

# Linear Collider Workshop 2019

CLIC+ILC

October 28 to November 1st

In Sendai, Japan

P. Colas, M. Titov

- Sendai is at 100 km from Ichinoseki, the place hosting the ILC
- There were 400 participants
- An industrial exhibition was held, with 60 companies (80% from Japan), all related to components of the accelerator and civil engineering. The involvement of the local industry is very strong.
- KEK published a few weeks before a rather detailed report on 'Recommendations on ILC Project implementation' (discussion this afternoon in this room)
- MP Hon. Ryu Shionoya gave a very encouraging talk, reminding the 'Expression of Interest' for ILC by Japanese government (MEXT) on March 7
- However no new statement from the executive
- Next opportunity (and last before final ESG draft) at ICFA meeting Feb.20. But final ESG drafting session in Bad Honnef is before, and SCJ master plan should be published January 30.

# Strong efforts from the local government

How to welcome nicely foreign workers (scientists and technicians and their family)

Reception at the famous designer's and voice actor Kin Ichi Ogata to give our opinion on local products.

Nice architecture and design, very well suited to the Global Science City.



# Lyn Evans's opinion (LCC director, not official CERN's)

- Europe's possibilities are limited in the next 10 years (1 B€ missing for GSI, LHC using all resources in the next 10 years.)
- It is necessary to keep CLIC project alive
- ILC in Japan not approved, but there is a political move forward, and it is the most advanced project
- FCC is not at the same time scale

