

# ATF2 and Asian Plan for the ILC

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ATF2 Mini-workshop, Jan.5.2005, SLAC

## Official Time Schedule

2005.2	Decide the director and location of <b>Central GDI</b>
2005.	Establish Regional GDIs
2005.8	Decide the <b>design outline in Snowmass Workshop</b> (acc.gradient, 1 or 2 tunnel, dogbone/small DR, e <sup>+</sup> generation etc)
2005 end	Complete <b>CDR</b> with rough cost/schedule
2007 end	Complete <b>TDR</b> , role of regions, start site selection
2008	Decide the site, budget approval
2009	Ground breaking
2014	Commissioning starts

# Asian Organization for ILC Research

- LC Office  
F. Takasaki, K. Yokoya, H. Hayano, N. Toge, S. Yamashita
- Working groups
  - WG1 Overall design (K. Kubo)
  - WG2 RF (H. Hayano)
  - WG3 Injectors (M. Kuriki)
  - WG4 Beam Delivery System (T. Sanuki)
  - WG5 Cavities (K. Saito)
  - ? Facility (A. Enomoto)
  - ? Site (R. Sugawara)

## Critical Research Areas

- **Establishment of the technology for accelerating gradient 35MV/m**
  - Technologies for cost reduction
  - Technologies for mass production
- **Pursuit of possible higher accelerating gradient**
  - Larger operational margin of gradient
  - Wider possibility of site selection
- **Beam technology development using KEK-ATF**
  - Unique storage ring to reach ILC emittance
  - Make full use of ATF capabilities

# Guiding Principle

## Global Point of View

- Time line
- Low cost design
- Effective use of R&D budget by global coordination

## Regional Point of View

- Establish the leadership in leading areas
- Promote industrial level

## Time Scale

- Snomass issues (Aug.2005)
- CDR issues (End of 2005)
- TDR issues (End of 2007)

## Development of 45MV/m

- Single-cell test in Dec 2004
- Individual vertical test of four 9-cell cavities **by Sep.2005**
  - Just in time for CDR completion
  - In existing facilities (AR east)
  - If expected performance not obtained,  
⇒ change to slower plan for ILC 2nd stage
- Cryomodule test by end of 2006 ⇒ STF Phase 1
- Industrial design by TDR

## STF

### Superconducting RF Test Facility

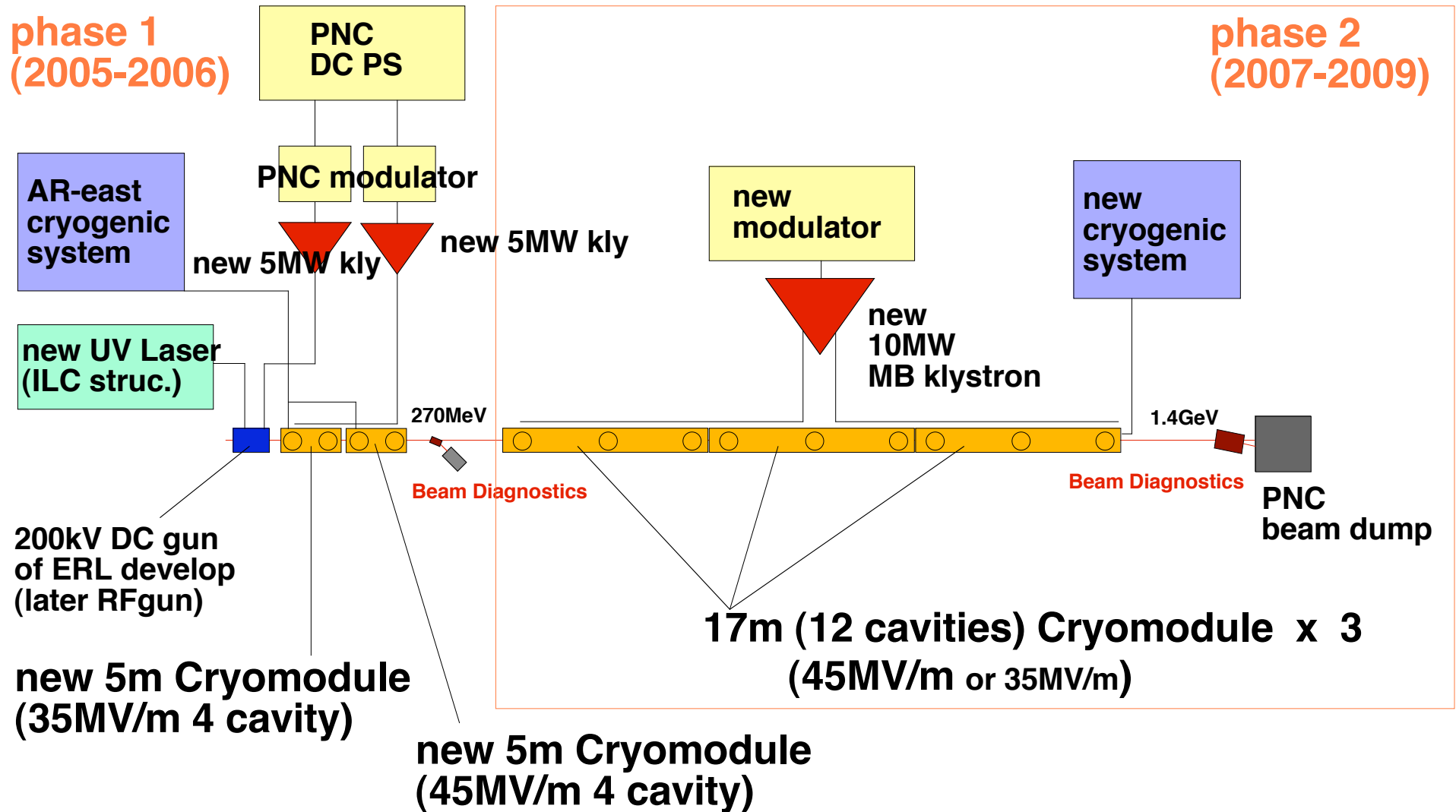
- Linac R&D building for JPARC
- Emptied by summer 2005
- 93m tunnel underground
- Reuse existing facilities
  - Refrigerator from AR east
  - Power supply and modulator



