Asia-Pacific Regional Report

Yasuhiro Okada (KEK)

10th ICFA Seminar on Future Perspectives in High-Energy Physics 2011

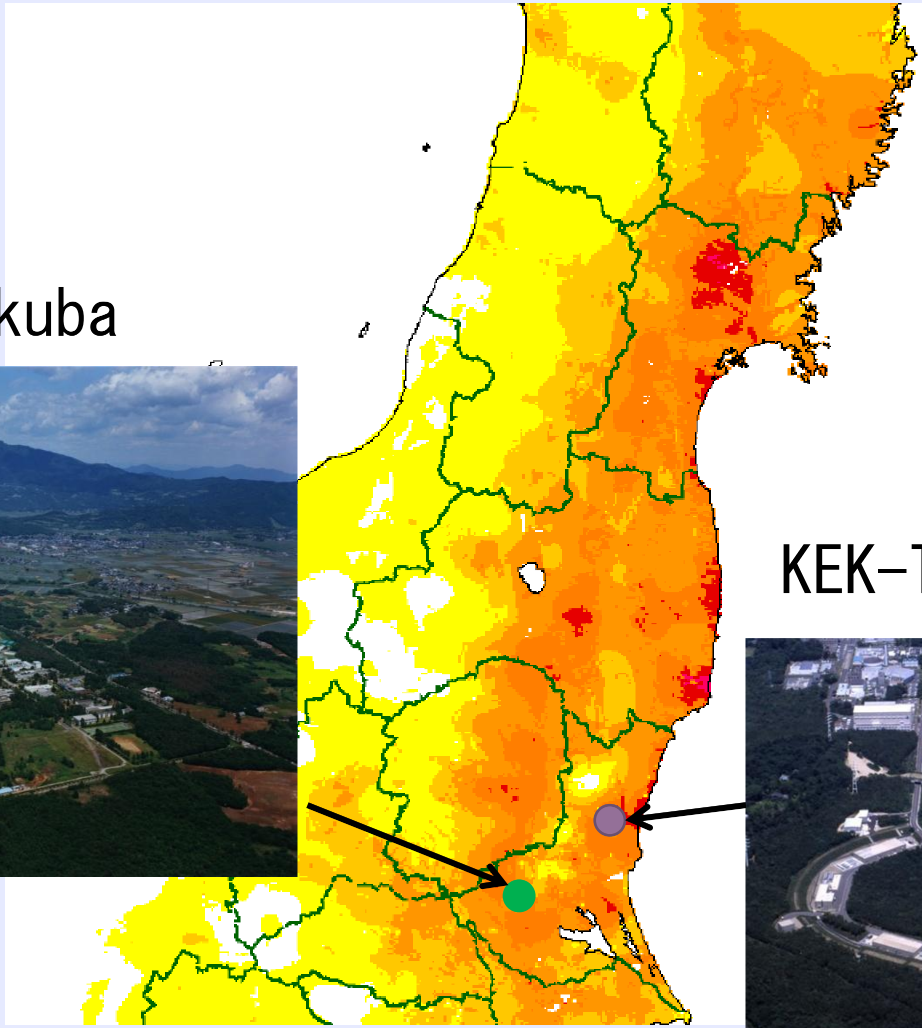
Science driving facilities for particle physics

October 3, 2011, CERN

KEK recovery plan

Earthquake on March 11, 2011

KEK-Tsukuba

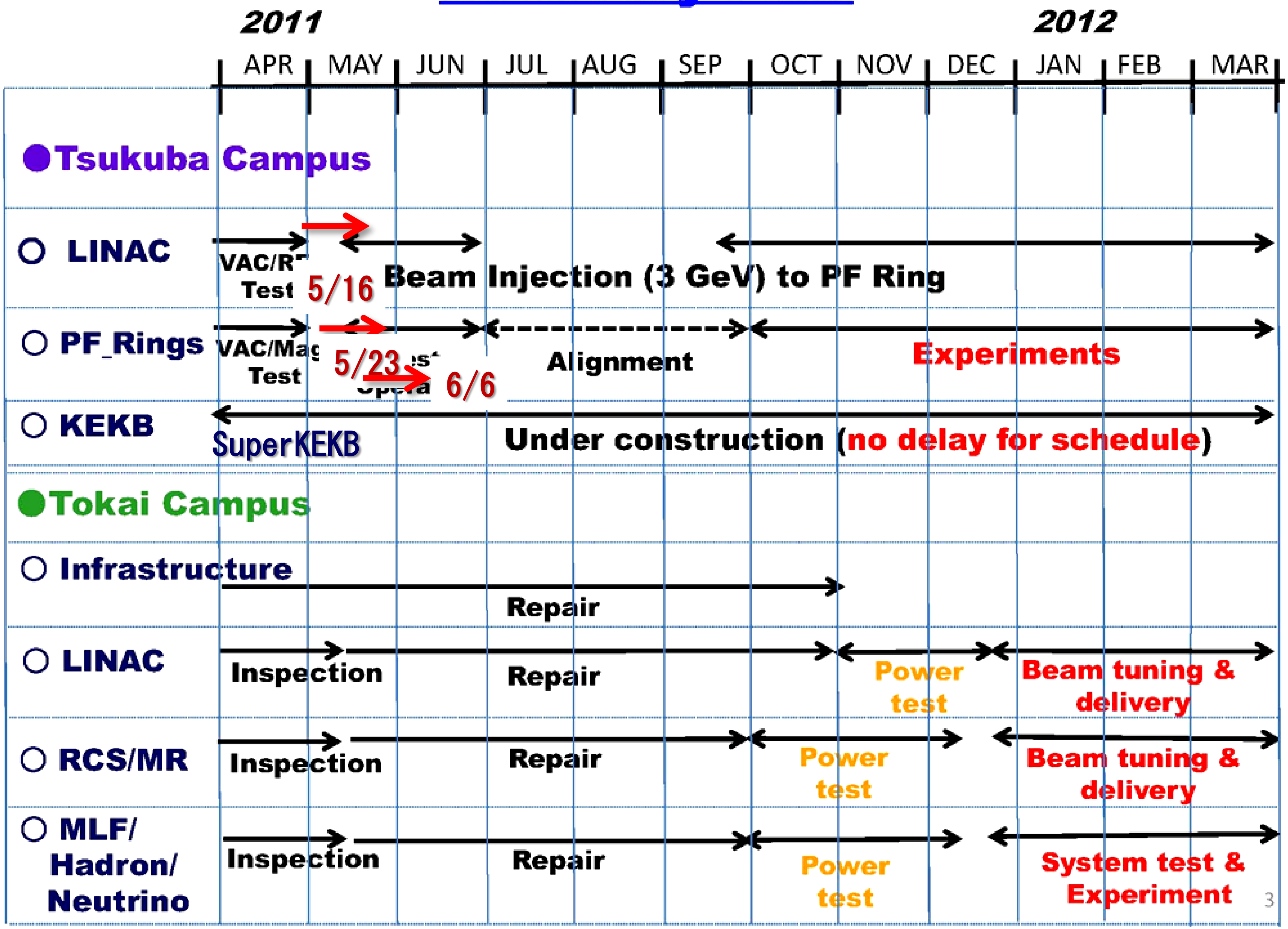


KEK-Tokai (J-PARC)

