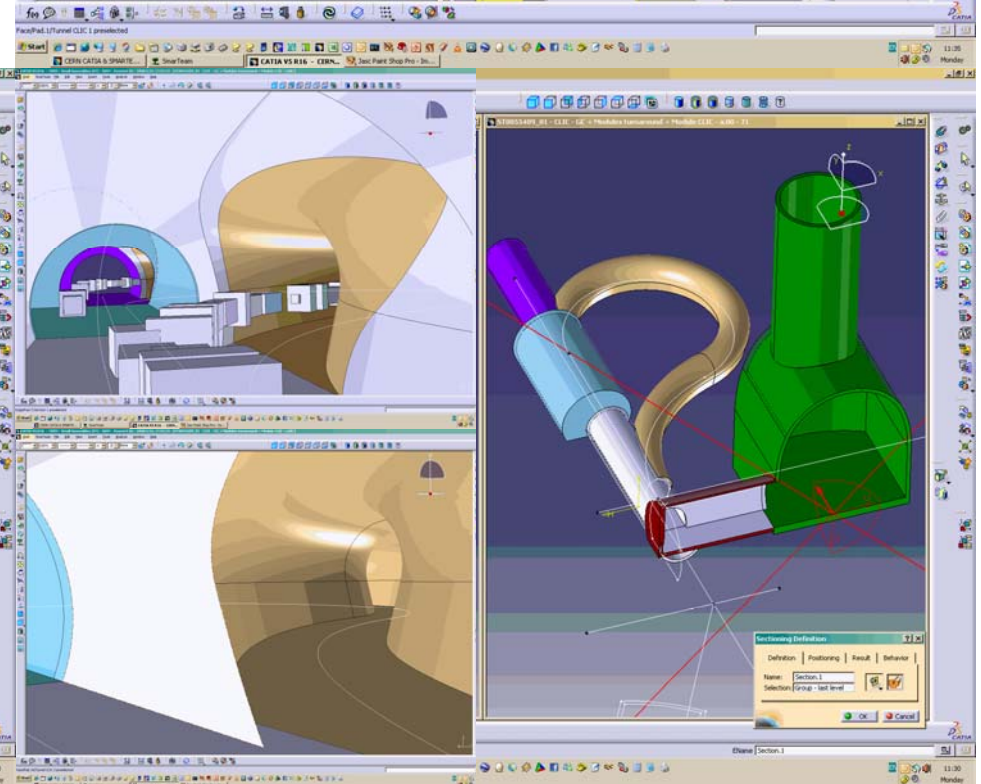
Integration of machine & services needed to define underground volumes



