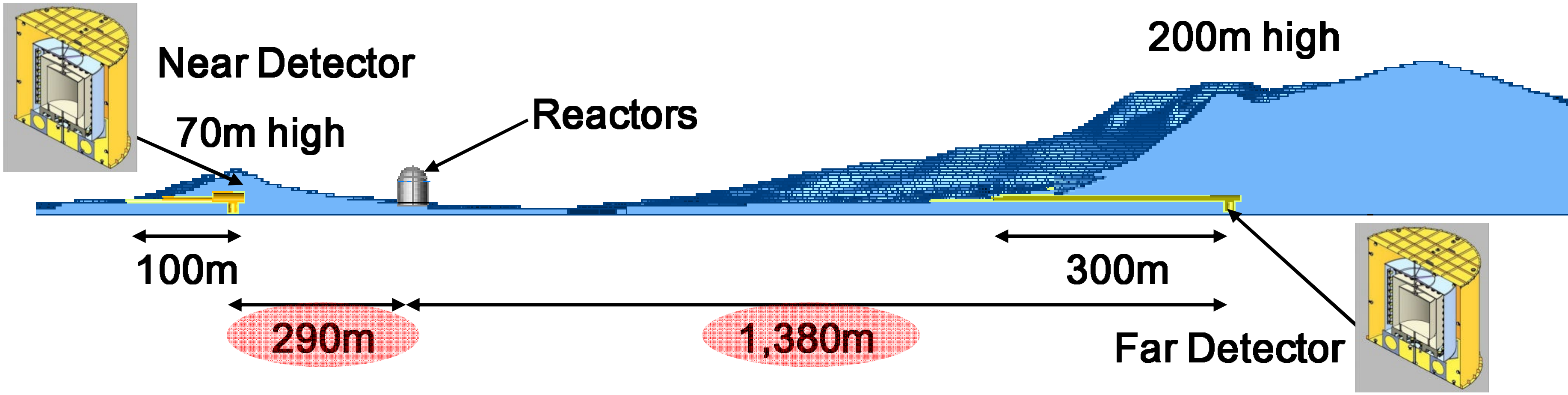
IV. Present Status of RENO & Daya Bay

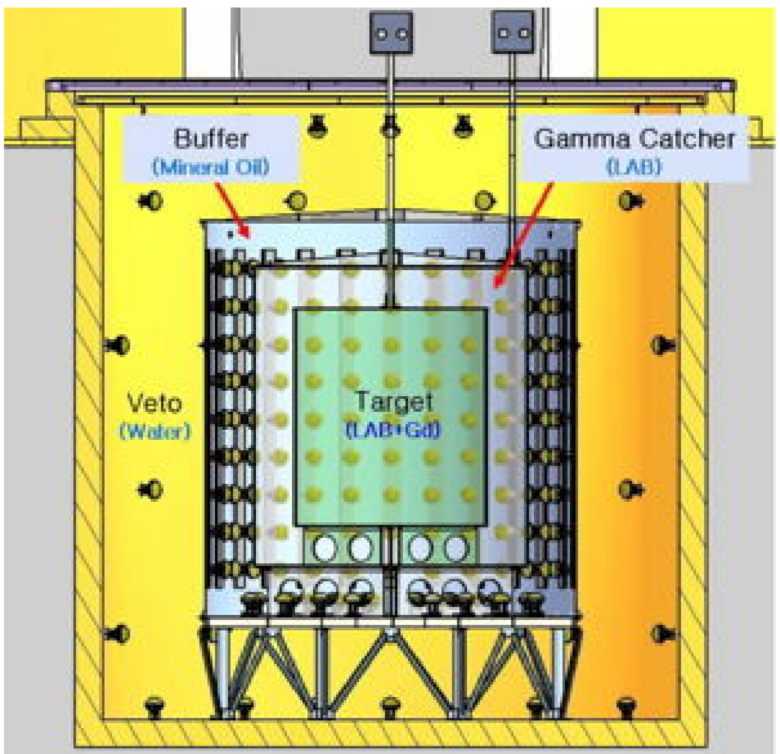
RENO for Neutrino Mixing Angle θ_{13}

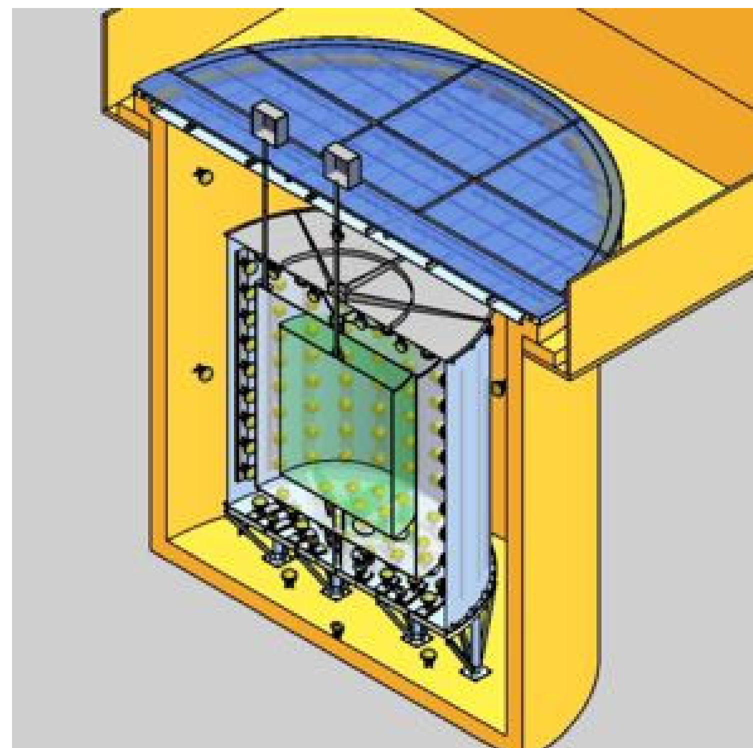
Experiments	Location	Thermal Power (GW)	Distances Near/Far (m)	Depth Near/Far (mwe)	Target Mass (tons)
Double-CHOOZ	France	8.7	280/1050	60/300	10/10
RENO	Korea	17.3	290/1380	120/450	16/16
Daya Bay	China	11.6	360(500)/1985(1613)	260/910	40×2/80

- ❑ Data –taking is expected to start in mid 2010.
- ❑ Korea-Russia collaboration

Schematic View of Underground Facility







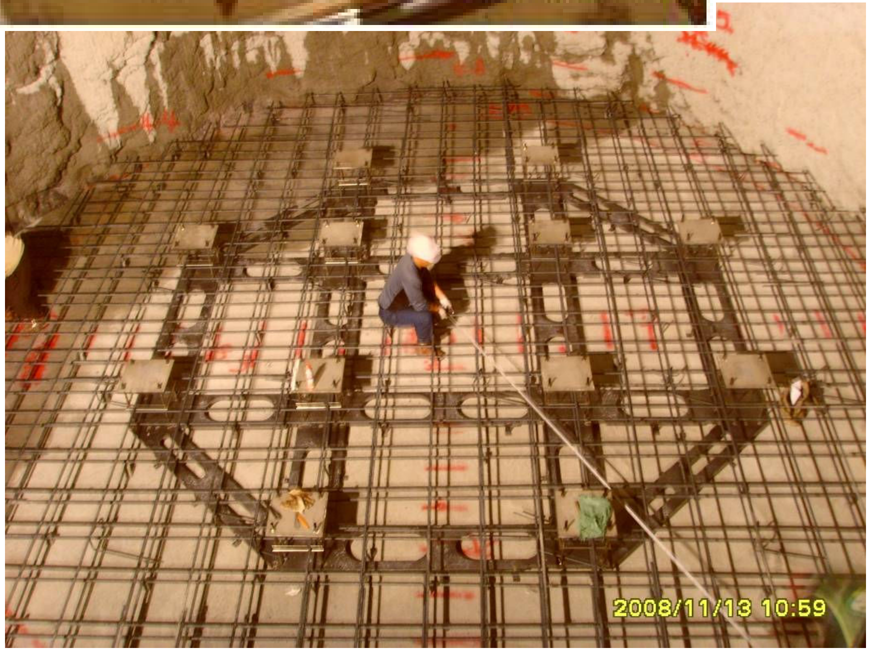
Near & far tunnels are completed

(2008.6~2009.3)

by Daewoo Eng. Co. Korea

Detector vertical halls are ready

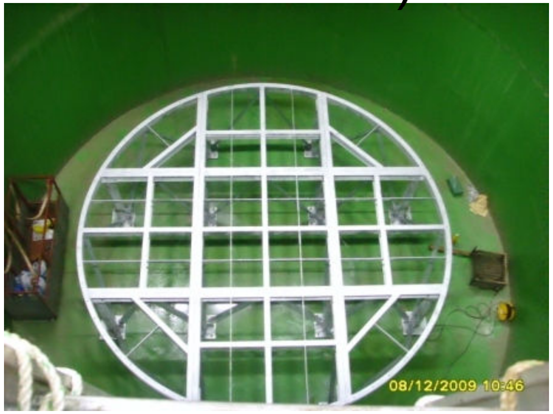
(2008.12~2009.2)