## Purpose of STF

- Establish industrial design of Linac unit (35MV/m and 45MV/m)
- Promote Asian/Japanese industrial level for ILC component production
- Form Asian base for international collaboration
- Enlist/educate new comers

# Plan of Superconducting Cavity Test Facility (STF)





## STF Phase 1 (2005-2006)

- Cryomodule for 4 45MV/m cavities
- Cryomodule for 4 35MV/m cavities
- RF source and cryogenic system (mostly recycled)
- Electron beam and its diagnostics system
- Synthetic test of 35MV/m & 45MV/m cryomodules with beam

### Other items in parallel

- **Electro-polishing Facility**
  - Can electro-polish cavities to be used overseas
- Cost reduction of cavity fabrication (Nb/Cu-clad, seamless)

## **STF Phase 2 (2007-2009)**

- 3 Cryomodules each containing 12 cavities (35 or 45MV/m)
- Reinforcement of RF and cryogenic systems
- Synthetic test with a beam

## **Many uncertainties for Phase 2**

- GDI will be functional by the time of detail design of Phase 2
- Collaboration/competition with TTF2/SMTF
- A few full-spec RF unit needed for TDR somewhere in the world
- STF Phase 2 is desired for Asian industrial level

# ATF

- Beam dynamics study (Fast ion instability, wiggler, etc)
- Development of diagnostics devices (Laser wire, cavity BPM etc.)
- Improvements of extracted beam (coupling, stabilization)
- Development and test of **fast extraction kicker**

## Extension of ATF Extraction Line : ATF2

### (A) **Small beam size**

(A1) Obtain  $\sigma_y \sim 35\text{nm}$

(A2) Maintain for long time

### (B) **Stabilization of beam center**

(B1) Down to  $\lesssim 2\text{nm}$  by nanoBPM (cavity BPM)

(B2) Bunch-to-bunch feedback of ILC-type beam ( $\sim 300\text{nm}$  interval)