A.Samoshkin 3D Clic module

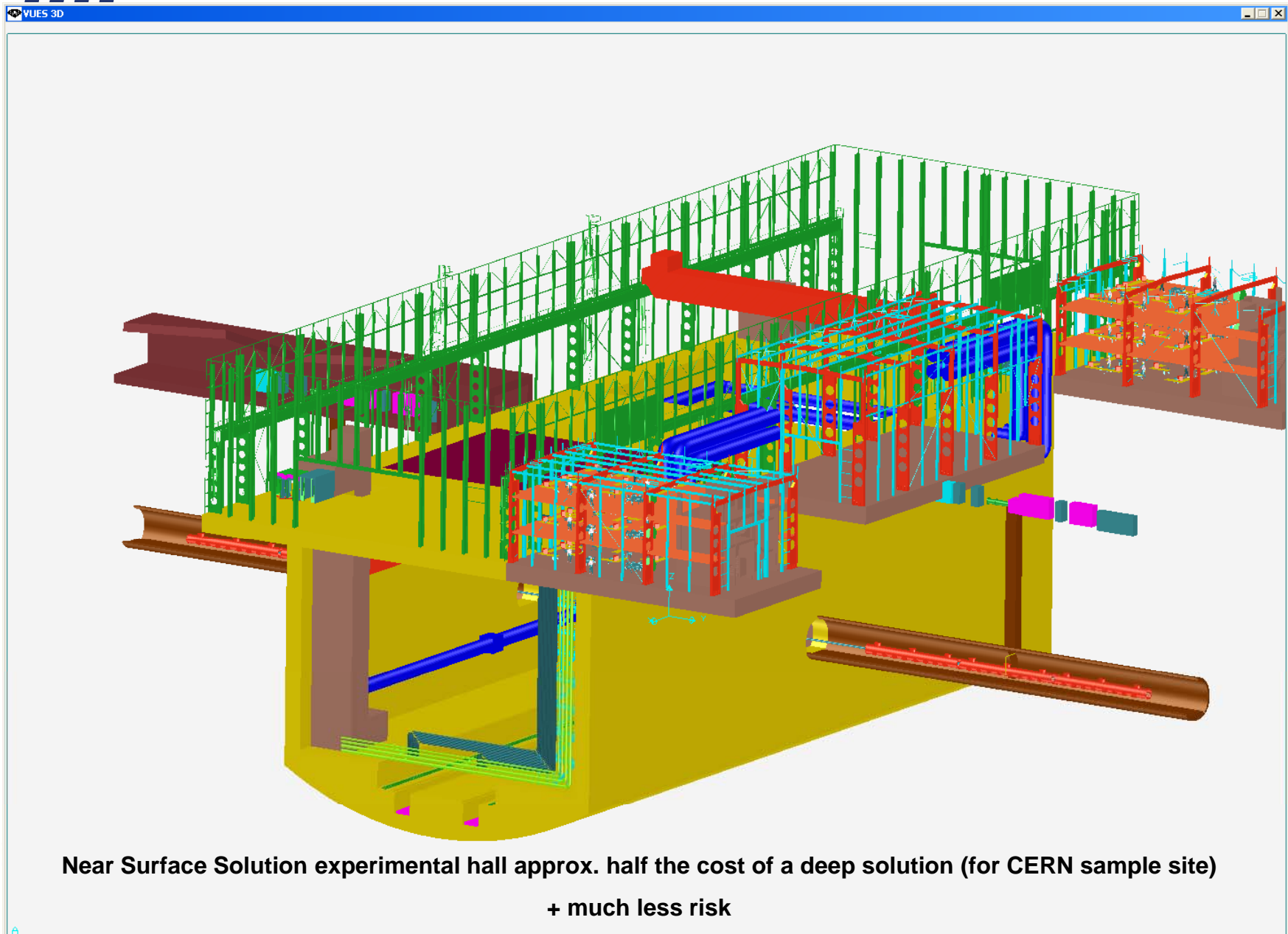


A.Kosmicki 3D Clic CE Turnaround area





Possible layout for interaction region for a Shallow Site





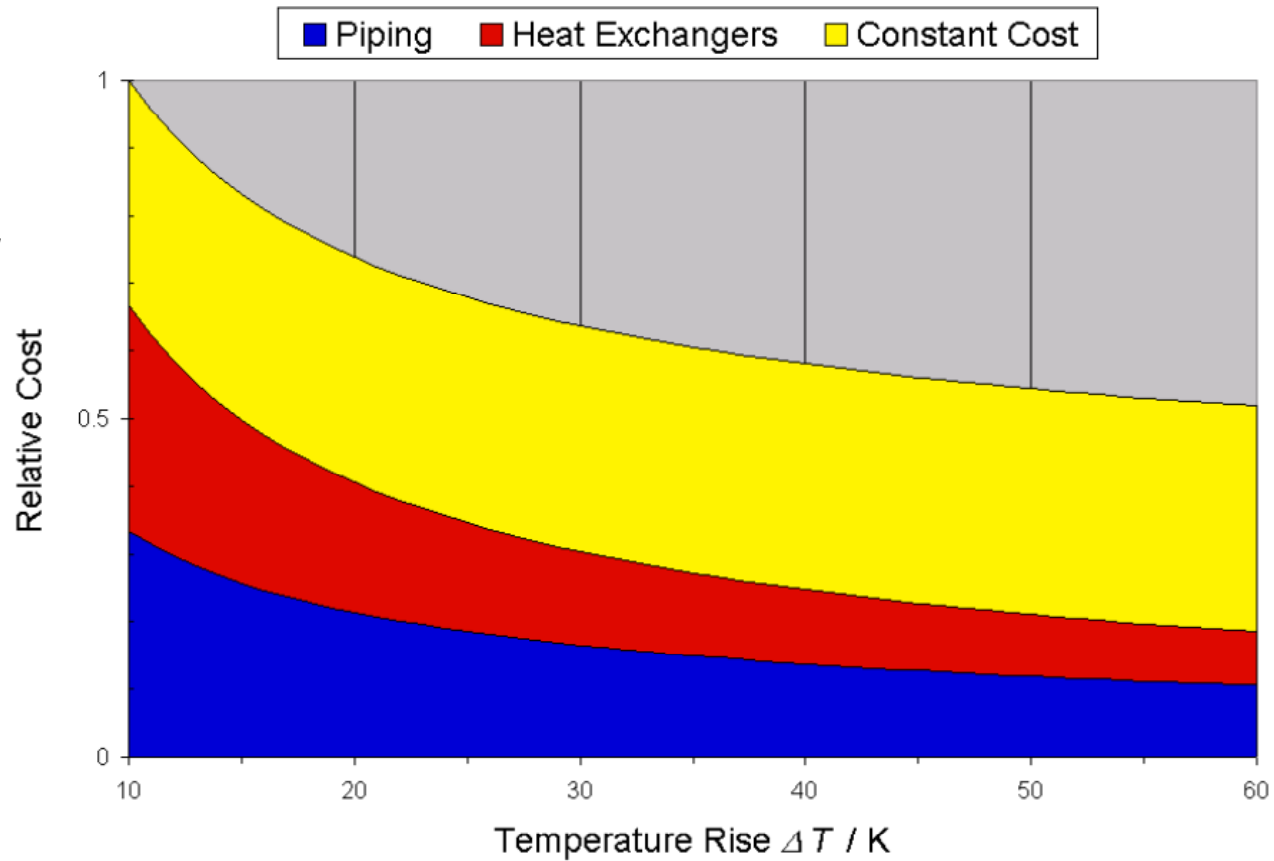
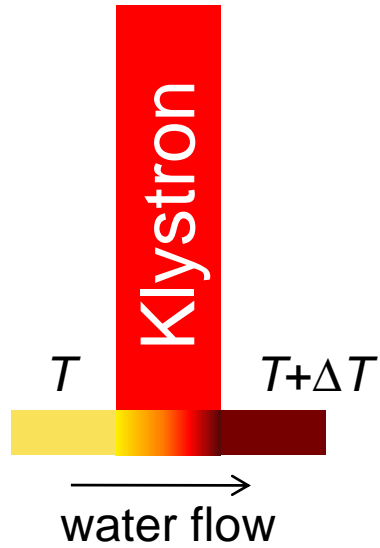
Group A Conclusions

- Dubna solution looks very promising, but Site Investigation needed to allow detailed costing (using same RDR principles)
- CFS will develop 'Requirement Matrix' over coming months
- Ground rules need to be defined by PM team e.g. which solutions do we pursue the most given resource levels, which safety legislation do we adopt.....site strategy
- XFEL progress to be followed closely, particularly during installation phase
- 3D Integration studies for ILC need to developed to allow CFS to better determine underground volumes
- ILC/CLIC collaboration is a promising development in CFS field