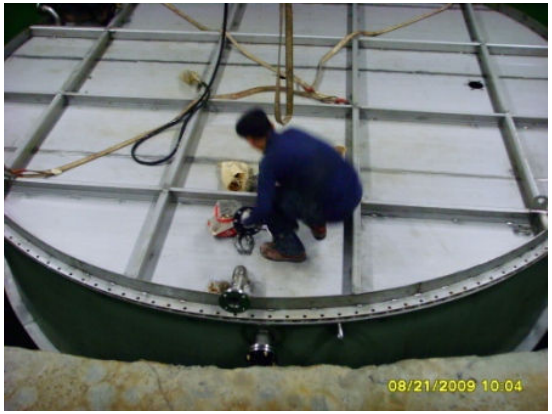


Buffer steel tanks are installed

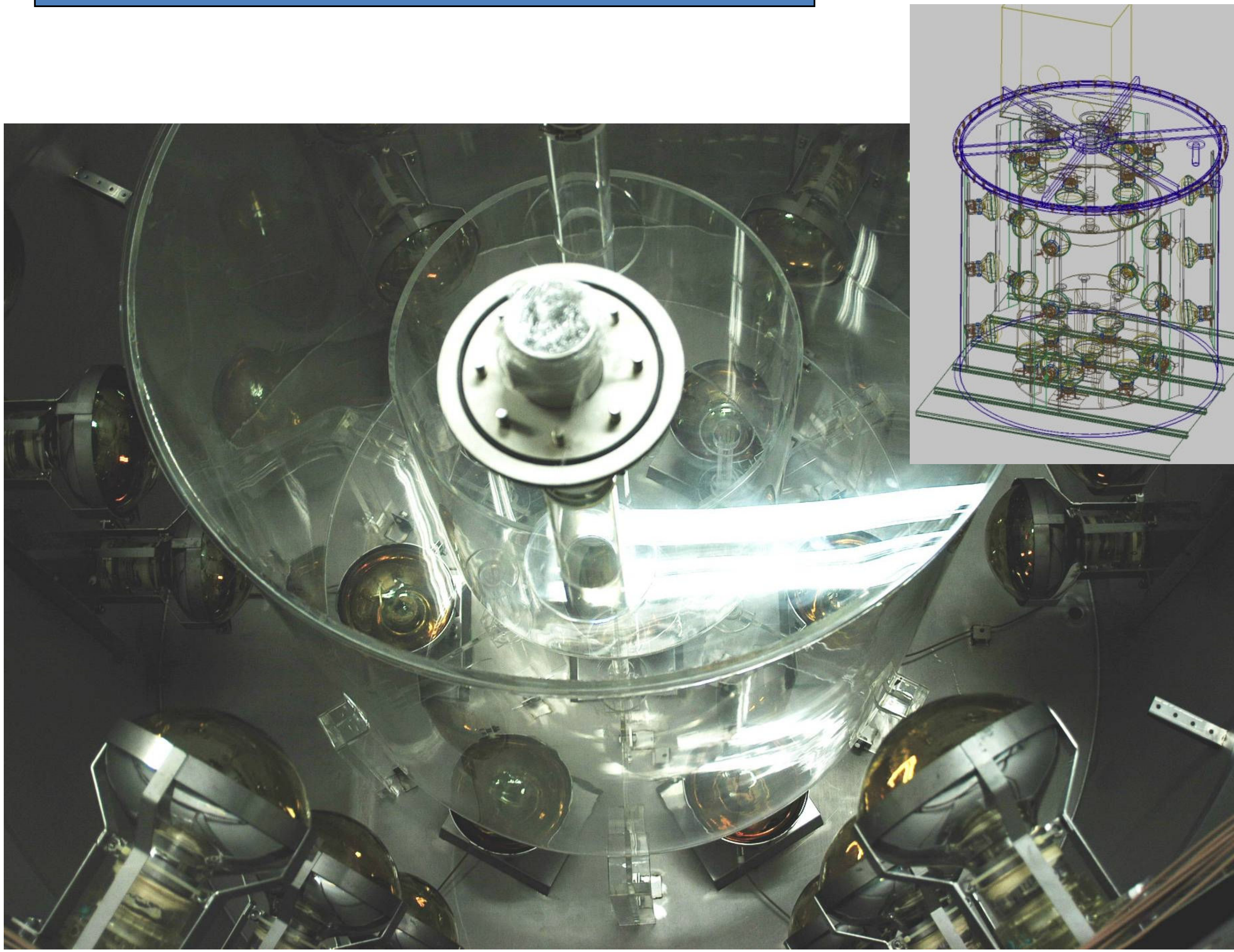
(2009.6~2009.9)

by NIVAK Co. Korea





Mockup Detector Assembly



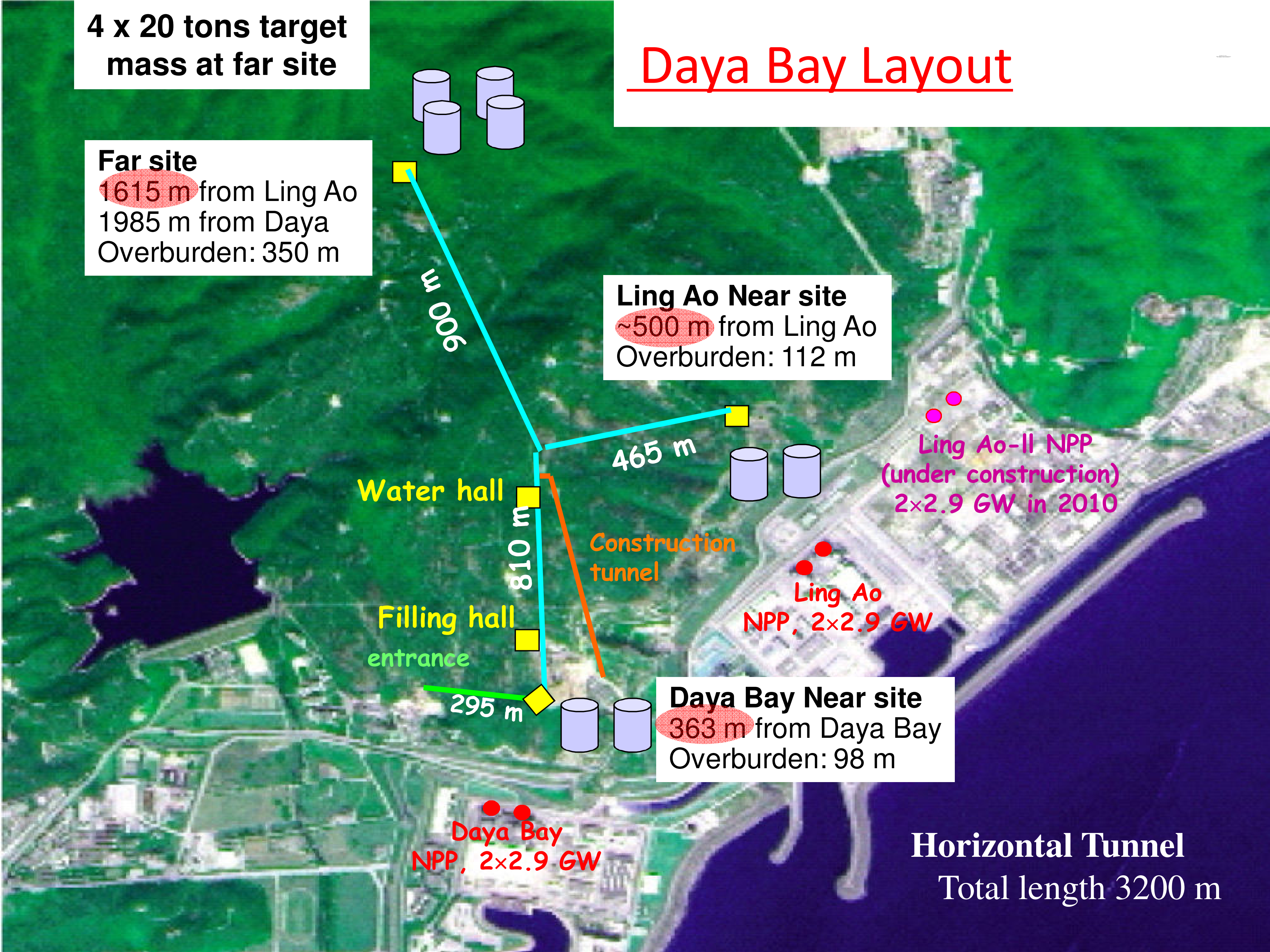
The Daya Bay Nuclear Power Plant

1 GW_{th} generates 2×10^{20} $\bar{\nu}_e$ per sec

- 12th most powerful in the world (11.6 GW)
- Top five most powerful by 2011 (17.4 GW)
- Adjacent to mountain, easy to construct tunnels to reach underground labs with sufficient overburden to suppress cosmic rays

- ❑ China, Taiwan, US, Russia and Czech
- ❑ Data –taking is expected in summer 2011.

Daya Bay Layout



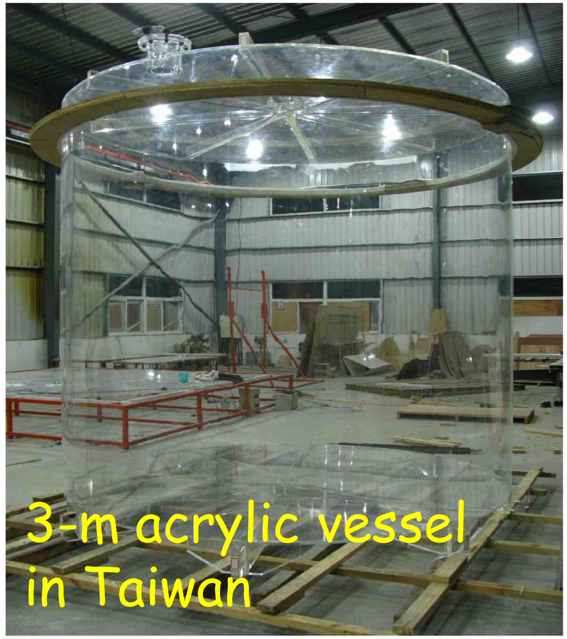
Tunnel Construction Status

Pool Excavation in DBY Hall - Aug 09

Main Tunnels Join - June 09

Detector Assembly


Stainless steel tank in China


3-m acrylic vessel in Taiwan

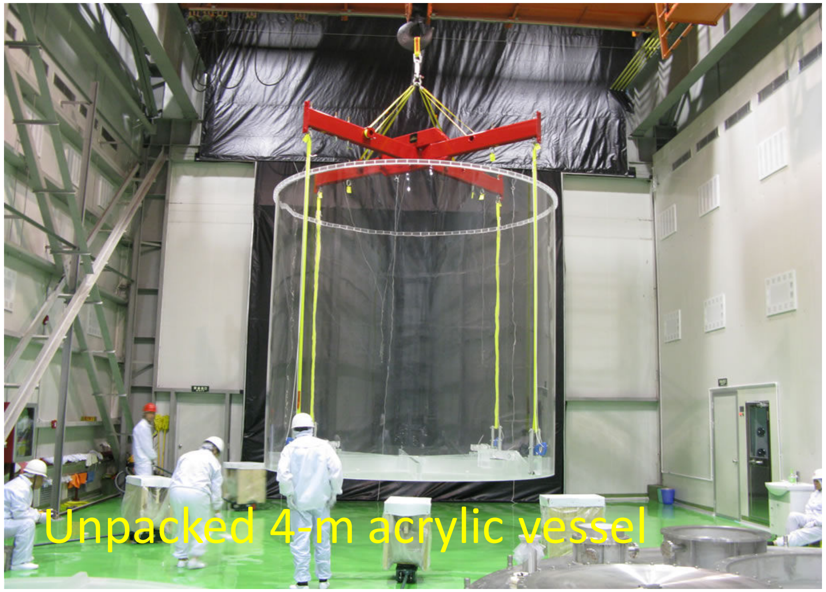

4-m vessel in the U.S.