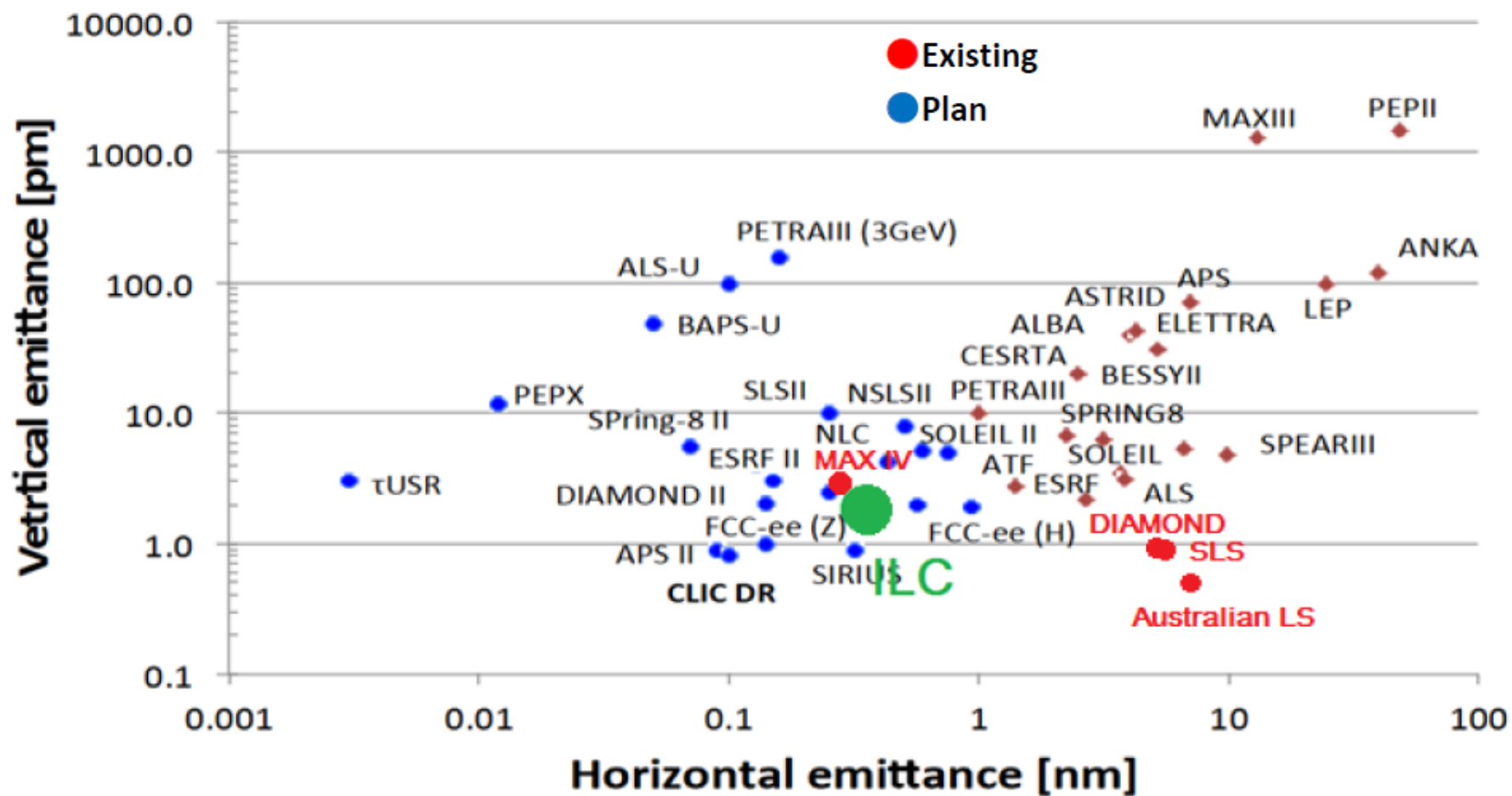
## The Sendai statement

- We reaffirm the importance of ILC construction (ICFA March 2019 : consensus for the next global project in HEP)
- The ILC design is mature and ready for implementation (with flexibility)
- We have strong support from the local community
- We are committed to making the ILC a success

# KEK DG Masa Yamauchi

- Following the opinion of the SCJ, **MEXT has not yet reached declaration for hosting the ILC in Japan at this moment.** The ILC project requires further discussion in formal academic decision-making processes such as **the SCJ Master Plan**, where it has to be clarified whether the ILC project can gain understanding and support from the domestic academic community.
- Nonetheless, MEXT keeps interest in ILC
- Actions : set up an International Working Group to prepare the implementation of the project: cost sharing, organization and governance, Technical Preparation Plan
- Set up a Pre-Lab to prepare for the ILC Lab

## Worldwide light sources' emittance



Horizontal emittance is smaller at MAX IV.

Vertical emittance is smaller at Australian LS, SLS, DIAMOND.

# Status of the machine

Parameter	Requirement	Design	Achieved	Unit	Facility
Bunch Charge	3.2	4.8	8.0	nC	SLAC -SLC
Average Beam current	21	42	1000	$\mu$ A	JLAB
Beam current in pulse	5.8	11.6	60	mA	Cornell U.
Polarization	80	80	90	%	Nagoya, SLAC, KEK
Quantum Efficiency	0.5	0.5	2.2	%	Nagoya
Drive Laser (in pulse)	1.8	10	>10	W	Commercially available