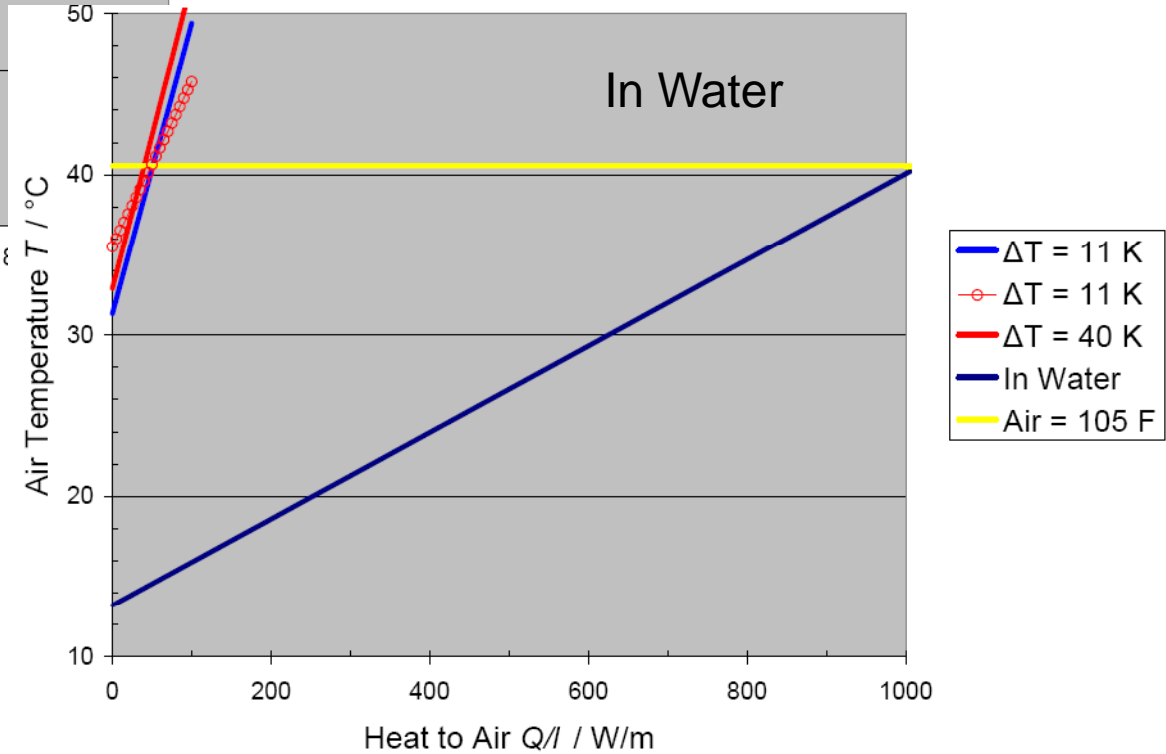
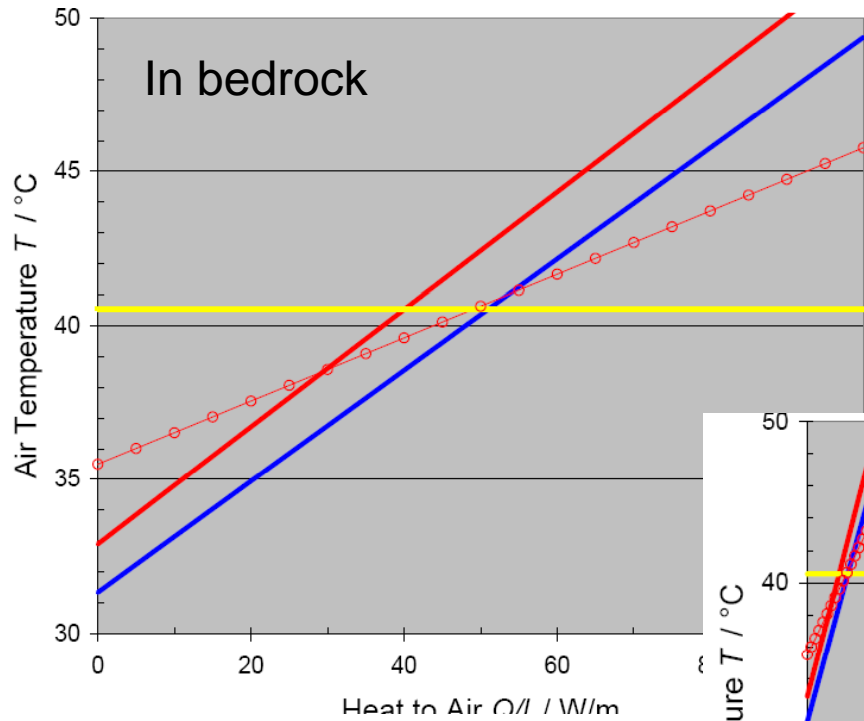
Group B: Water Cooling

Scaling of Process Water Costs





Parametric Models for Tunnel Air Temperature





Group B Summary

Summary

- (1) Many useful discussions.*
- (2) Delta T increase and Chilled Water Decrease are potential measures to reduce cooling costs. Effect of high ΔT to room T may be suppressed by insulator with relative low cost.*
- (3) Effect of high ΔT to equipment and beam instability should be studied separately.*
- (4) Alternative air cooling system using package air conditioner is proposed and under consideration.*
- (5) More investigation and effort to decrease heat load to air are necessary.*
- (6) Cooling effect by tunnel wall depends on geology of the site, though an order of ~ 100 W/m may be cooled under some conditions.*
- (7) High DT study where kly col temp up to 75deg will be studied with a colaboration between KEK, FNAL and DESY.*