http://www.seisvol.kishou.go.jp/eq/suikei/

Damage in Tsukuba and Tokai

Recovery Plan



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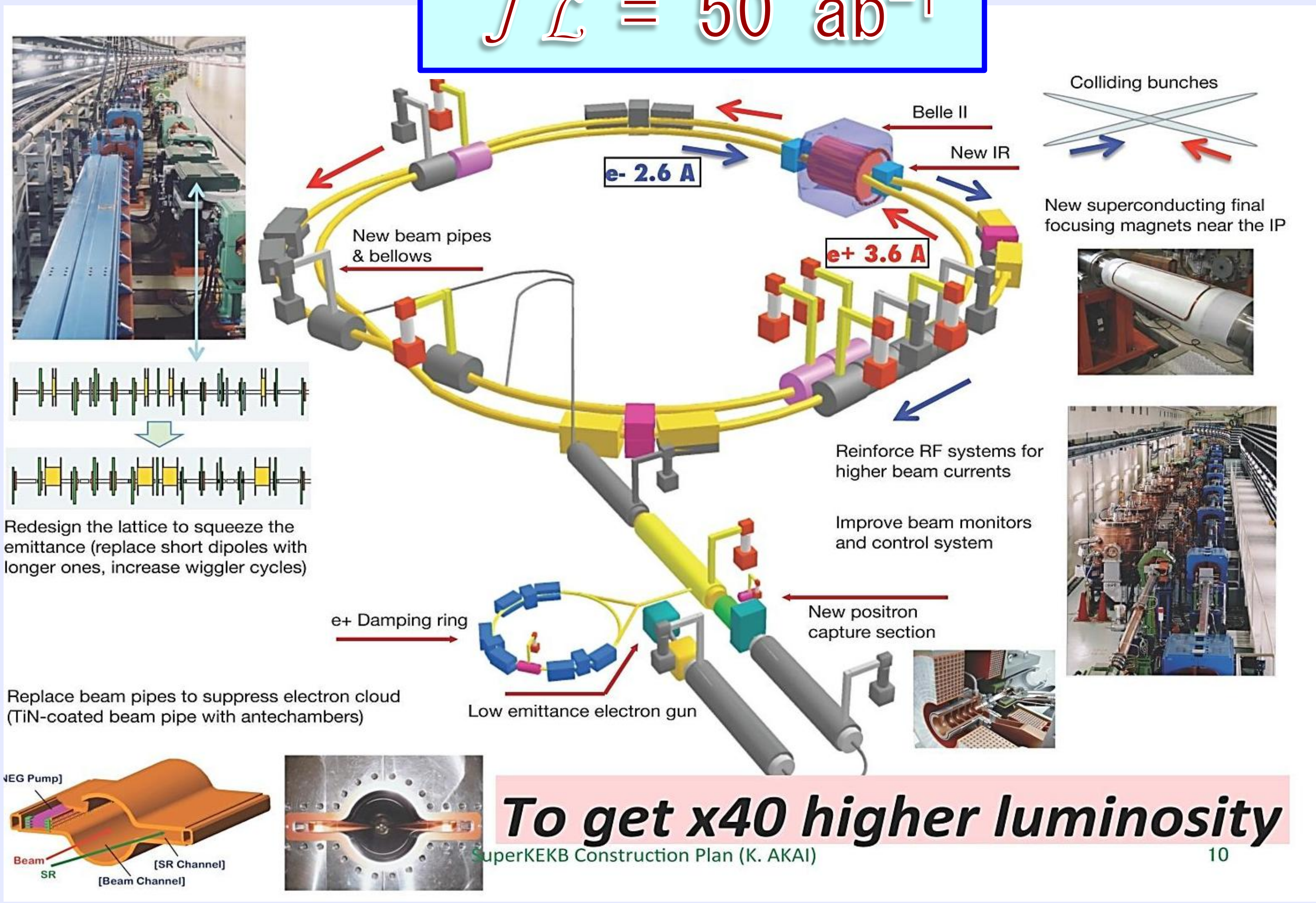
Quark flavor physics and tau physics

- KEKB goes to Super KEKB
- BEPCII/BESIII is on-going at IHEP, Beijing
- Kaon programs at J-PARC

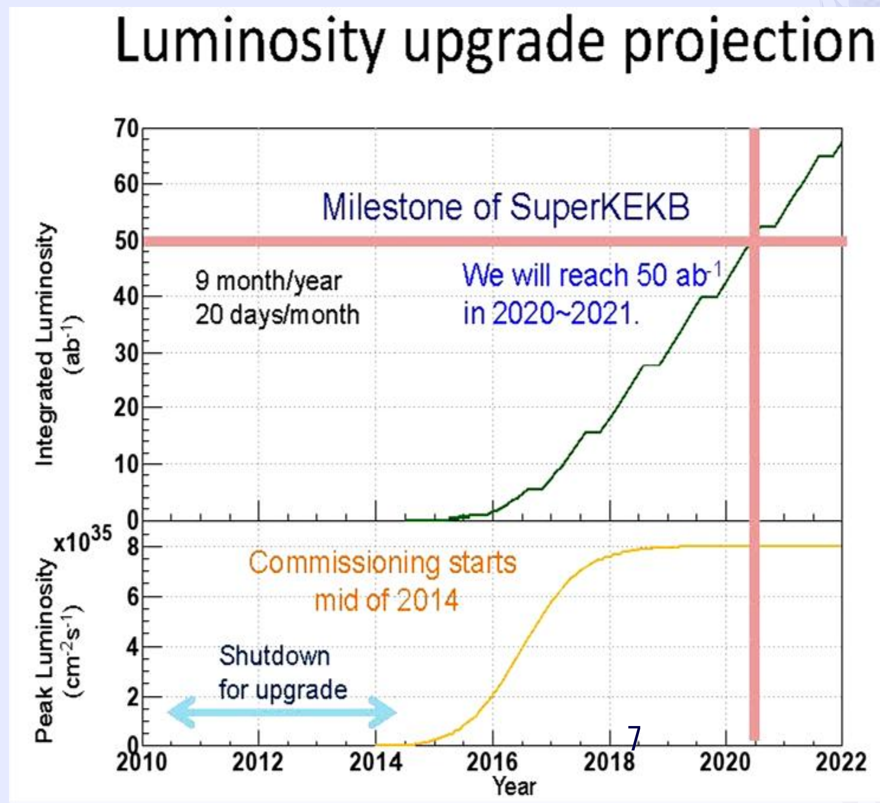
KEKB to be upgraded to SuperKEKB with $\mathcal{L} = 8 \times 10^{35}$ ($40 \times \mathcal{L}_{KEKB}$)

$$\int \mathcal{L} = 50\ ab^{-1}$$

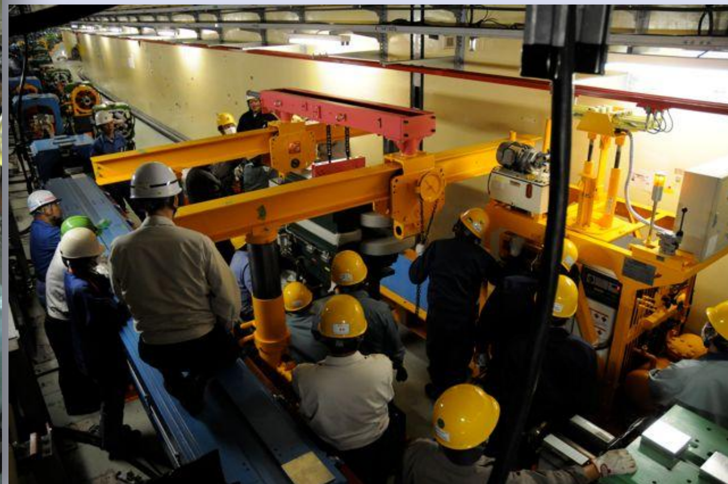


June 30. 2010

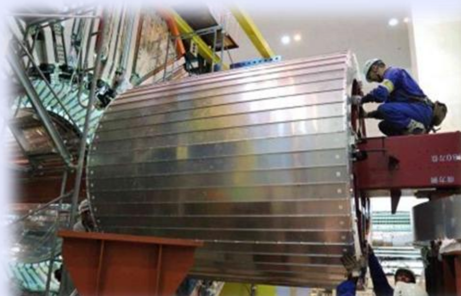
KEKB stopped its operation on June 30, 2010.
SuperKEKB/Belle II construction is on-going.
Aim to accumulate 50 times more integrated luminosity by ~2020.