SS Tank delivery


Delivery of 4m AV

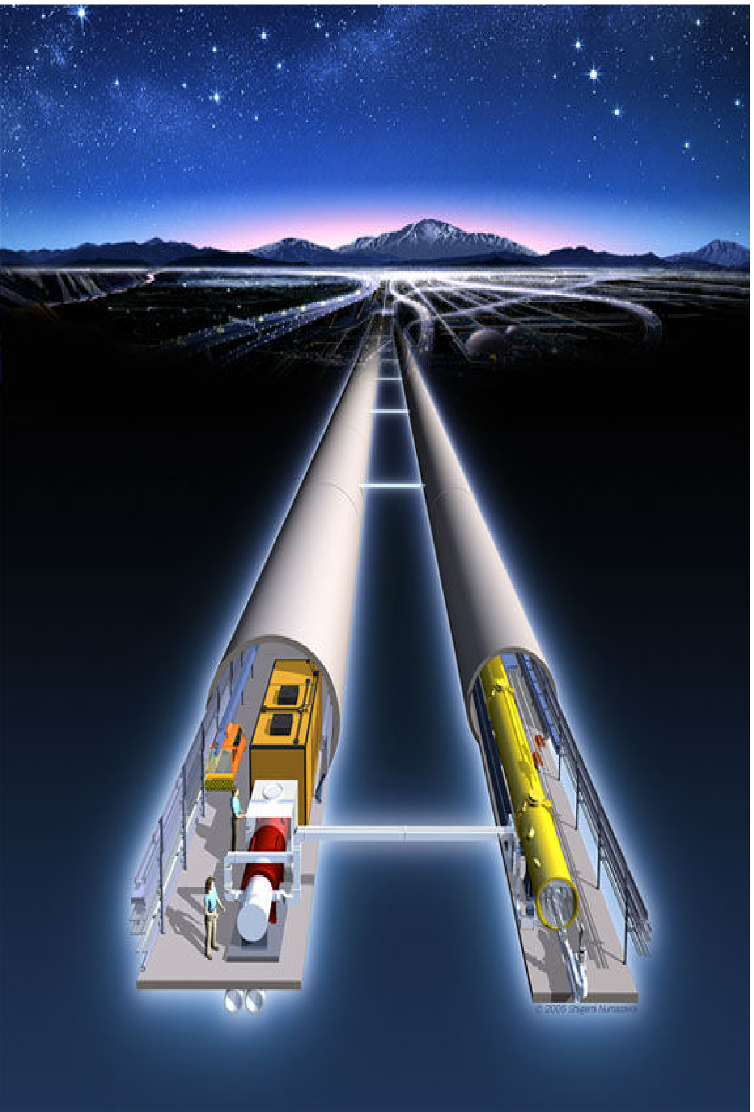

Stainless steel tank in SAB

AD Components

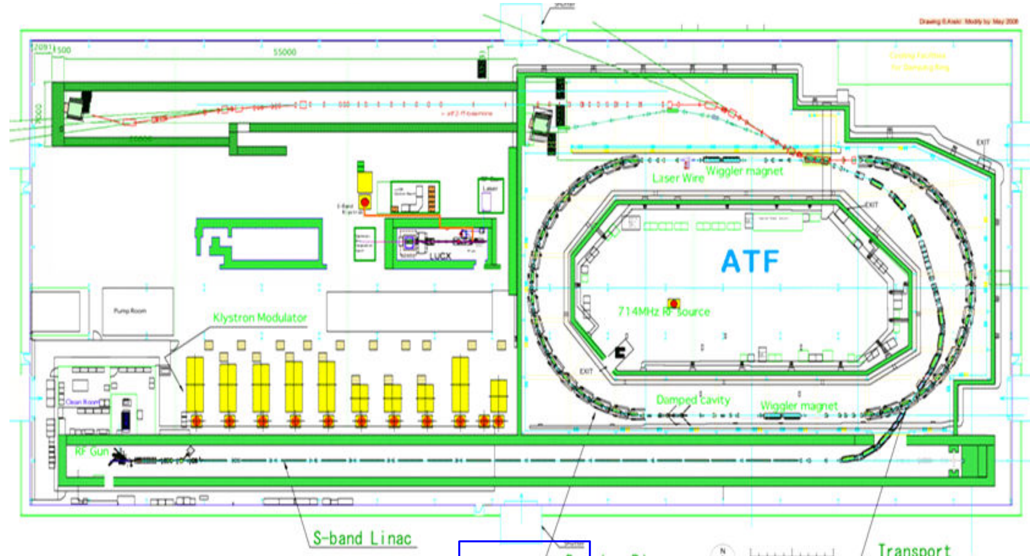


V. R&Ds for Energy Frontier Projects

International Linear Collider

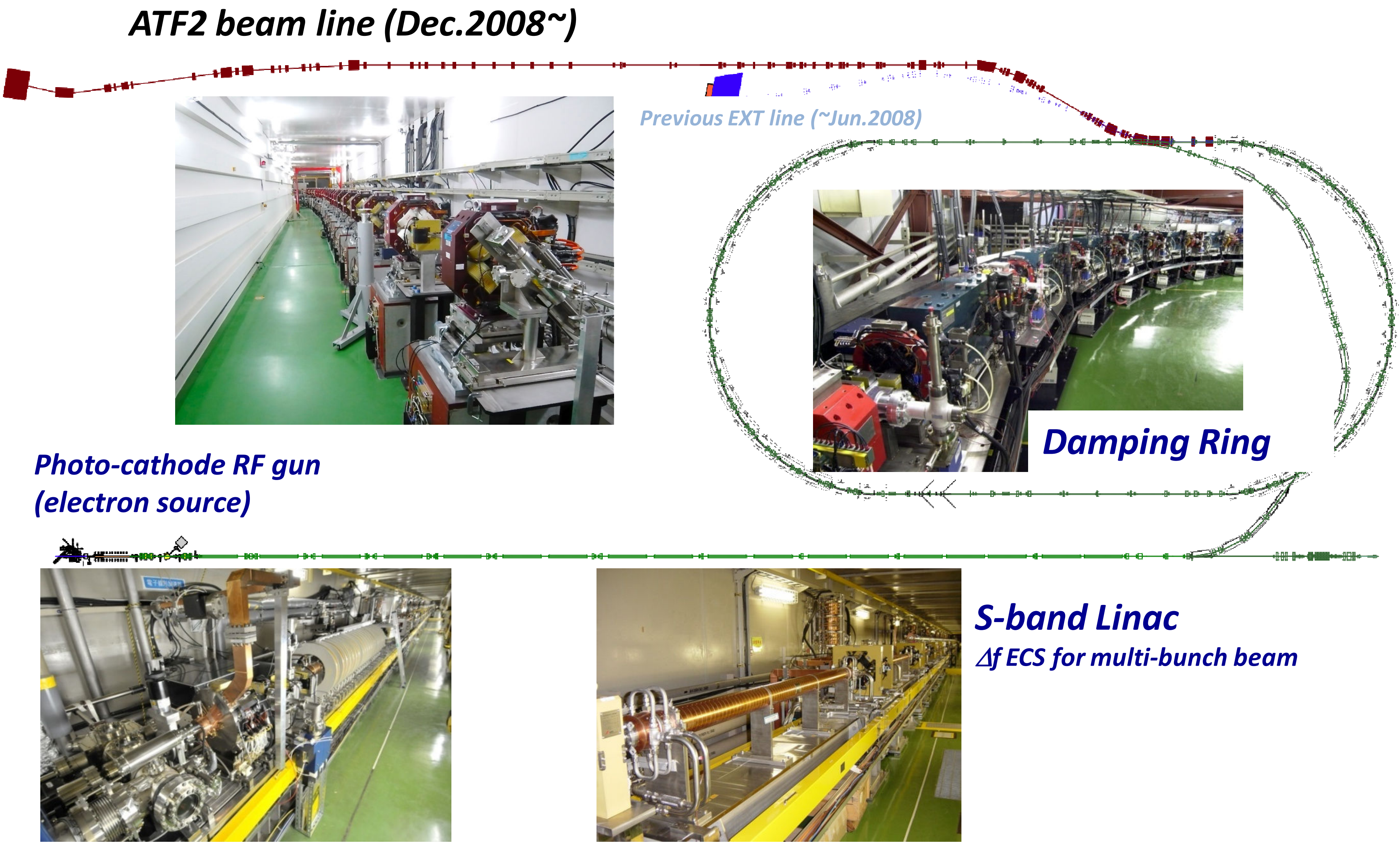


ATF



STF

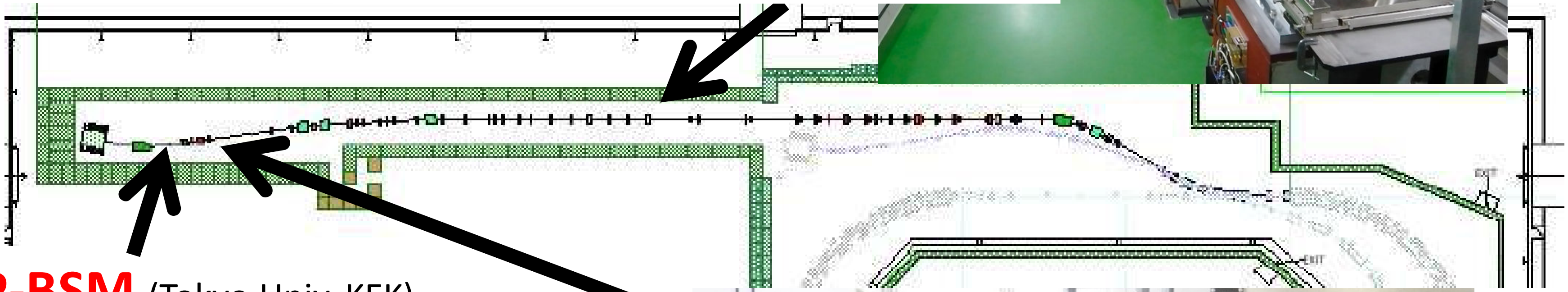
Accelerator Test Facility



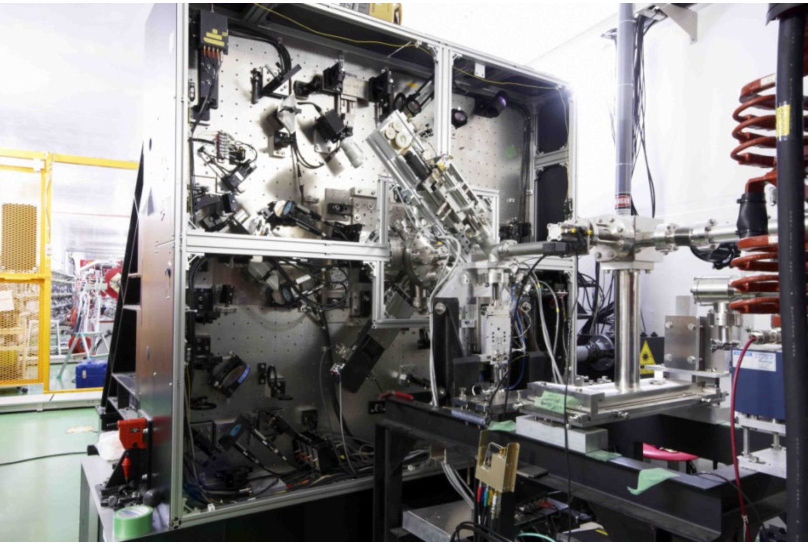
ATF2 Beamline

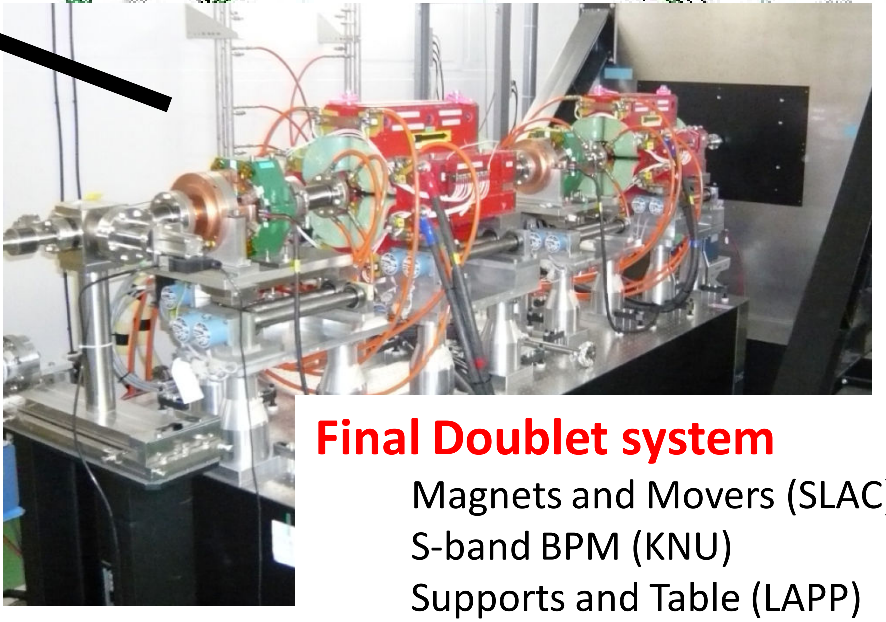
Final Focus beamline

Magnets and Movers (IHEP, SLAC, KEK)
C-band BPM (PAL, SLAC, KEK)
Support Table (KEK)



IP-BSM (Tokyo Univ, KEK)





Final Doublet system

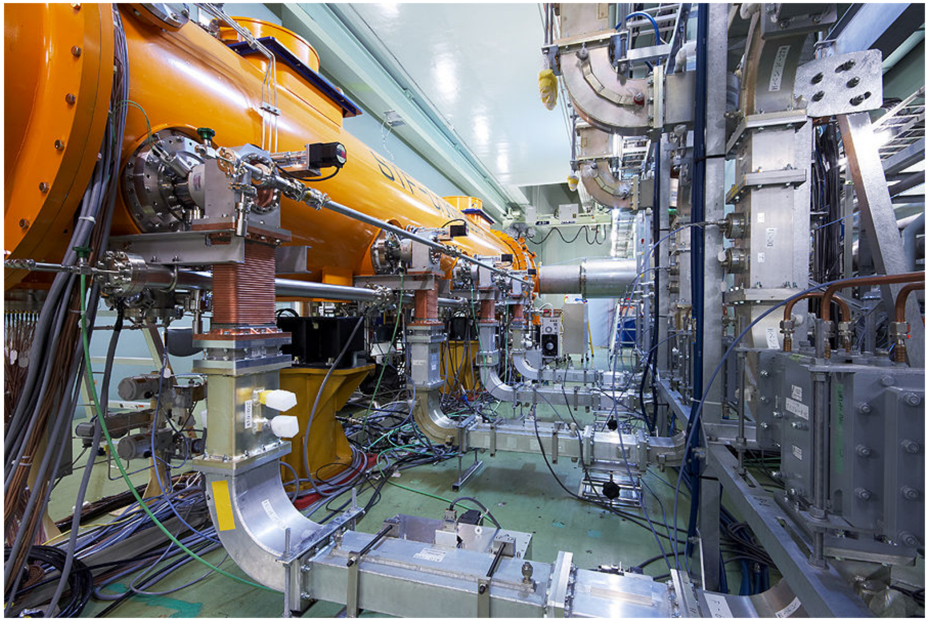
Magnets and Movers (SLAC)
S-band BPM (KNU)
Supports and Table (LAPP)

STF Phase1.0 4 TESLA-style cavities in a short cryomodule

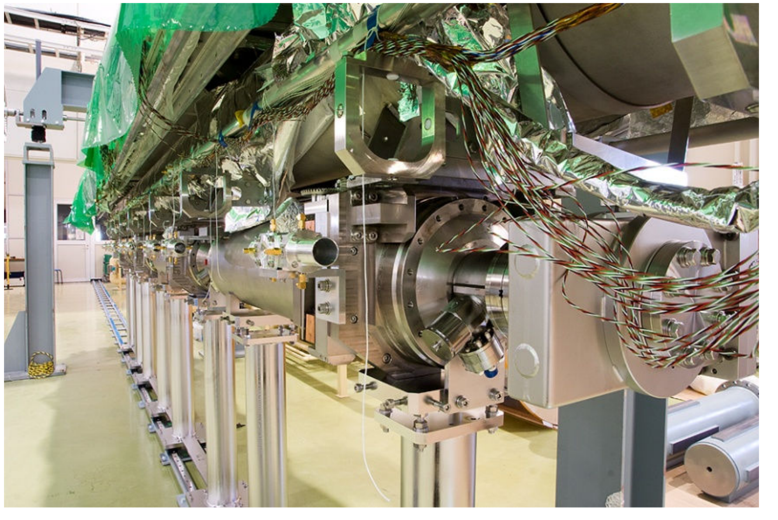
Cool-down test: May 2008 – Dec. 2008