Towards a 'Minimum Machine' Configuration

- Working Groups:
 - C. **Siting**: Examine possible sites and evaluate possible design differences that accommodate features. Includes staging, design modifications and upgrade issues.
 - D. **Accelerator Systems**: particular focus on the central injection complex, BDS and RTML.
- Beginning of the process of:
 - Re-thinking the layout of the machine for a lower cost
 - Look for new and innovative ideas – particularly staging options
 - Defining the 'minimum machine' layout

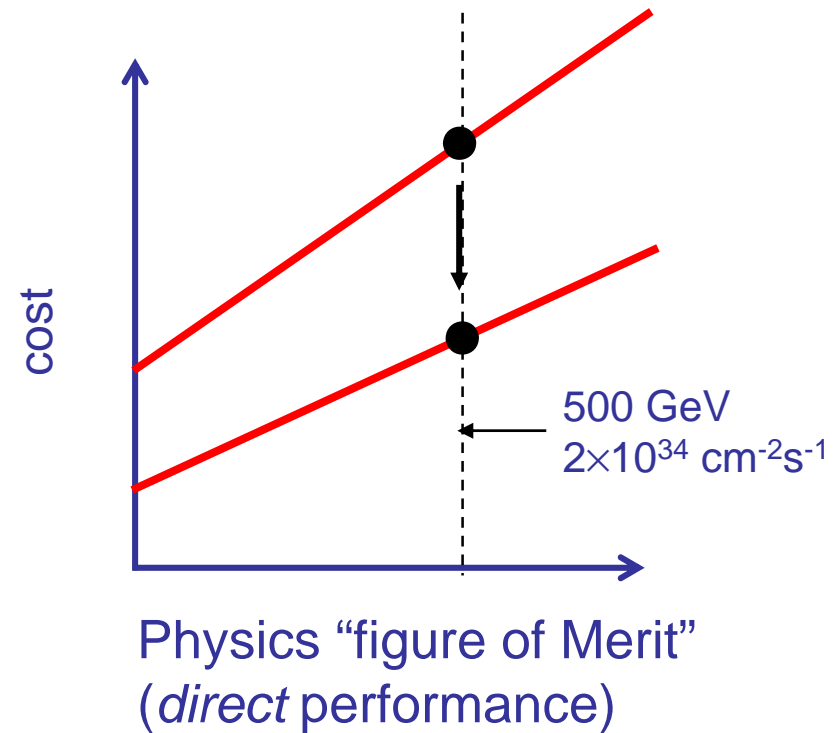
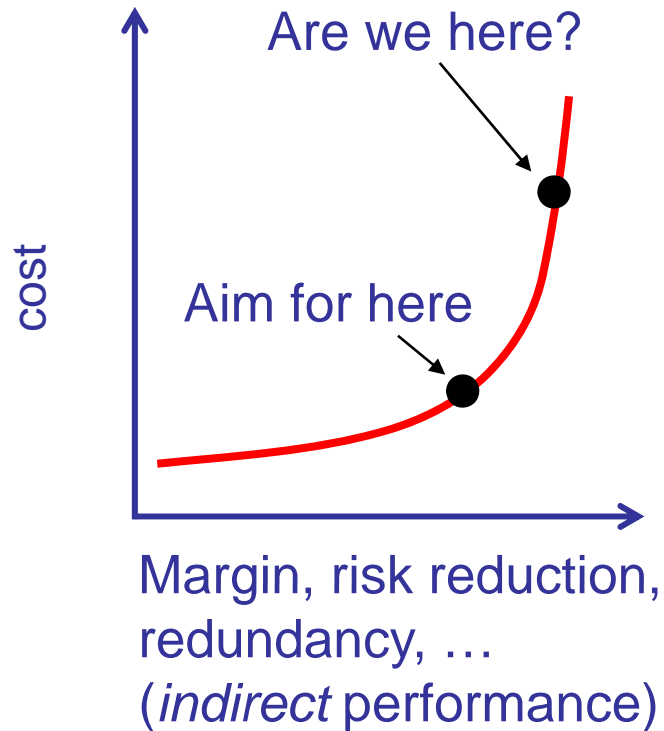


Minimum Machine Concept

- Physics scope (WWS document)
 - **200-500 GeV centre-of-mass energy range**
 - **$2 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$**
 - **polarised electrons**
- Identify cost-driving requirements and criteria
 - **Push back on them to acceptable minimum**
 - **(May increase risk to performance, which must be quantified)**
 - **CFS will be primary target**
 - Underground volume
 - Process cooling water
 - ...