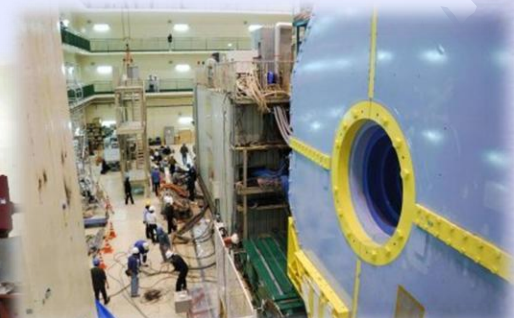


KEKB disassembling



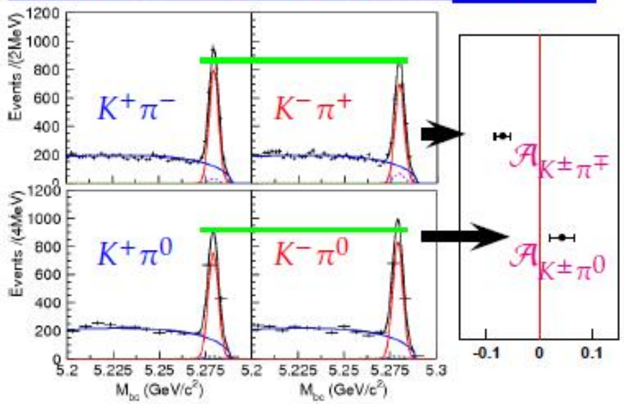
Belle disassembling



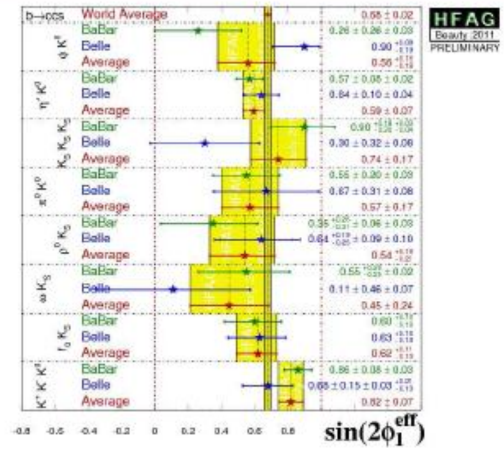


Possible hints for NP?

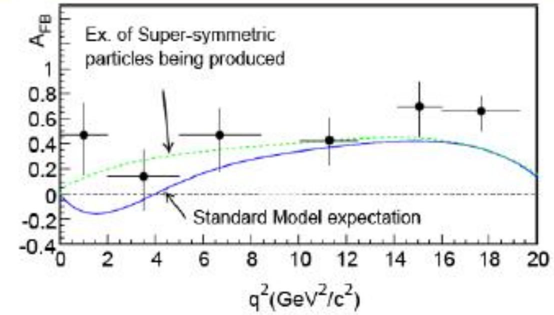
Difference in CPV between B^0 and B^+



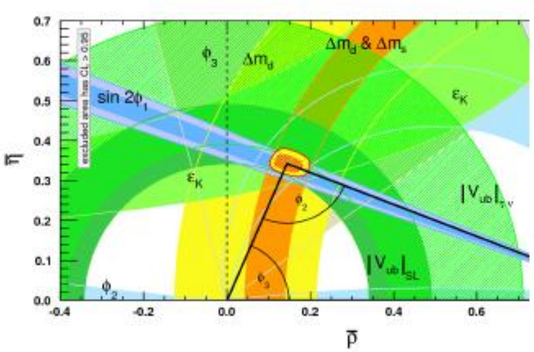
Anomalous CPV in $b \to s$ processes?

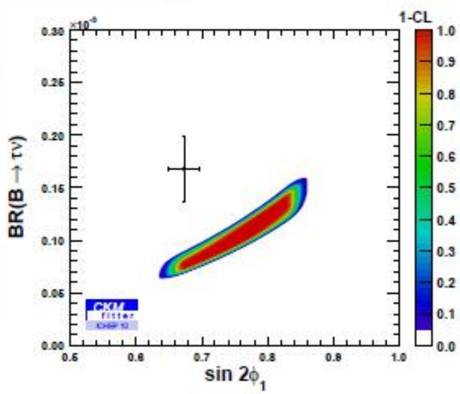


Anomaly in $B \to K^* \ell^+ \ell^-$ decay?

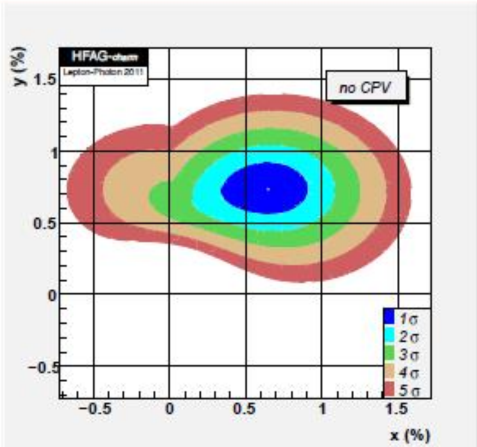


Inconsistency in Unitarity Triangle?





Unexpectedly large $D^0\overline{D}^0$ oscillation



Belle II TDR

Observable	Belle 2006 ($\sim$0.5 ab^{-1})	Belle II/SuperKEKB (5 ab^{-1})	Belle II/SuperKEKB (50 ab^{-1})	LHCb[†] (2 fb^{-1})	LHCb[†] (10 fb^{-1})
Hadronic $b \to s$ transitions					
$\Delta S_{\phi K^0}$	0.22	0.073	0.029		0.14
$\Delta S_{\eta' K^0}$	0.11	0.038	0.020		
$\Delta S_{K^0_S K^0_S K^0_S}$	0.33	0.105	0.037	-	-
$\Delta \mathcal{A}_{\pi^0 K^0_S}$	0.15	0.072	0.042	-	-
$A_{\phi\phi K^+}$	0.17	0.05	0.014		
$\phi_1^{eff}(\phi K_S)$ Dalitz		3.3°	1.5°		
Radiative/electroweak $b \to s$ transitions					
$S_{K^0_S \pi^0 \gamma}$	0.32	0.10	0.03	-	-
$\mathcal{B}(B \to X_s \gamma)$	13%	7%	6%	-	-
$A_{CP}(B \to X_s \gamma)$	0.058	0.01	0.005	-	-
C_9 from $\bar{A}_{FB}(B \to K^* \ell^+ \ell^-)$	-	11%	4%		
C_{10} from $\bar{A}_{FB}(B \to K^* \ell^+ \ell^-)$	-	13%	4%		
C_7/C_9 from $\bar{A}_{FB}(B \to K^* \ell^+ \ell^-)$	-		5%		7%
R_K		0.07	0.02		0.043
$\mathcal{B}(B^+ \to K^+ \nu\bar{\nu})$	[††] $< 3\ \mathcal{B}_{SM}$		30%	-	-
$\mathcal{B}(B^0 \to K^{*0} \nu\bar{\nu})$	[††] $< 40\ \mathcal{B}_{SM}$		35%	-	-
Radiative/electroweak $b \to d$ transitions					
$S_{\rho\gamma}$	-	0.3	0.15		
$\mathcal{B}(B \to X_d \gamma)$	-	24% (syst.)		-	-
Leptonic/semileptonic B decays					
$\mathcal{B}(B^+ \to \tau^+ \nu)$	3.5σ	10%	3%	-	-
$\mathcal{B}(B^+ \to \mu^+ \nu)$	[††] $< 2.4 \mathcal{B}_{SM}$	4.3 ab^{-1} for 5σ discovery		-	-
$\mathcal{B}(B^+ \to D \tau \nu)$	-	8%	3%	-	-
$\mathcal{B}(B^0 \to D \tau \nu)$	-	30%	10%	-	-
LFV in τ decays (U.L. at 90% C.L.)					
$\mathcal{B}(\tau \to \mu\gamma)$ $[10^{-9}]$	45	10	5	-	-
$\mathcal{B}(\tau \to \mu\eta)$ $[10^{-9}]$	65	5	2	-	-
$\mathcal{B}(\tau \to \mu\mu\mu)$ $[10^{-9}]$	21	3	1	-	-
Unitarity triangle parameters					
$\sin 2\phi_1$	0.026	0.016	0.012	$\sim$0.02	$\sim$0.01
ϕ_2 $(\pi\pi)$	11°	10°	3°	-	-
ϕ_2 $(\rho\pi)$	$68° < \phi_2 < 95°$	3°	1.5°	10°	4.5°
ϕ_2 $(\rho\rho)$	$62° < \phi_2 < 107°$	3°	1.5°	-	-
ϕ_2 (combined)		2°	$\lesssim 1°$	10°	4.5°
ϕ_3 $(D^{(*)}K^{(*)})$ (Dalitz mod. ind.)	20°	7°	2°	8°	
ϕ_3 $(DK^{(*)})$ (ADS+GLW)	-	16°	5°	5-15°	
ϕ_3 $(D^{(*)}\pi)$	-	18°	6°		
ϕ_3 (combined)		6°	1.5°	4.2°	2.4°
$\lvert V_{ub} \rvert$ (inclusive)	6%	5%	3%	-	-
$\lvert V_{ub} \rvert$ (exclusive)	15%	12% (LQCD)	5% (LQCD)	-	-
$\bar{\rho}$	20.0%		3.4%		
$\bar{\eta}$	15.7%		1.7%		