Experience of ILC cryomodule technology

cryomodule assembly,
2k cryogenics technology,
low heat load technology,
cavity control for high performance for pulsed RF,
LLRF digital control technology,
RF power distribution, Qext control.

Cavity assembly in clean room



Loaded Q control using external phase shifter and reflector. +/-15% QL control was possible.



Cryomodule cold-mass assembly

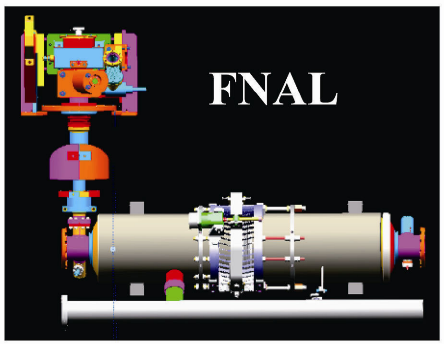
S1-Global

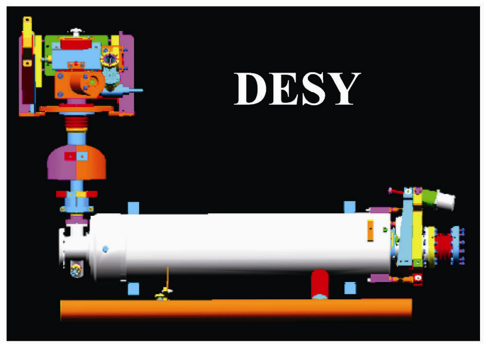
Aiming 31.5MV/m operational cryomodule, by international collaboration

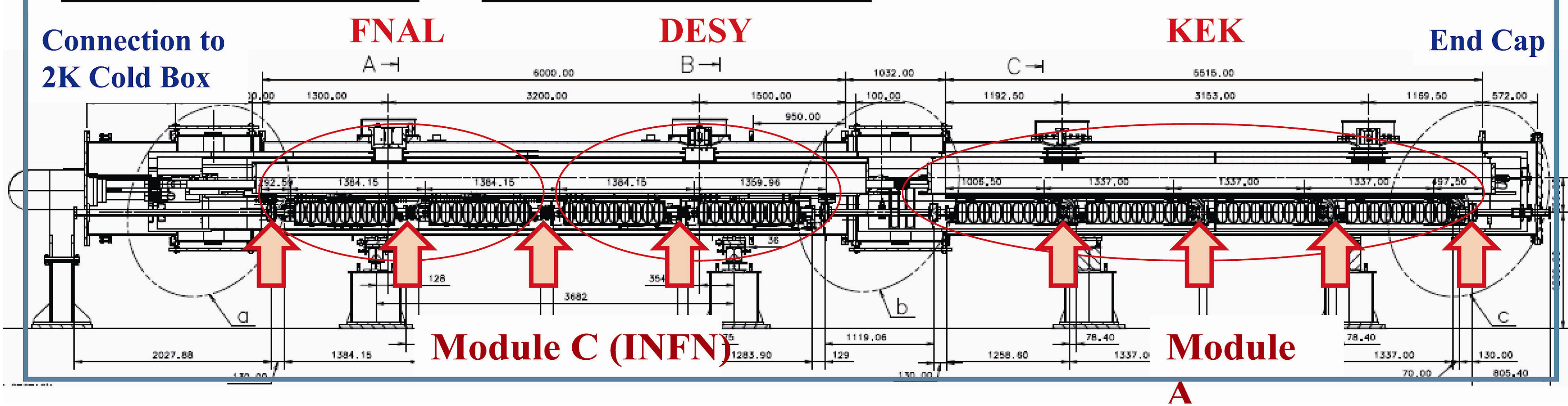
assembly : Oct 2009 - April 2010
operation : May 2010 – December 2010

MOU between INFN and KEK : exist
MOU between DESY and KEK : first version was exchanged
MOU between FNAL and KEK : first version was exchanged
MOU between SLAC and KEK : start soon