The Minimum Machine Study



Minimum cost machine

Understand the performance derivatives



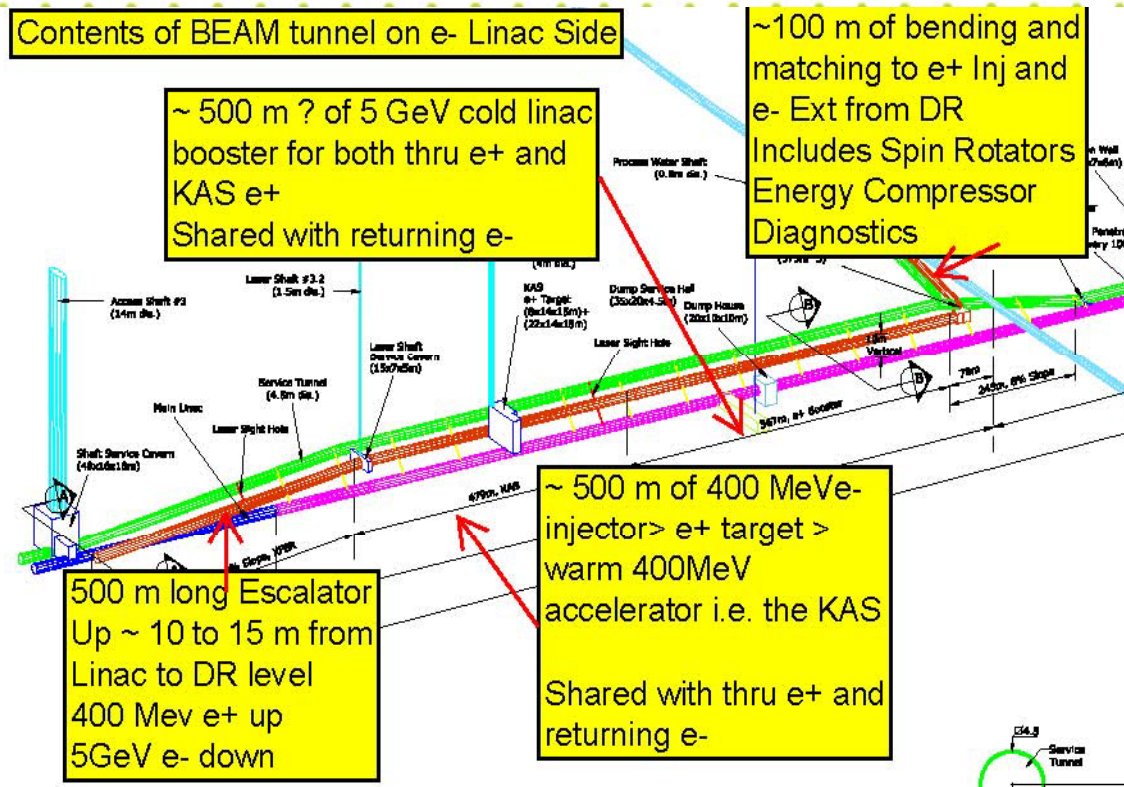
Groups C&D: Contents

- Minimal Beam Delivery System, Andrei Seryi (SLAC)
- Advanced e⁺ source, Junji Urakawa (KEK)
- Central Region Integration, Ewan Paterson (SLAC)
- 1st stage , site filler and brainstorming session
- Next steps for study of Minimal machine



Integration Ideas for Central Region

Ewan Paterson



● assume that with additional shielding walls can enable independent operation of central region systems with open access to the BDS, the IR and linacs =>

● Put everything in the same plane and put the Injectors in the same shared tunnel with the BDS



Quick Synopsis of Layout Discussions

- Bring Damping Rings to same plane as BDS
 - **Saves vertical “escalator” tunnels**
- Move e+ source to end of linac and integrate with BDS
 - **Natural ‘chicanes’ in BDS**
 - **Fuller integration with MPS systems etc.**
 - **Shorter e+ transfer lines to DR**
- Incorporate 5 GeV injector linacs into same tunnel housing
 - **Saves additional tunnels, but needs careful review**
- Remove separate 10% KAS e+ source
 - **Replace with few % 500MV warm linac with same (thin) target in undulator source.**
- Minimum 500GeV BDS
 - **Saves km beamline**
 - **Idea to use main 18MW beam dump also for commissioning / emergency abort dump**