Bs physics

Observable	Belle	Belle II/SuperKEKB		LHCb[†] (2 fb^{-1})	LHCb[†] (10 fb^{-1})
B_s physics	(25 fb^{-1})	(5 ab^{-1})			
$\mathcal{B}(B_s \to \gamma\gamma)$	$< 8.7 \times 10^{-6}$	0.25×10^{-6}		-	-
$\Delta\Gamma_s^{CP}/\Gamma_s$ $(Br(B_s \to D_s^{(*)} D_s^{(*)}))$	3%	1% (model dependency)		-	-
$\Delta\Gamma_s/\Gamma_s$ $(B_s \to f_{CP}$ t-dependent)	-	1.2%		-	-
ϕ_s (with $B_s \to J/\psi\phi$ etc.)	-	-	-	0.02	0.01
$\mathcal{B}(B_s \to \mu^+\mu^-)$	-			6 fb^{-1} for 5σ discovery	
ϕ_3 $(B_s \to KK)$	-			7-10°	
ϕ_3 $(B_s \to D_s K)$	-			13°	
Υ decays	(3 fb^{-1})	(500 fb^{-1})			
$\mathcal{B}(\Upsilon(1S) \to$ invisible)	$< 2.5 \times 10^{-3}$	$< 2 \times 10^{-4}$			
	($\sim$0.5 ab^{-1})[‡]	(5 ab^{-1})	(50 ab^{-1})		
Charm physics					
D mixing parameters					
x	0.25%	0.12%	0.09%		0.25%[††]
y	0.16%	0.10%	0.05%		0.05%[††]
$\delta_{K\pi}$	10°	6°	4°		
$\lvert q/p \rvert$	0.16	0.1	0.05		
ϕ	0.13 rad	0.08 rad	0.05 rad		
A_D	2.4%	1%	0.3%		
New particles[8]					
$\gamma\gamma \to Z(3930) \to DD^*$		$> 3\sigma$			
$B \to KX(3872)(\to D^0 D^{*0})$		400 events			
$B \to KX(3872)(\to J/\psi\pi^+\pi^-)$		1250 events			
$B \to KZ^+(4430)(\to \psi'\pi^+)$		1000 events			
$e^+e^- \to \gamma_{ISR} Y(4260)(\to J/\psi\pi^+\pi^-)$		3000 events			
Electroweak parameters		($\sim$10 ab^{-1})			
$\sin^2\Theta_W$	-	3×10^{-4}			

Charm physics

Tau LFV

Complementarity between
e^+e^- B factories and LHCb

Belle II Collaboration

~400 members, 54 Institutes, 13 countries

Australia
U. Melbourne
U. Sydney

Austria
AAS

China
IHEP
U. S&T

Czech
Charles U.

Germany
KIT
LMU
Max-Planck Inst.
Technical U. Munich
U.Bonn
U. Giessen
U. Goettingen
U. Heidelberg

India
Inst. of Tech Guwahati
Inst. of Tech Madras
Inst. of Math & Sci
Panjab U.
TIFR

Japan
KEK
Nagoya U.
Nara Women's U.
Niigata U.
NPC
Osaka City U.
Shinshu U.
Toho U.
Tohoku U.
Tokyo Metropolitan U.
U. Tokyo

Korea
Gyeongsang U.
Hanyang U.
KISTI
Korea U.
KyungPook U.
Seoul U.
Yonsei U.

Poland
Inst. of Nuclear Physics

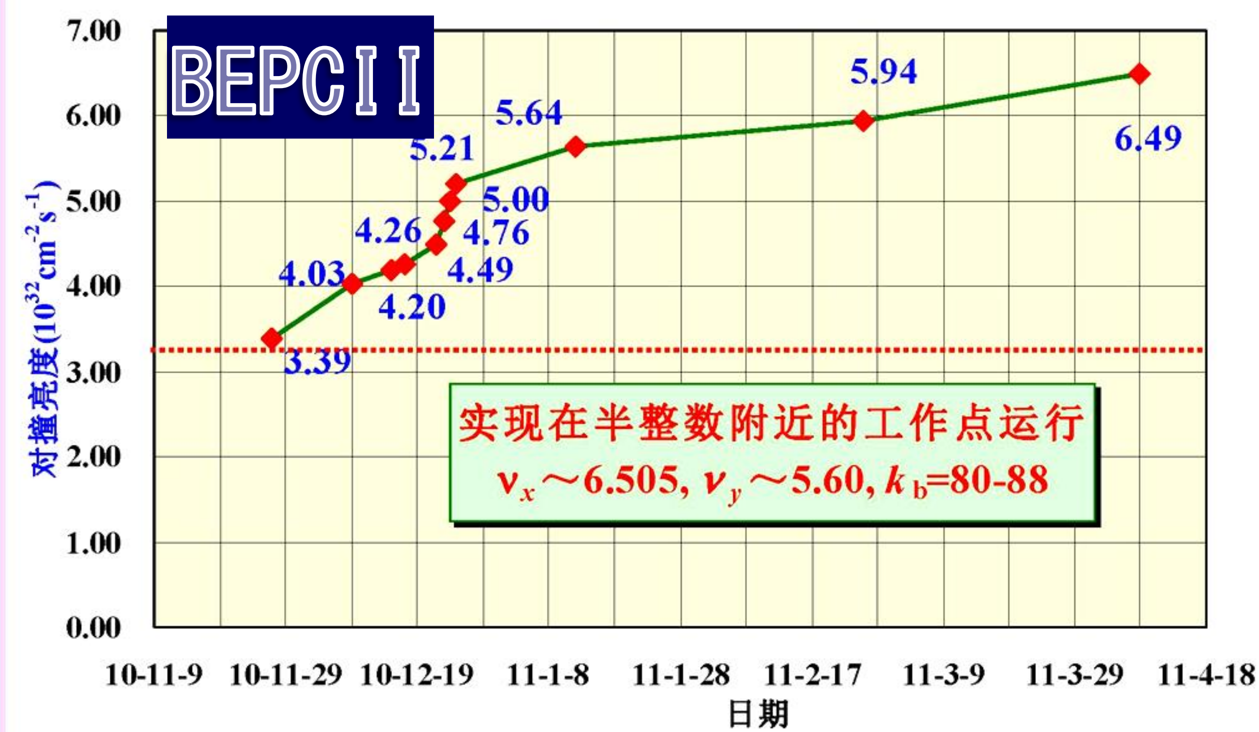
Russia
BINP
Inst. for Th. & Exp. Phys
IHEP

Slovenia
U. Ljubliana
U. Nova Gorica

Taiwan
Fu Jen Catholic U.
Central U.
Taiwan U.
United U.