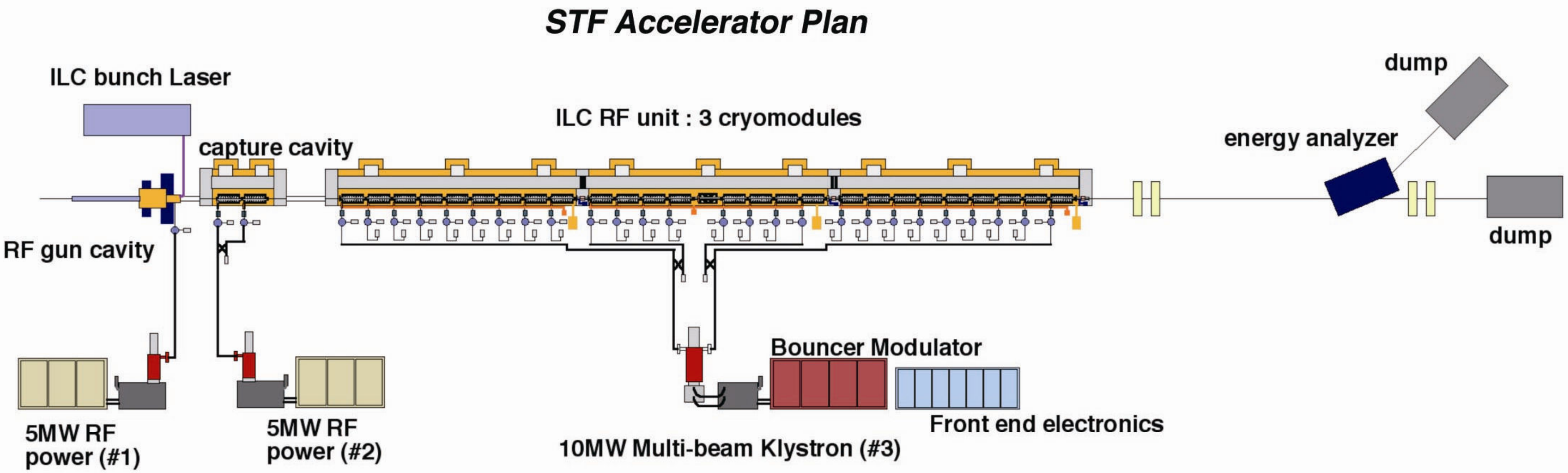
Module-A : existing KEK cryostat + 4 new KEK cavities
Module-C : INFN cryostat + 2 DESY cavities + 2 FNAL cavities
power distribution : 2 SLAC VTO + existing KEK WG







STF phase2.0 accelerator



Cavities : 2+26
Klystrons : 5MW + 5MW + 10MW
Beam : 850MeV, 1ms train、9mA、 5Hz

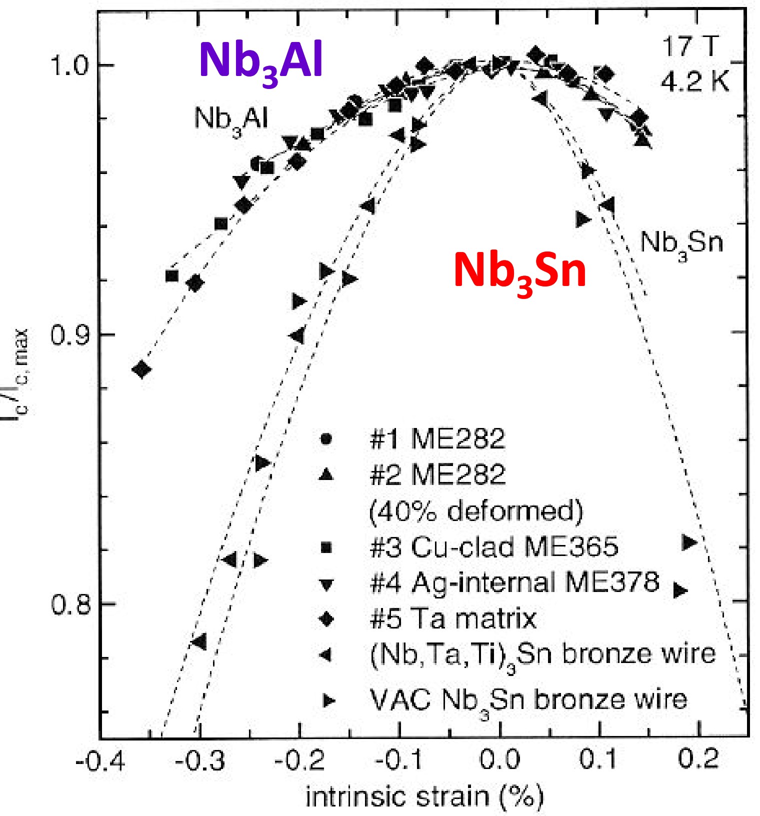
ILC structure beam, high pressure vessel regulation, beam user section in downstream

Component

Photocathode-RFgun : DESY-FNAL gun cavity, JINR-IAP Laser, ATF photo-cathode
Capture cavities: two 9-cell SC cavities in short cryomodule
Cryomodule: three ILC cryomodules with 26 SC cavities
Klystron: horizontal 10MW multi-beam klystron
Modulator: bouncer type modulator
waveguide : Linear-type power distribution

IRQ Development
Required for Luminosity Upgrade

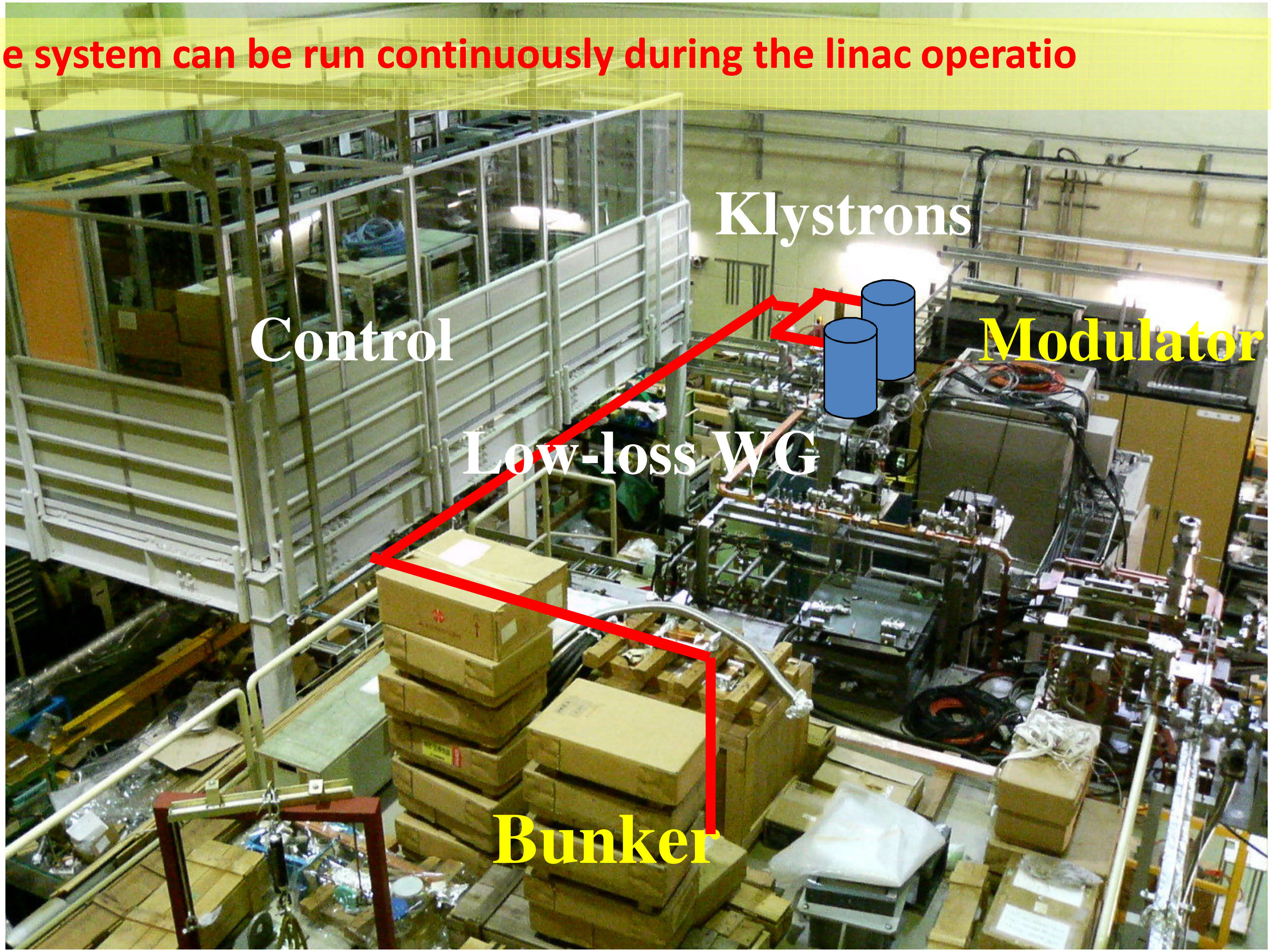
Parameters	LHC start	--> Upgrade
Field gradient	215 T/m	--> 250 T/m
Coil inner radius	35 mm	--> 50 mm
Yoke outer radius	235 mm	
Magnetic length	6.37 m	
Peak field in coil	8.63 T	--> ~ 15 T
Current	7149 A	
Superc. load-line ratio	80 %	
Inductance	87.9 mH	
Stored energy	2.24 MJ	
Mag. force/pole (octant)		
Fx	1.19 MN/m	
Fy	-1.37 MN/m	



Supercond. Sci. Technol. 18 (2005) p. 284.
by N. Banno et al.