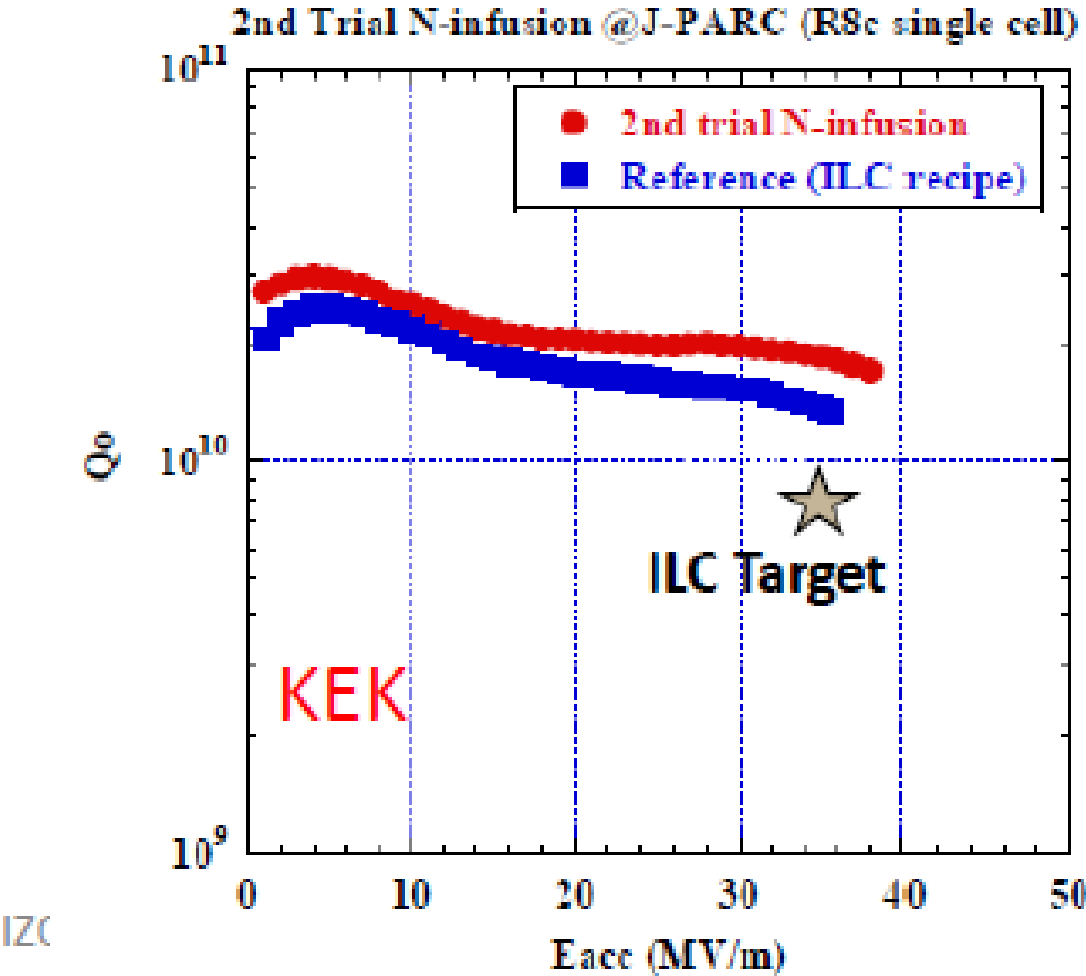
The design parameters are achievable, even if challenging.

Still, stimulated by FCC expected performance, the possibility to run at Z pole has been revisited and an increase in luminosity is under study.

Beam dump system is studied to evaluate the Tritium production

Shin Michizono

Highest gradients and highest quality factor by N-infusion and similar techniques.





# Fermilab High Luminosity ILC Workshop (May 2019)

- Significant luminosity improvements are made possible by SRF R&D advances since TDR
- Main result is given below – by implementing technically feasible changes, ILC baseline luminosity of  $1.35 \times 10^{34}$  can be increased
  - Increased number of bunches x2
  - Increased rep rate x3
  - Increased  $Q_0$  x 2
  - Beam and IP parameters same as ILC baseline
- Effective luminosity with polarization advantage (x 2.5) is  $20 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$  (ILC) vs.  $17 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$  (FCC-ee, including multiplier of 2 for multiple interaction points)
- AC power ~270 MW (ILC) vs. 282 MW (FCC-ee)