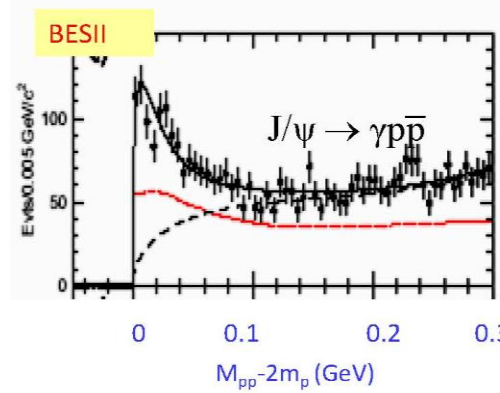
USA
Indiana U.
Luther College
PNNL
U. Cincinnati
U. Hawaii
Virginia Polytechnic
Wayne State U.

BESIII data taking status & plan



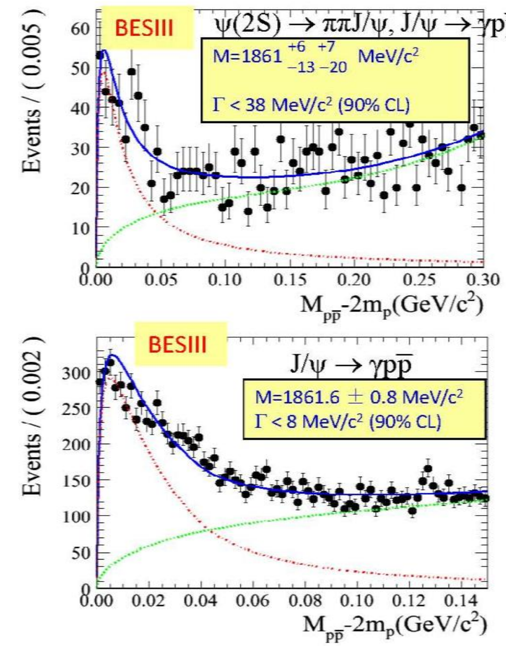
	Previous Data	BESIII Near future
J/psi	BESII 58M	2009：225M, 2012：1 B
Psi'	CLEO：28 M	2009：106M
Psi"	CLEO：0.8 /fb	2010：0.9/fb, 2011 2.0/fb
ψ(4040)/ψ(4160) & scan	CLEO：0.6/fb @ ψ(4160)	2011：0.5/fb @ ψ(4040) 2013：4/fb
Tau mass	BESII	2011
R scan & Tau	BESII	2014

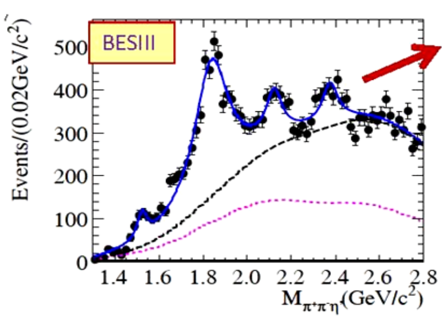
Confirmation of BESII observation : $p\bar{p}$ threshold enhancement in J/ψ decays



M=1859 $^{+3}_{-10}$ $^{+5}_{-25}$ MeV/c²
Γ < 30 MeV/c² (90% CL)

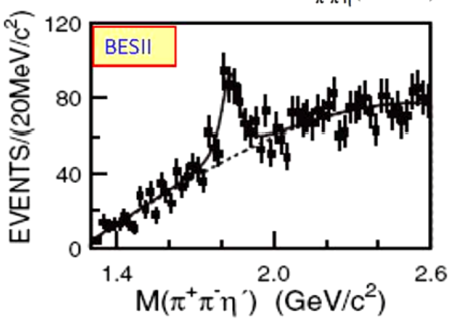
arXiv:1001.5328,
Chinese Phys. C 34（2010）421





Two new resonance

resonance	M(MeV/c^2)	Γ(MeV/c^2)	Stat. sig.
X(1835)	1838.1 ± 2.8	179.5 ± 9.1	$> 25\sigma$
X(2120)	2124.8 ± 5.6	101 ± 14	$> 7.2\sigma$
X(2370)	2371.0 ± 6.4	108 ± 15	$> 6.7\sigma$



significance: $7.7\,\sigma$

$M = 1833.7 \pm 6.1(\text{stat}) \pm 2.7(\text{syst})$ MeV

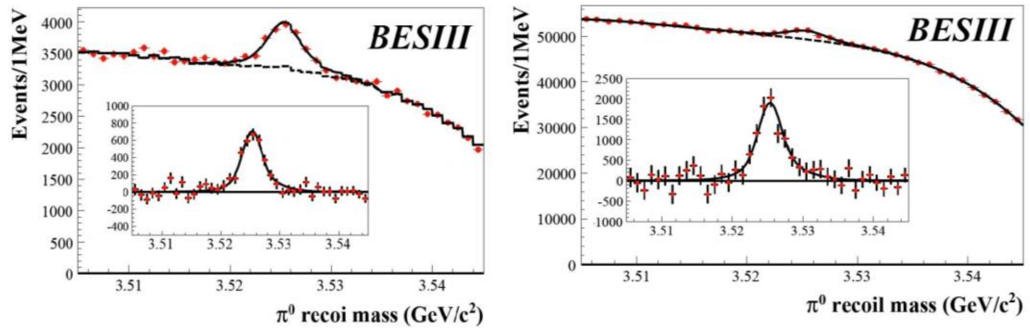
$\Gamma = 67.7 \pm 20.3(\text{stat}) \pm 7.7(\text{syst})$ MeV

To be submitted to PRL

New resonances in BESIII : X(2120) and X(2370) in $J/\psi \to \gamma\eta'\pi\pi$

Confirmation of BESII observation : X(1835) in $J/\psi \to \gamma\eta'\pi\pi$

Observation of h_c in $\psi(2S) \rightarrow \pi^0 h_c, h_c \rightarrow \gamma\eta_c$



$M(h_c)^{Inc}$ = 3525.40 ± 0.13 ± 0.18 MeV

$\Gamma(h_c)^{Inc}$ = 0.73 ± 0.45 ± 0.28 MeV

$Br(\psi' \rightarrow \pi^0 h_c) \times Br(h_c \rightarrow \gamma\eta_c)^{Inc}$

$= (4.58 \pm 0.40 \pm 0.50) \times 10^{-4}$

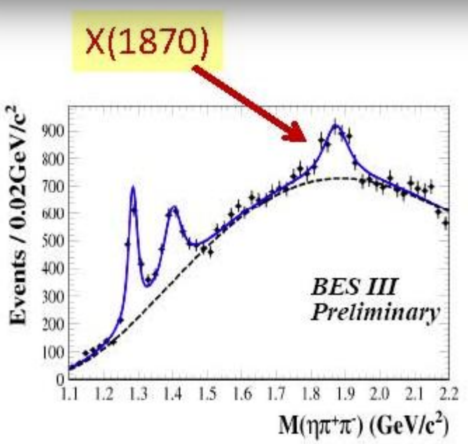
$Br(\psi' \rightarrow \pi^0 h_c) = (8.4 \pm 1.3 \pm 1.0) \times 10^{-4}$