KEK Testing Programs toward X-band CLIC

- The system can be run continuously during the linac operatio



VI. Other Asian Activities

Mashines&Detectors at Budker INP

A few generations of the colliders and detectors

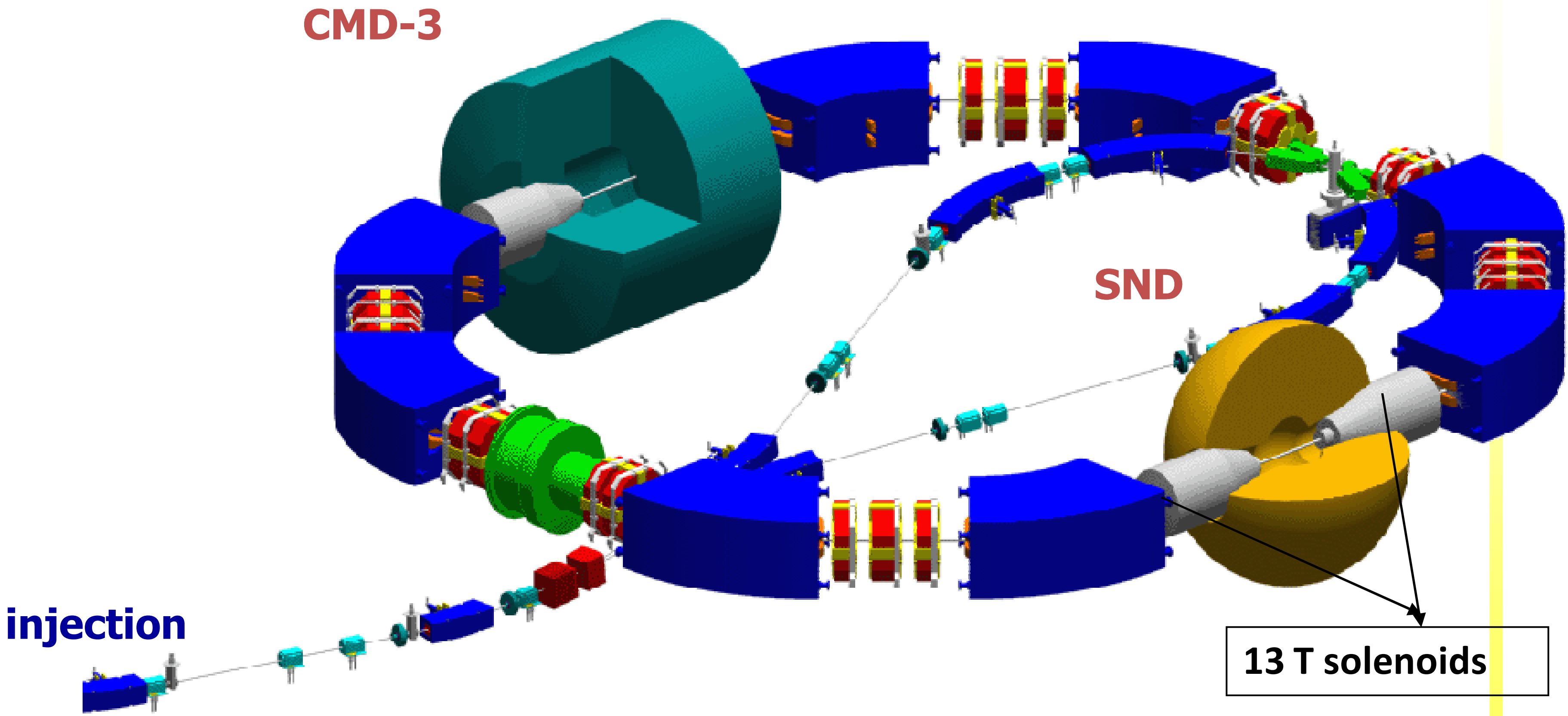
Collider	2E, Gev	Detectors	Operation
VEP-1 (e^-e^-)	0.32	2 detectors	1965-67
VEPP-2	1.4	3 detectors	1967-72
VEPP-3 (buster, SR, Nucl. Phys)	2.0	2 detectors	1972-
VEPP-4	11.0	OLYA, MD-1	1980-85
VEPP-2M	1.4	OLYA, ND, CMD SND, CMD-2	1974-2000
VEPP-4M	11.0	KEDR	2000-
VEPP-2000	2.0	SND, CMD-3	2009
Tau-Charm			?

- Study of hadronic cross sections $e^+e^- \to 2h, 3h, 4h \ldots, h = \pi, K, \eta, \ldots$
- Precision measurement of $R = \sigma(e^+e^- \to hadrons) / \sigma(e^+e^- \to \mu^+\mu^-)$
- Study of light vector mesons excitations: $\rho', \rho'', \omega', \varphi', \ldots$
- CVC testing by comparison of the energy dependence of $e^+e^- \to hadr.$ (I=1) cross sections with spectral functions in τ-*decays*
- Measurement of the nucleons electromagnetic form factors and search for *NN- resonances*
- Study of e^+e^- *-annihilation* into hadrons at low energy by radiative return (ISR)

VEPP-2000 Collider

Round beams (beam-beam effects suppressed), 2E=2000 MeV

Status: in operation since 2009

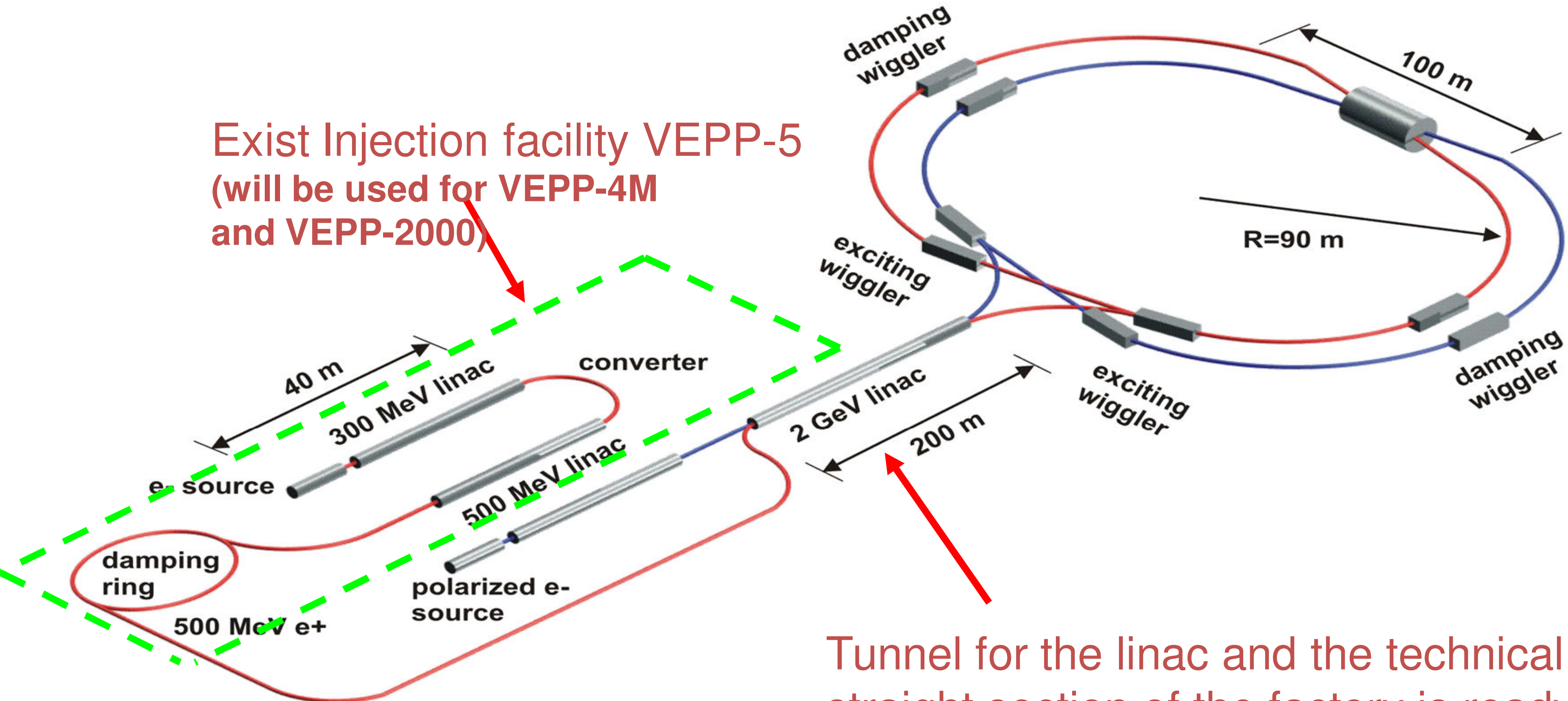


$L=1x10^{31}\ cm^{-2}\ c^{-1}$ at 2E=1.0 ГэВ,

$I^{-}I^{+}$ =45x35 mA^2, ΔV=0.10 !

Novosibirsk Tau-Charm factory

Exist Injection facility VEPP-5
(will be used for VEPP-4M and VEPP-2000)

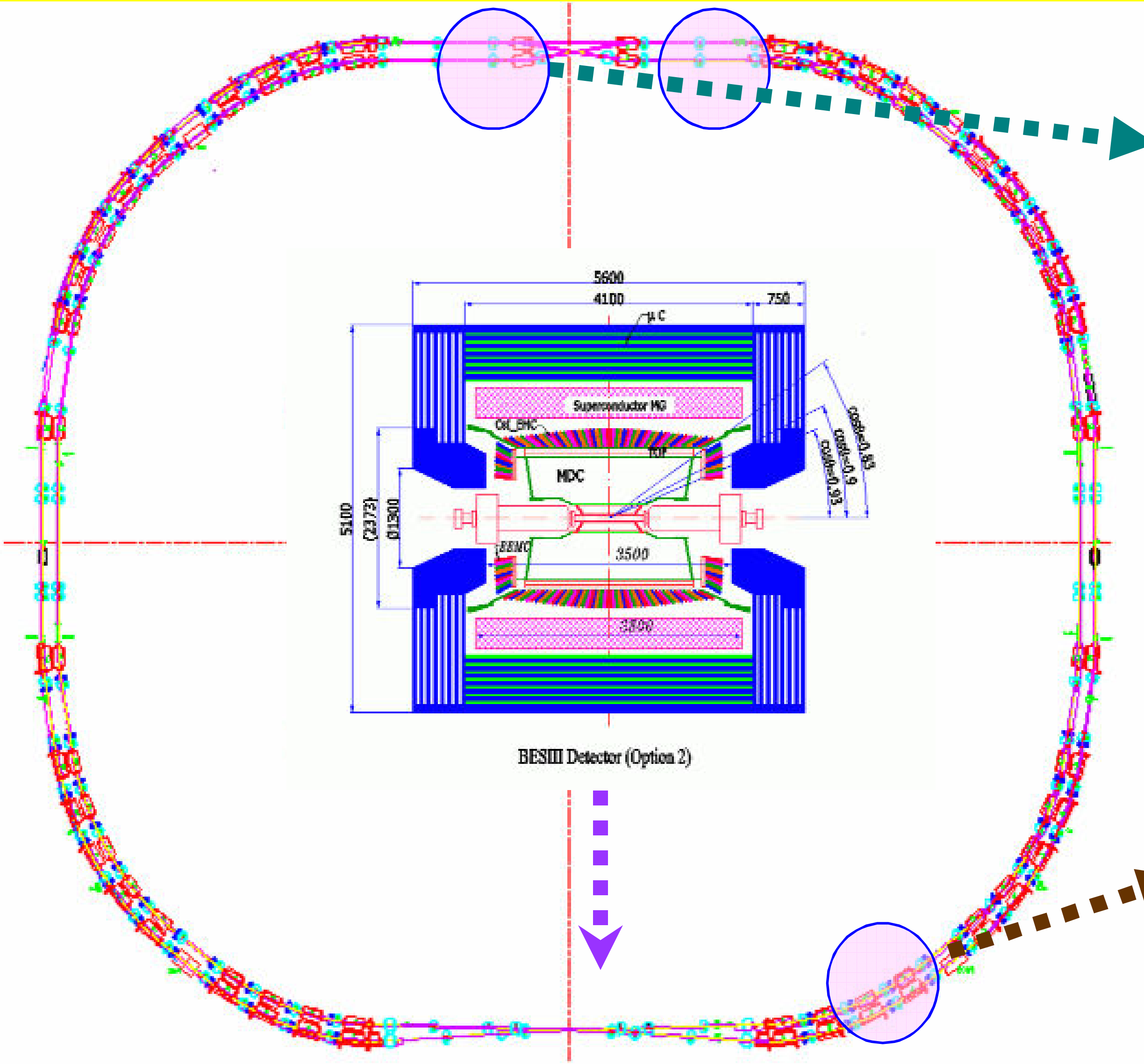


Tunnel for the linac and the technical straight section of the factory is ready

L = 2×1035 cm-2s-1, Variable energy Ecm= 2 – 5 GeV**

(Mashine in Levichev's presentation)