# Progress in the Accelerator Design


Operation at Z-pole

Status of Positron Source Development

Kaoru Yokoya

2019.10.29 LCWS2019, Sendai

# Undulator Summary

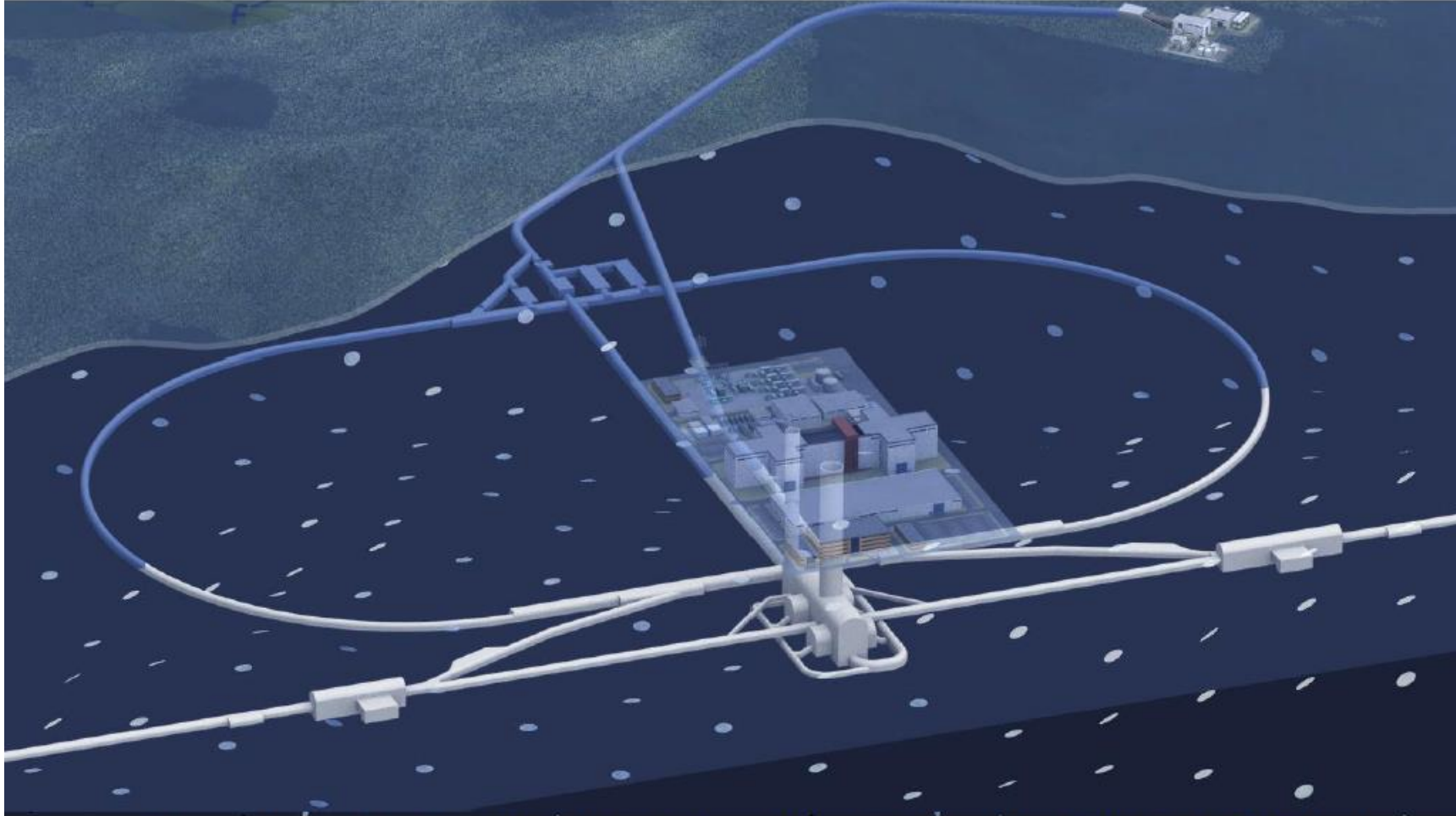
- No showstopper seen for undulator-based source
- Detailed engineering specifications for target wheel and experimental tests still to be done
  - Test cooling efficiencies by thermal radiation for a target piece
  - Develop full-size mock-up for the target to test the target rotation in vacuum
  - Photon dump design
- resources....(only for information)
  - DESY e+ source group decreased: 
    - Andriy and Felix left, Sabine retired; no successors
    - Khaled (PhD student) studies realistic undulator (see his talk)