$Br(h_c \rightarrow \gamma\eta_c) = (54.3 \pm 6.7 \pm 5.2)$ %

arXiv:1002.0501
Phys.Rev.Lett.
104(2010) 132002

BESIII measured for the first time
$\Gamma(h_c)^{Inc}$, $Br(\psi' \rightarrow \pi^0 h_c)$ & $Br(h_c \rightarrow \gamma\eta_c)$

Observation of $X(1870) \rightarrow a_0(980)\pi$ in $J/\psi \rightarrow \omega\pi^+\pi^-\eta$



Fit result (stat. sig.~7.7σ)

$M = 1873 \pm 11 MeV$

$\Gamma = 82 \pm 19 MeV$

Whether the X(1870) is the X(1835) or $\eta_2(1870)$, or a new resonance, further study is needed.

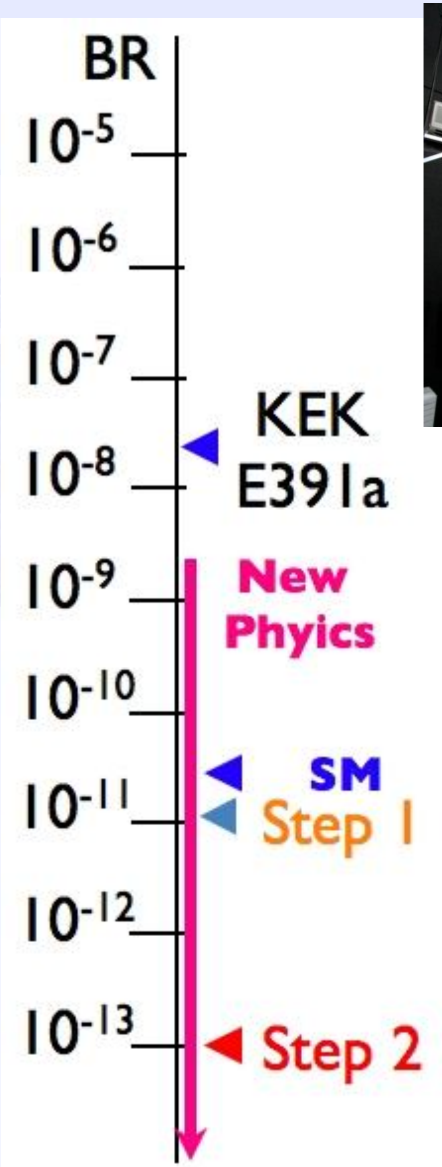
To be submitted to PRL

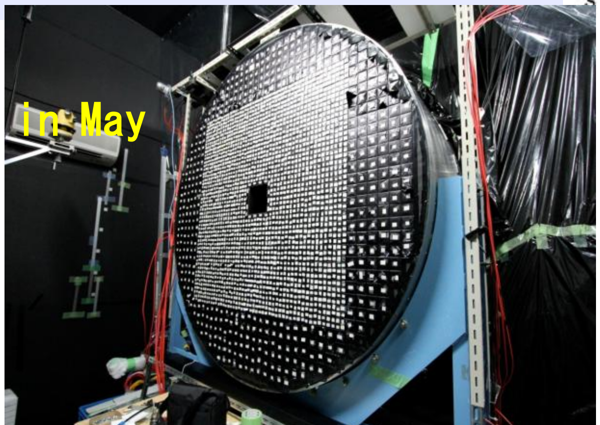
BESIII Collaboration

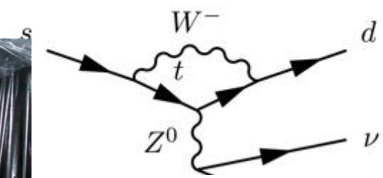
326 members, 46 Institutes, 10 Countries

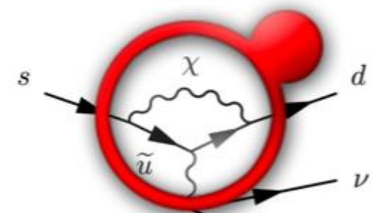
274 members, 26 Institutes	5 members, 1 Institutes
8 members, 3 Institutes	4 members, 1 Institutes
9 members, 2 Institutes	11 members, 4 Institutes
3 members, 2 Institutes	1 members, 1 Institutes
1 members, 1 Institutes	10 members, 5 Institutes