中2階

1階作業ルーム

Pit

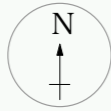
10m

Pit

配管

2500

7500



PLC Test Facility

S-Band KLY

六有

RF-Gun Laser

Las

Bending Magnet Power Source

Pump Room

Klystron Modulator

714MHz RF

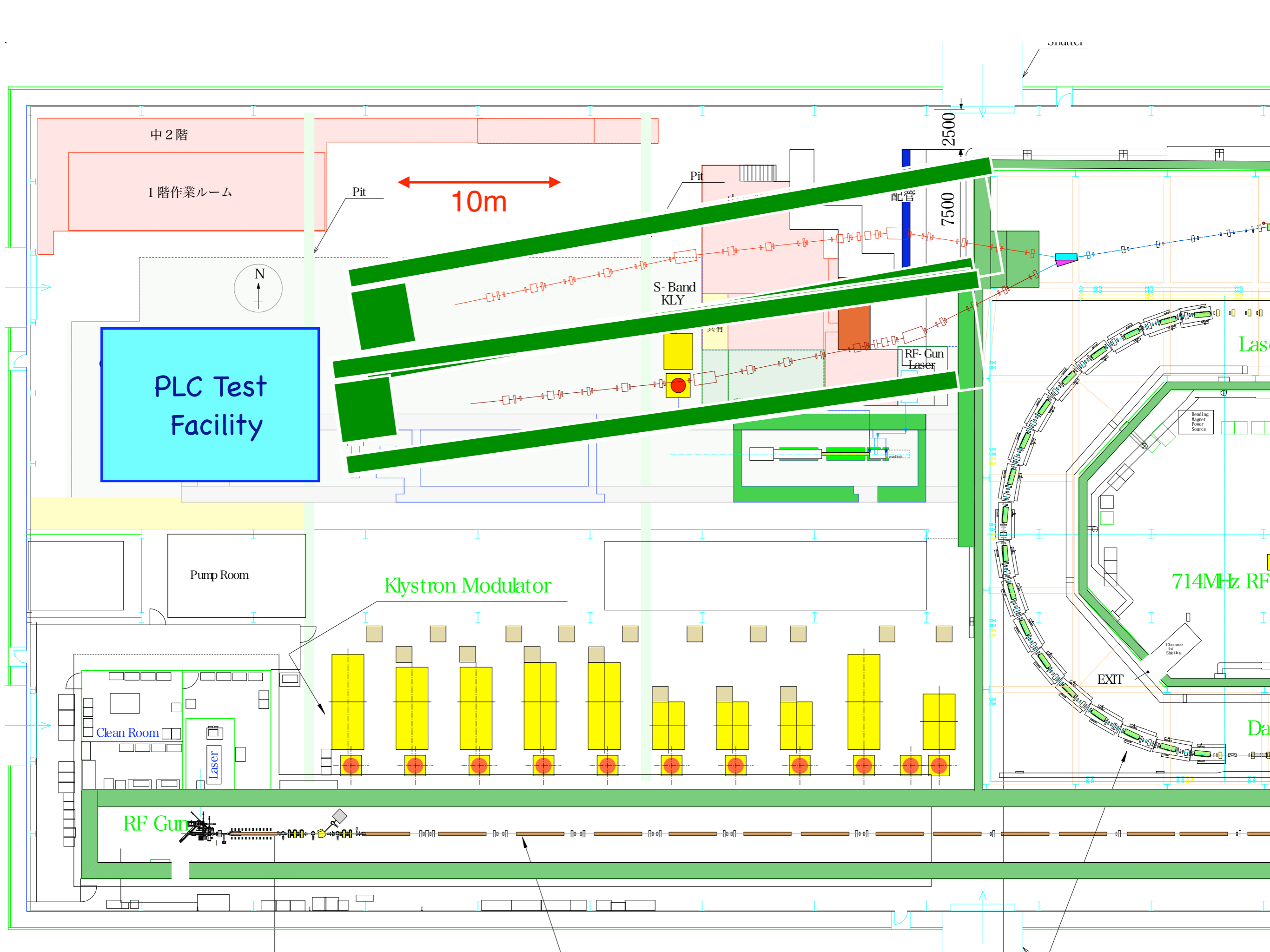
EXIT

Da

Clean Room

Laser

RF Gun



## Time Line of ATF2

- Not a CDR issue
- **A and B cannot be done simultaneously**
  - Shintake monitor at 'IP' for **A** but nanoBPM for **B**
  - **B** requires better beam stability than **A**
- ⇒ First **A** at least by TDR
  - Later **B** when ATF extracted beam well stabilized
- **There are many things to be done even after TDR with A/B**
  - BDS design work will continue after TDR
  - Can be a good test bench even after start of ILC operation
- Present plan
  - Component production autumn 2005 - summer 2006
  - Floor construction in summer 2006
  - Start operation in Jan.2007

## International Collaboration on ATF2

- Design study going on by international collaboration
  - Mini-workshops: Dec.11 at KEK, Jan.5 at SLAC
  - Completion of optics design in ~ March 2005 ?
- Budget requirements
  - Total 2.8 Oku Yen (floor, beamline, diagnostics)
  - Floor + shielding ~ 0.6 Oku Yen
  - Desirable to share other expenses among Asia, North America, Europe
  - Japanese budget request for JFY2005 (Apr.2005-Mar.2006) almost ready

# long-term Plan of KEK ILC-study