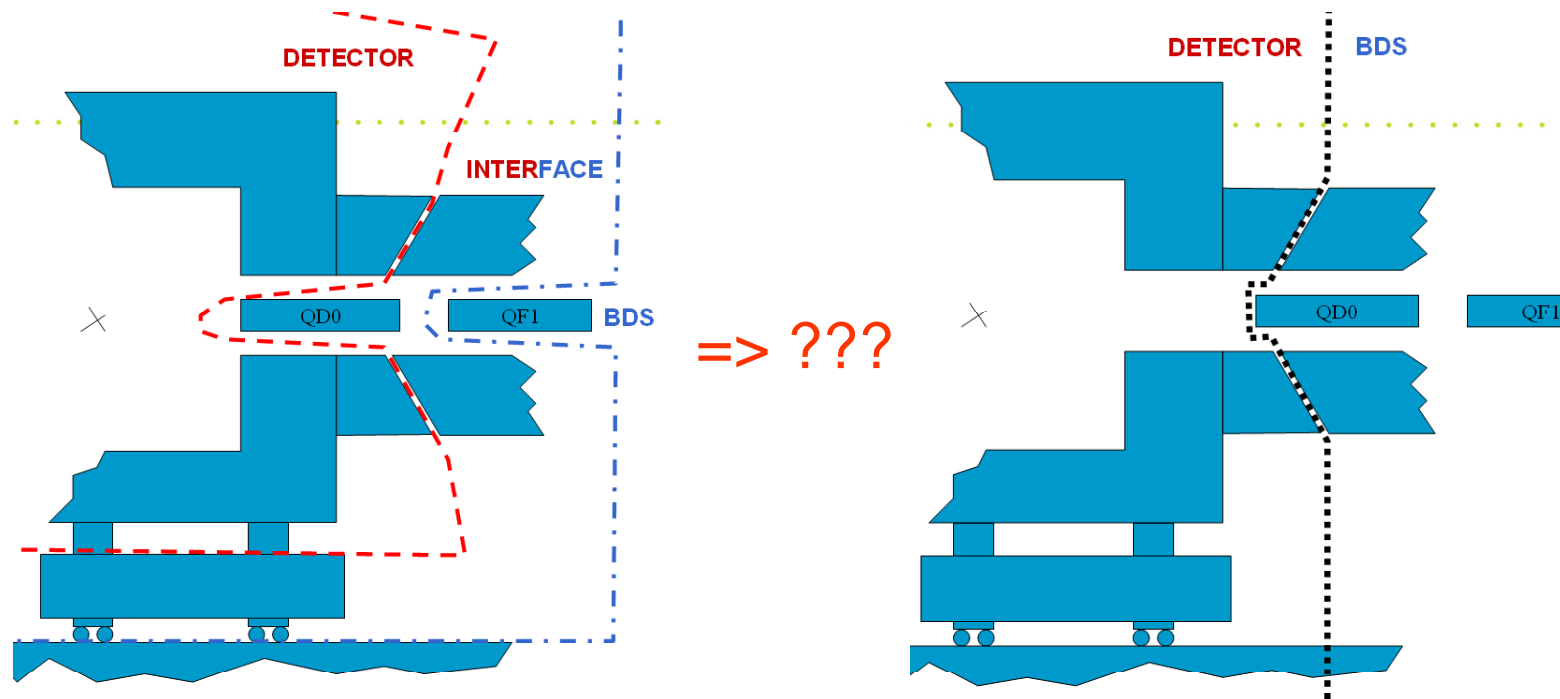
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Sound
familiar?



Simplified IR interface?



- Longer L^* , long enough to have QD0 outside of detector, separating M/D more cleanly and simplifying push-pull
 - **Some impact on luminosity is unavoidable; R_{vx} may need to be increased**
- If a longer L^* design will be found viable, a question will be
 - **whether to consider it as a permanent solution**
 - **if a Luminosity upgrade, by shortening the L^* , would be considered later, after operational experience will be gained with a simpler system**



Advanced e⁺ source

High possibility to make reliable target system using liquid lead target and S-band linac as one of advanced e⁺ source for ILC.