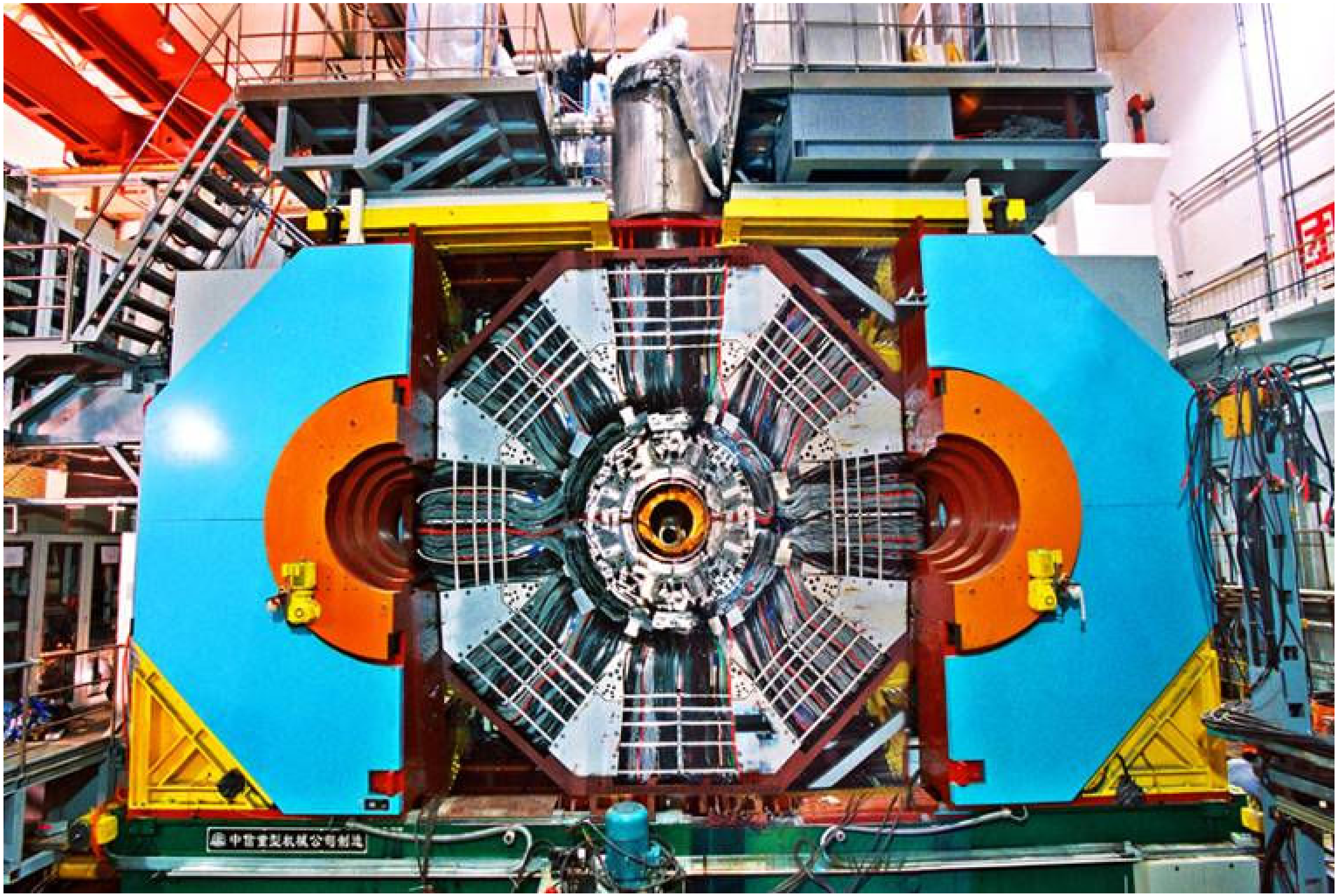
BEPCII: a high luminosity double-ring collider



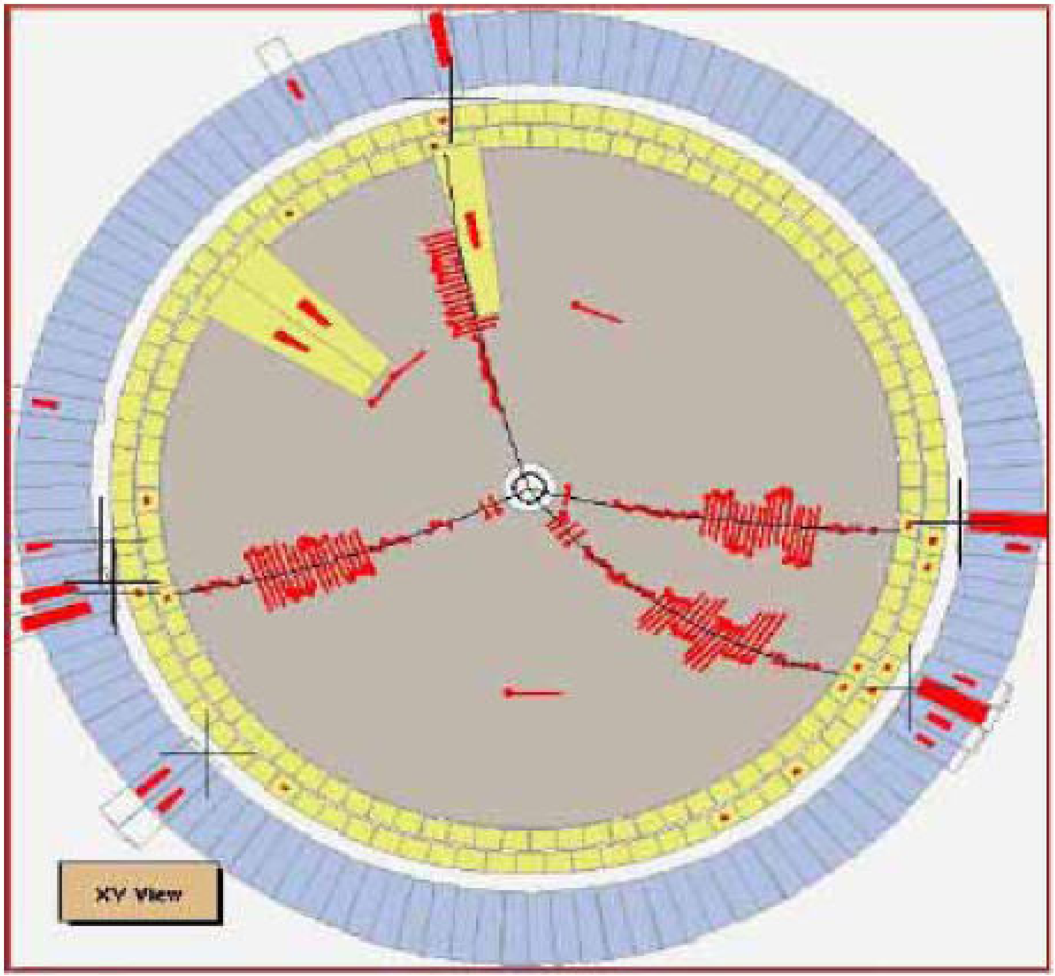
SC RF

Beam magnets

Detector installation and tuning completed April, and moved to IR May 2009

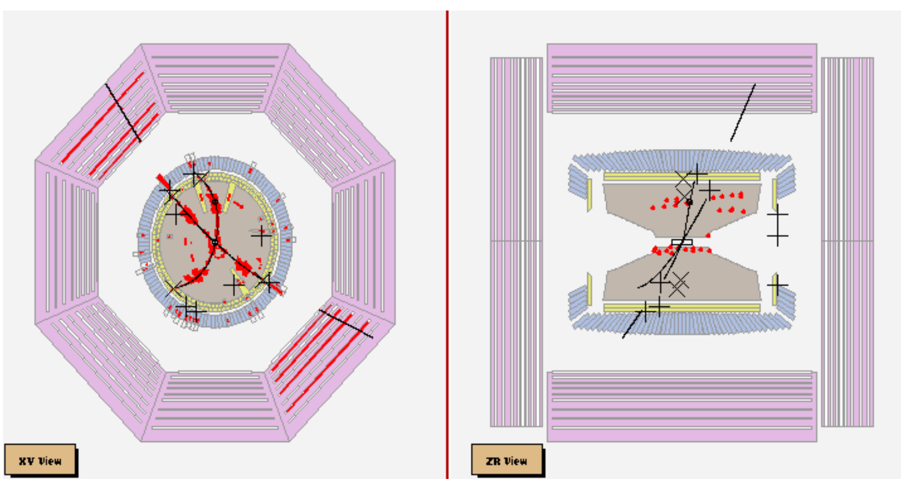


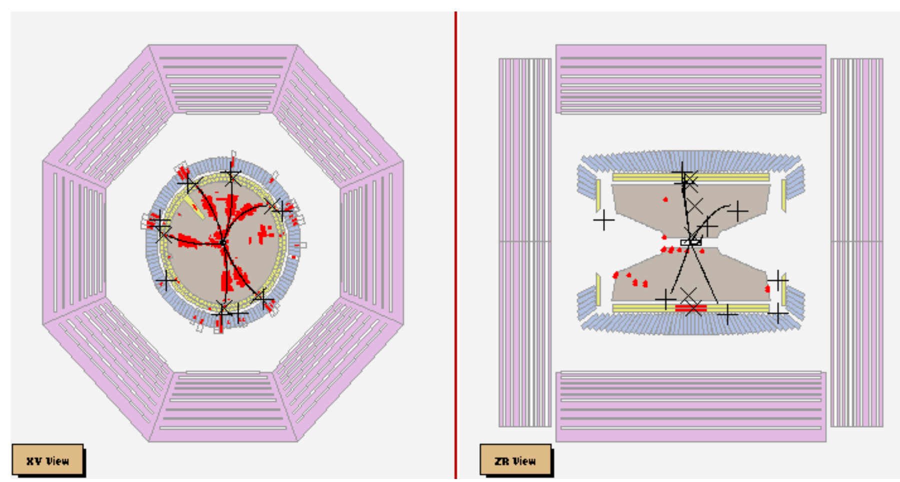
First hardron event observed on BESIII on July 19.