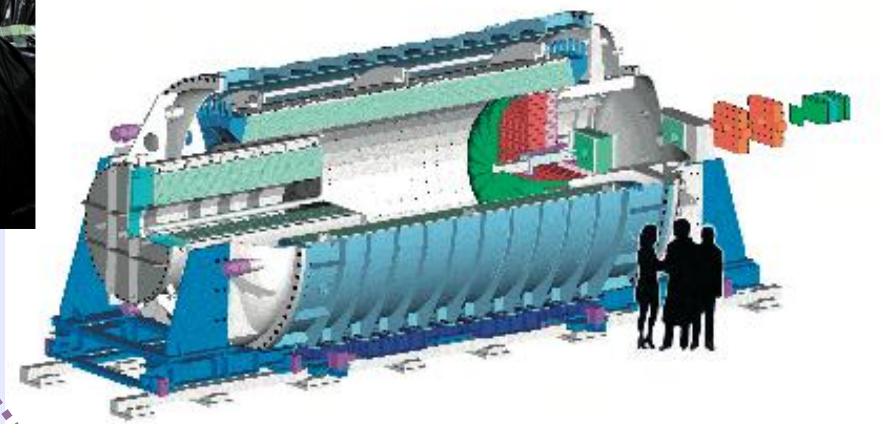
$K_L^0 \to \pi^0 \nu \bar{\nu}$

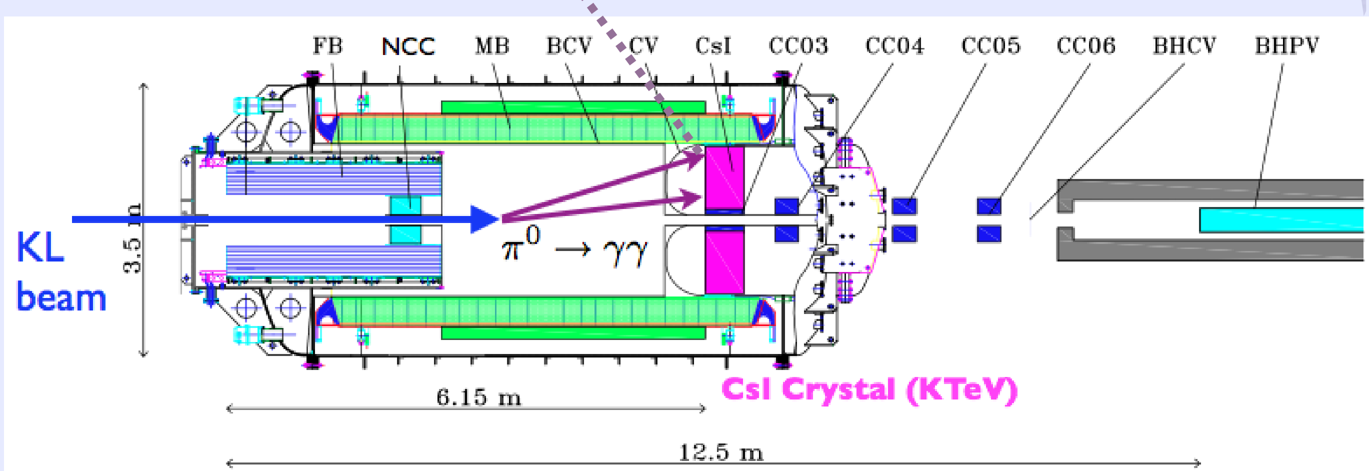








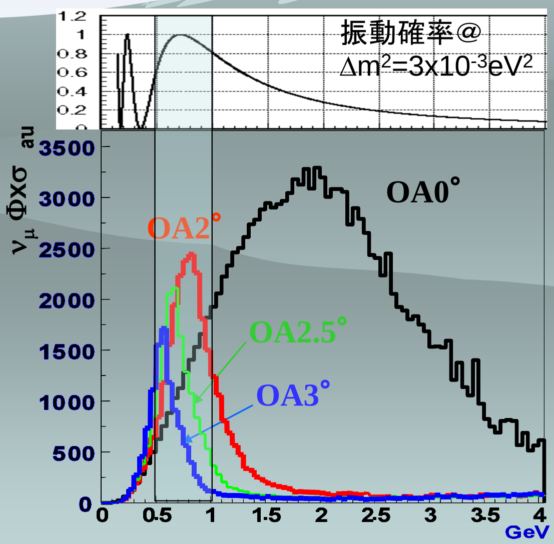




Neutrino physics

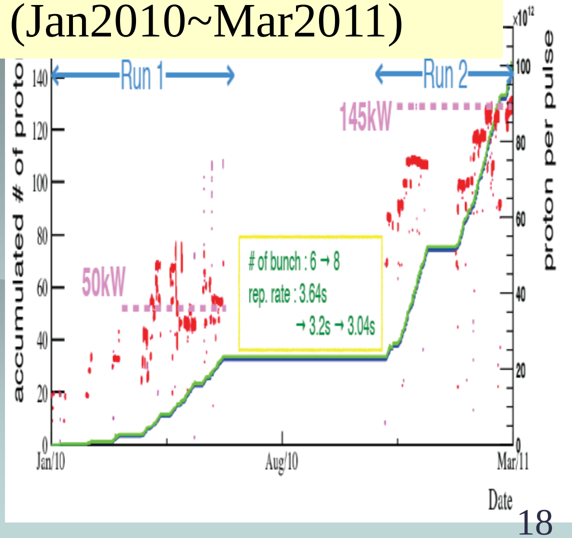
- T2K is on-going
- Two reactor neutrino experiments.
  RENO in Korea, Daya Bay in China.
- INO starts in India
- Double β decay experiment

Tokai-to-Kamioka (T2K) long baseline neutrino oscillation experiment



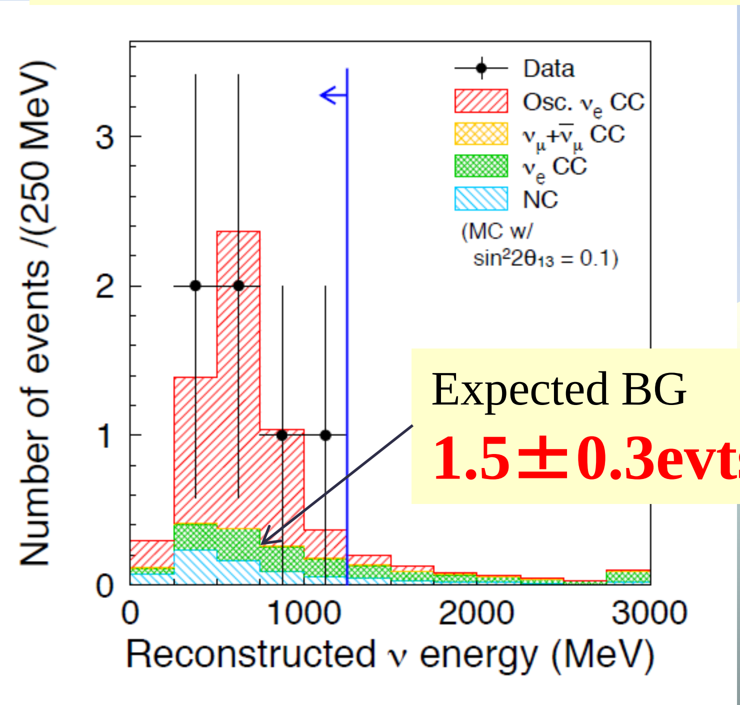
- Intense off-axis (2.5deg) ν_μ beam from J-PARC MR tuned at osc. max.
- Goal
  - **Discover νe app.**
    - Determine unknown θ_{13}
  - νμ disapp. meas.
    - Precise meas θ_{23}, Δm_{23}

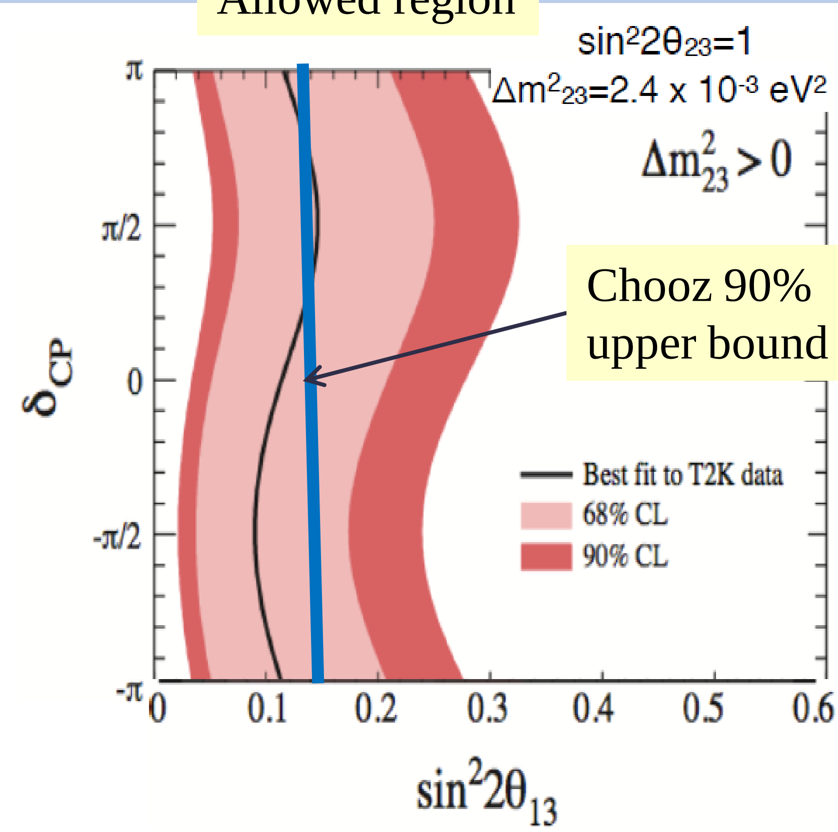
1.43e20pot accumulated (Jan2010~Mar2011)



Indication of ν_e appearance (non-zero θ_{13})

6 ν_e candidates found!