Junji Urakawa (KEK)

Present members : T. Omori (KEK), J. Urakawa (KEK), M. Kuriki (Hiroshima Univ.), T. Takahashi (Hiroshima Univ.), Pavel Logachev (BINP, Novosibirsk)

ILC positron sources

1) undulator-based e⁺ source

base line choice

1st stage: non-polarized source

later: upgrade to polarized source

2) Compton-based e⁺ source

advanced alternative

polarized source

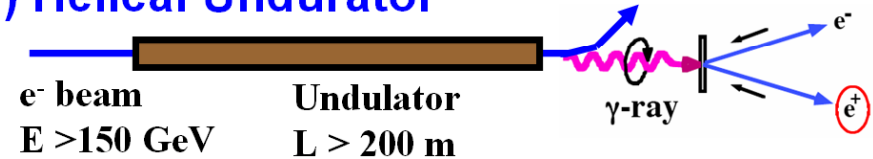
3) Conventional e⁺ source

back up

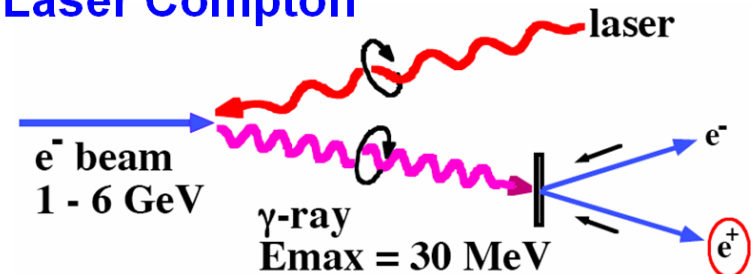
non-polarized source

Two ways to get pol. e⁺

(1) Helical Undurator



(2) Laser Compton





Summary: Site Discussion

Jonathan Dorfan

SLAC

Plenary Session, June 6, 2008



Summary of Key Issues for ILC

- ❖ Ultimately, there will be a global, high level process that decides on the governance, siting and the model for host versus non-host responsibilities
 - however, ignoring these issues now would be a mistake
 - on the 2012 timescale, we should provide guidance on these issues

Questions – these are not new questions, but we have made no progress in the past few years towards answering them

1) Do we remain committed to a truly *global* governance model?

If so, what are the key features of such a model?

What can we learn from the recent past (ITER, ALMA, SKA)?

2) In such a global model, what is the role of the “host” country?

3) What defines the construction responsibilities of the host country?

Does our knowledge of the RDR costs provide new guidance?

Slide from Dorfan on Tuesday



Summary Comments: Governance/Siting

- Wide-ranging discussion
 - **Albrecht Wagner described the history of XFEL governance process**
 - Provides a blueprint for the steps in the process
 - Required initiating event to bring governments together in a serious way
 - Took longer than hoped
 - **Atsuto Suzuki emphasized the need for the physics community to develop now a plan for the process for site selection**
 - The job should be done by ILCSC



Summary Comments: Governance/Siting

- ILCSC Chair, Enzo Iarrocchi, reminded us of the history of the governmental processes, including OECD Megascience study and the FALC process and their relationship to GDE
 - **General feeling was that, while FALC is not appropriately constituted to generate a governance roadmap for ILC, we should continue to work actively with them**
- **Result of the discussions:**
 - **ILCSC subcommittee will evolve a model for site selection process**
 - **GDE subgroup will be formed to evolve governance models**



R&D Plan Release 2



***ILC Research and Development Plan
for the Technical Design Phase***

Release 2
June 2008

ILC Global Design Effort
Director: Barry Barish

Prepared by the Technical Design Phase Project
Management

Project Managers: Marc Ross
 Nick Walker
 Akira Yamamoto

- Look! NO DRAFT!
- Released today
- Next review and release:
December 08
- *Subject for next week's meeting*



Summary

- Better than expected attendance
 - **Especially for focused ‘thematic’ meeting**
 - **Near-nominal attendance for GDE meeting 😊**
 - Very technical discussions on cost drivers
 - **Other than SCRF**
 - **Idea of ‘minimum machine’ now well established**
 - But work needs to be done to really define it → LCWS
 - **Importance of shallow site development**
 - Comparison with RDR deep rock sites
 - Upfront planning for workshop much better
 - **A good habit to get into**
 - Our JINR colleagues were very good hosts
 - **Best WLAN support award !**
 - Now time to consolidate and focus towards LCWS/ILC08
-