First data at psi(2S)

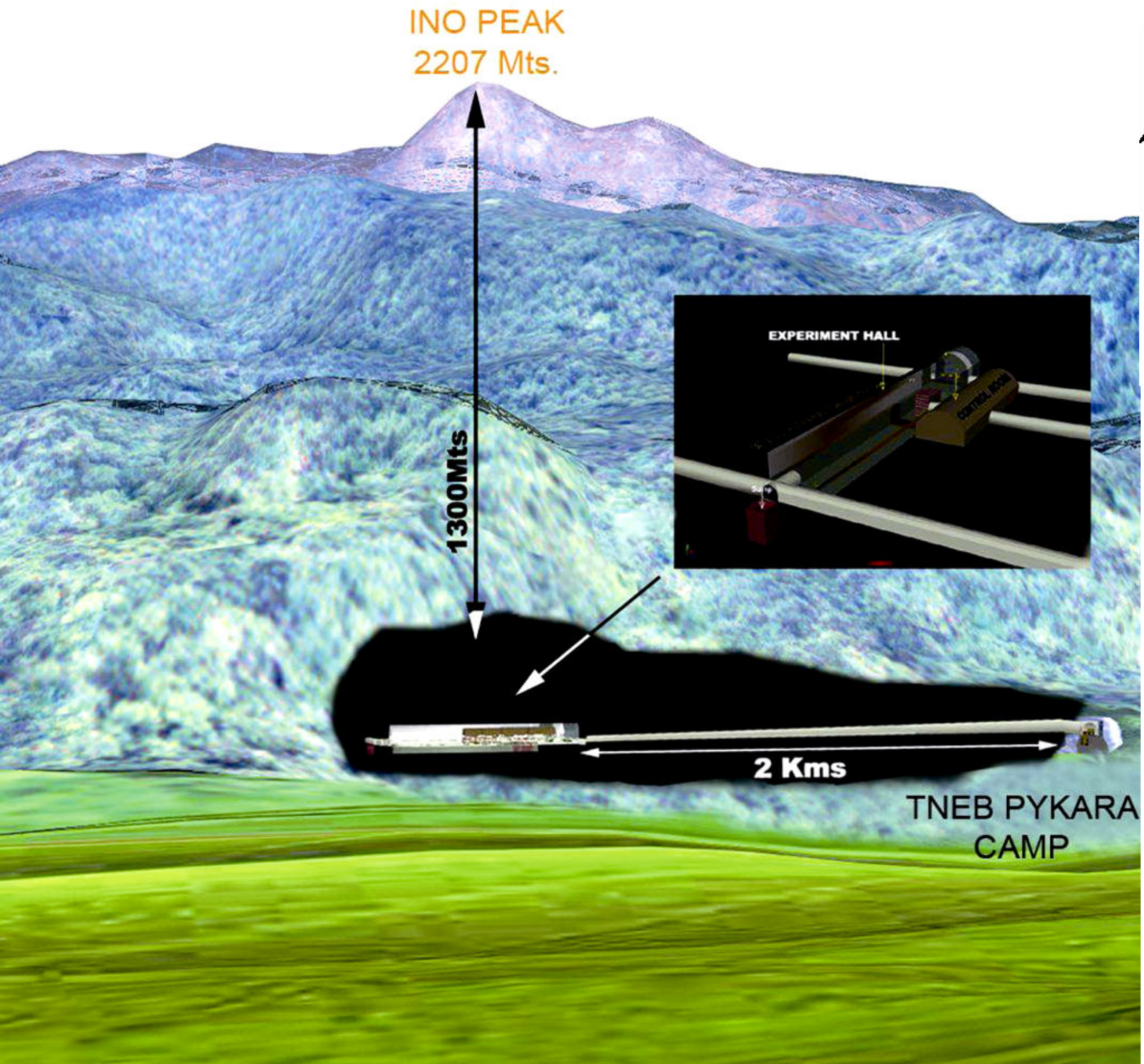
- Aug.: **1.3pb^{-1}**; Sep.: **2.3pb^{-1}**;
- Oct.: **14.4pb^{-1}**; Nov.: **4.8pb^{-1}**;
- Total integrated luminosity: **22.8pb^{-1}, 13M events**
- **Detector performance reached the design goal**
- **First physics results: see talk by Yifang Wang**

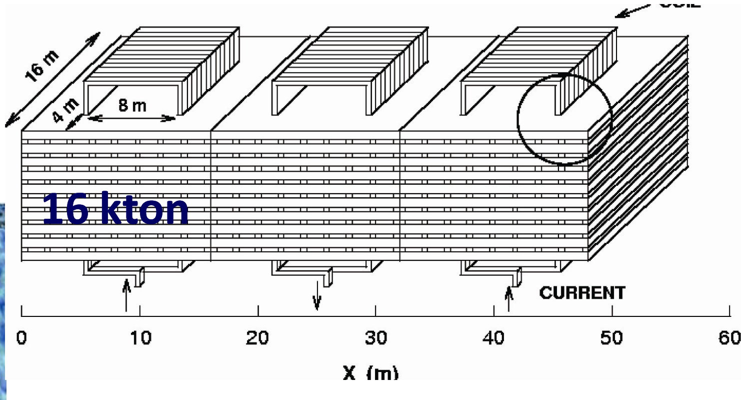




INO India-based Neutrino Observatory

Magnetized Iron Calorimeter Detector

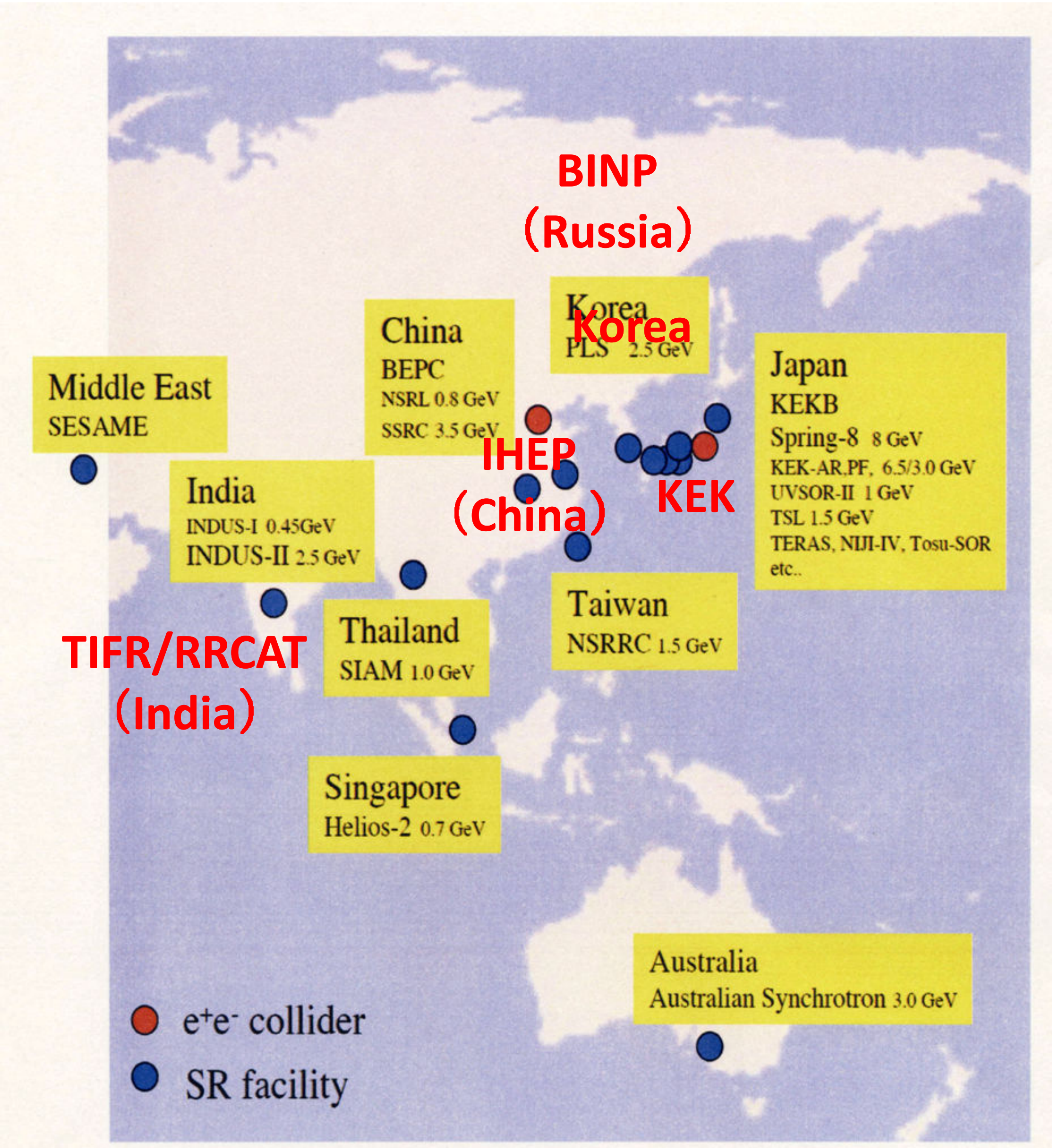




Sanctuary of Elephants and Tigers

VII. Conclusions

New Wave in Asia



Building up Multi-Lateral Collaboration Body
: KEK (Japan), IHEP (China). TIFR, RRCAT (India), Seoul U. (Korea), BINP (Russia)

Encouraging accelerator/ detector applications

Kick-off workshop :
in December 2009