S.Riemann

# Remaining Issues of e-Driven System

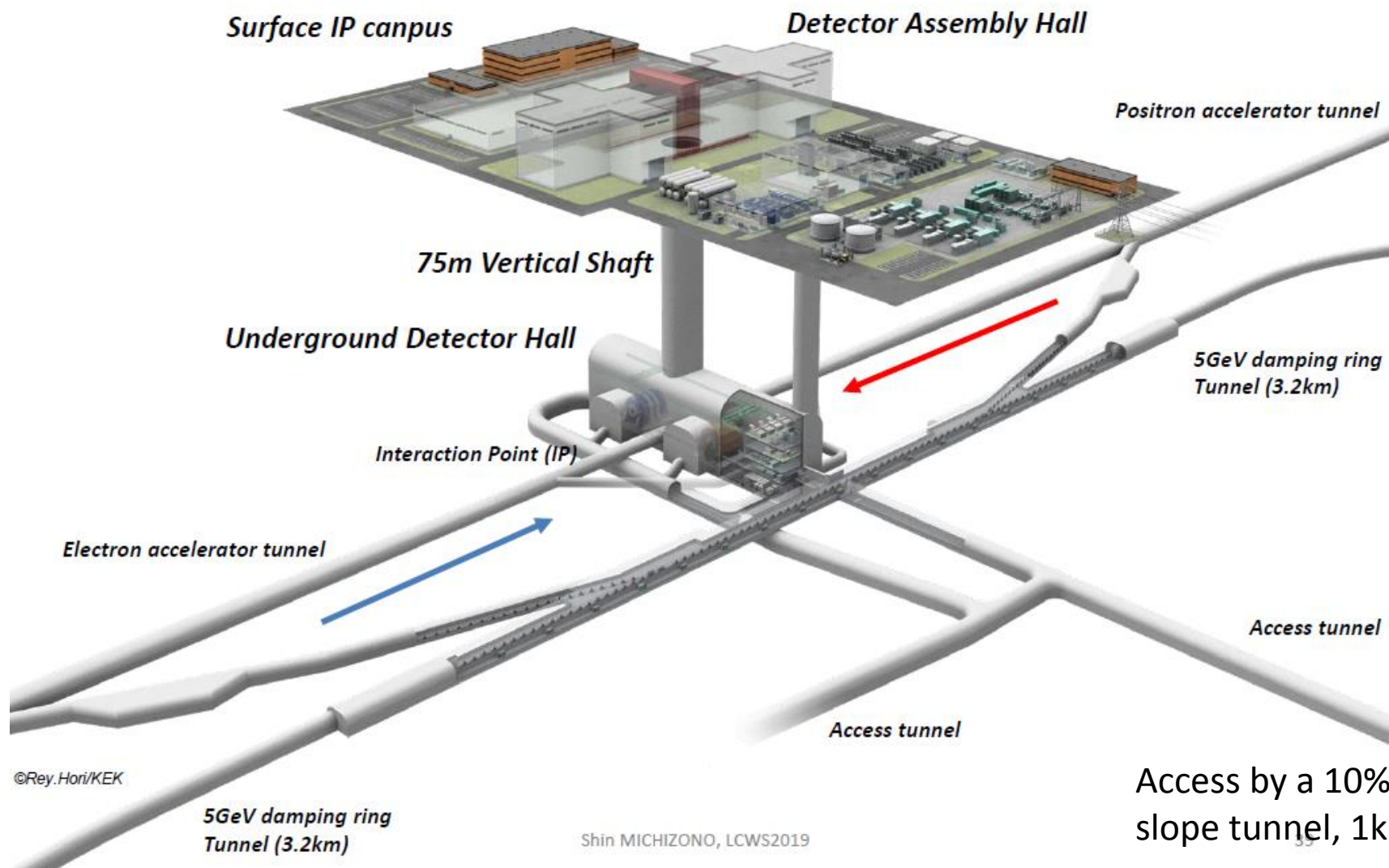
- Target
  - Prototype test for more realistic model
  - Endurance against neutron
- Flux concentrator
  - Cooling
- Capture cavity (standing wave)
  - New design (multiple cell, high  $\beta$ )
  - Transient beam loading
  - Cooling system
- Beamline
  - Chicane (after capture)
- Replacement system of target-capture area
- Radiation shield
  - Target-capture region
  - Entire beamline
- Layout
  - Possible transition from e-driven to undulator

## *Bird's eye view of ILC in Kitakami candidate site*



*Tunnel design for Kitakami Candidate Site (ILC250GeV 20.5km)*

# Plan of Interaction point



Access by a 10% down-slope tunnel, 1km long

# PRE-CAMPUS

- Before all the infrastructure will be available on site, there will be need for a pre-campus to store elements, test detector parts, etc...
- It could be at KEK, but this is far away. A possibility is to use a former NEC factory, just next to the Ichinoseki station.

# ILD meeting

- ILD Design Report : update of the Detector Baseline Document of 2013
- Costing of the ILD detector
  - New costing with clearer rules : do not count R&D, but include shipping, testing, in-house manpower. Based on actual projects and prototypes.
  - Result : ~25% lower cost than in DBD
- Start to think about how to be ready to accept newcomers once the project is launched



# Applications and spin-offs of ILC technology

- Cavities : Quantum resonators for creating entangled states
- Irradiation for water purification in India

INTERNATIONAL SUPPORT TO ILC: see next talk by Maxim

More details on the situation in Japan this afternoon : K.Fujii, and on collaboration with US : O. Napoly