- Prob. of 6 are all BG: **0.7% (2.5σ equiv)**

$(\Delta m_{23}^2>0)$		$(\Delta m_{23}^2<0)$
$0.03 < \sin^2 2\theta_{13} < 0.28$	**90%CL range**	$0.04 < \sin^2 2\theta_{13} < 0.34$
$\sin^2 2\theta_{13} = 0.11$	**Central value**	$\sin^2 2\theta_{13} = 0.14$

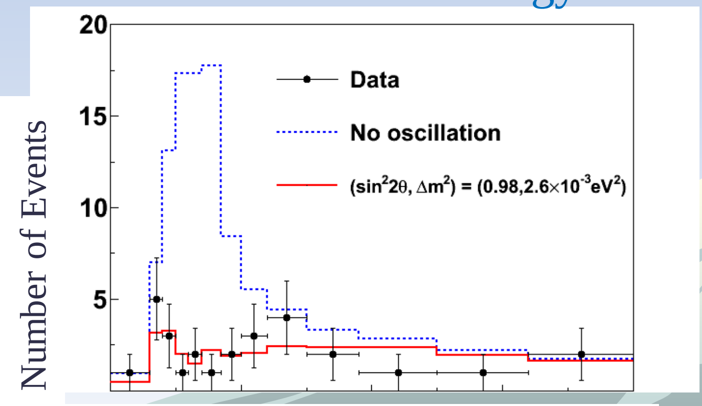
assuming $\Delta m^2_{23}=2.4 \times 10^{-3}$ eV^2, $\sin^2 2\theta_{23}=1$, $\delta_{CP}=0$

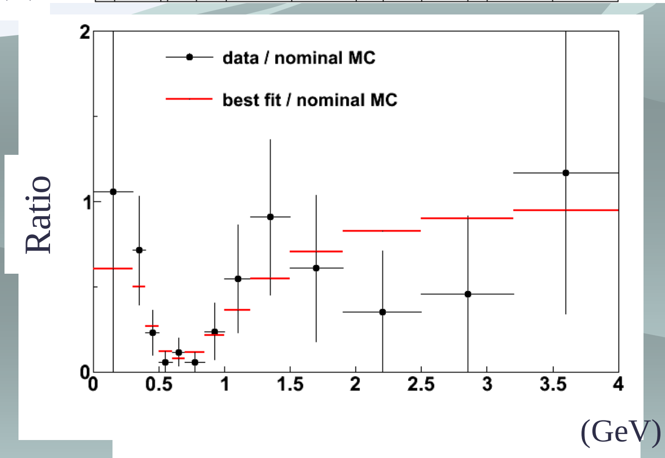
Measurement of ν_μ disappearance (Δm_{23}^2, $\sin^2 2\theta_{23}$)

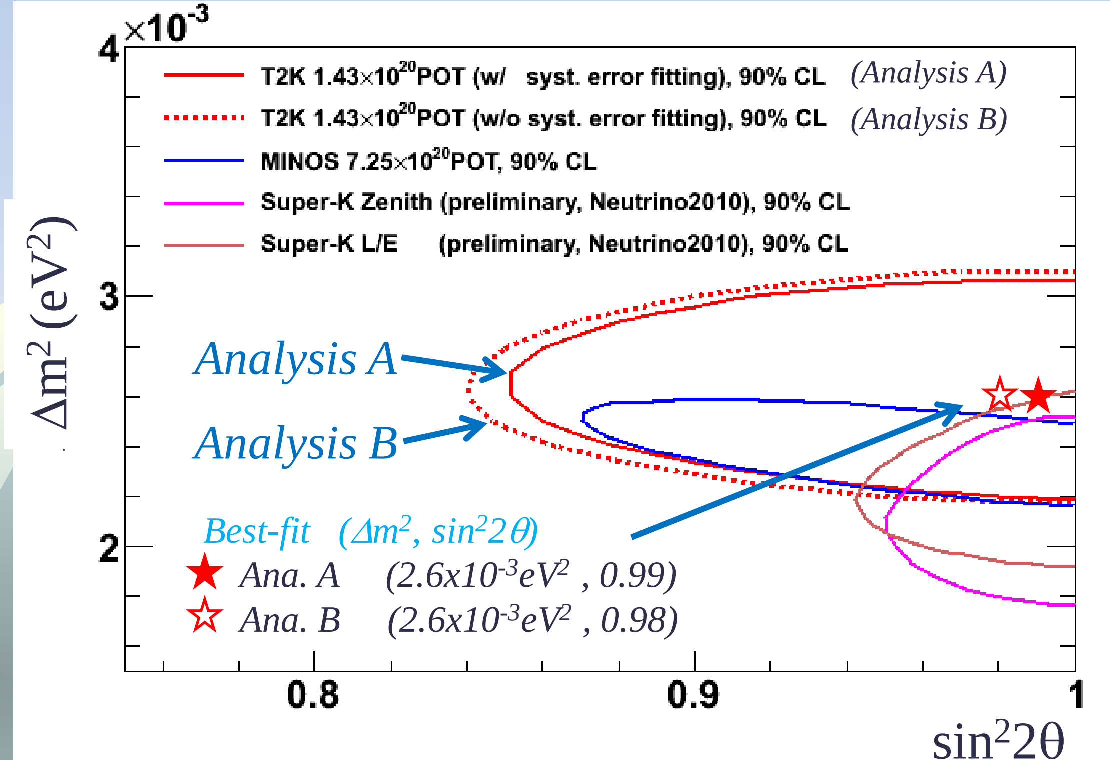
Single–μ ring events

- **104 events expected w/o osc**
- **31 events detected**

Reconstructed ν energy







90% C.L. allowed region

	Δm^2 (eV^2)	$\sin^2(2\theta)$
Analysis A	2.1 ~ 3.1 x 10^{-3}	> 0.85
Analysis B	2.1 ~ 3.2 x 10^{-3}	> 0.84

Clear disappearance and oscillation pattern observed!!

Consistent with MINOS/SK results

The T2K Collaboration

~500 members, 58 Institutes, 12 countries

Canada
TRIUMF
U. Alberta
U. B. Columbia
U. Regina
U. Toronto
U. Victoria
York U.

France
CEA Saclay
IPN Lyon
LLR E. Poly.
LPNHE Paris

Germany
U. Aachen

Italy
INFN, U. Roma
INFN, U. Napoli
INFN, U. Padova
INFN, U. Bari

Japan
ICRR Kamioka
ICRR RCCN
KEK
Kobe U.
Kyoto U.
Miyagi U. Edu.
Osaka City U.
U. Tokyo

Poland
A. Soltan, Warsaw
H.Niewodniczanski, Cracow
T. U. Warsaw
U. Silesia, Katowice
U. Warsaw
U. Wroklaw

Russia
INR

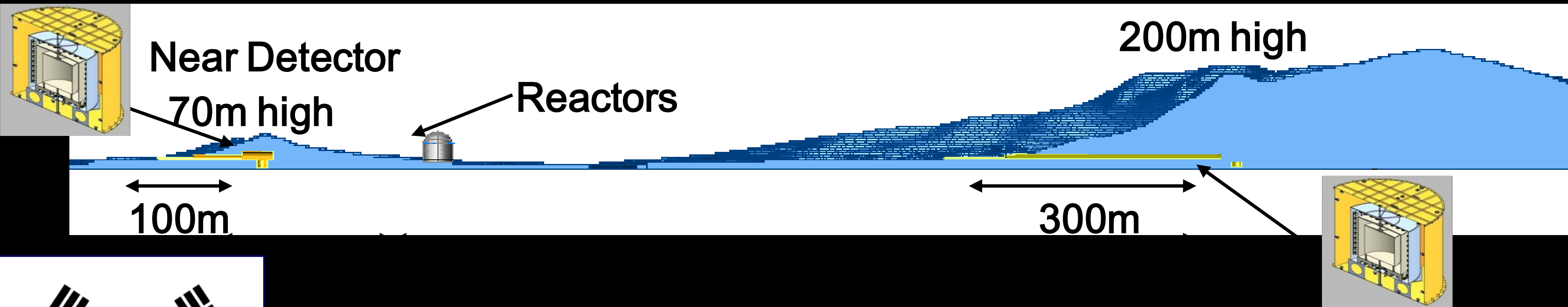
S. Korea
Chonnam N.U.
Dongshin U.
Seoul N.U.

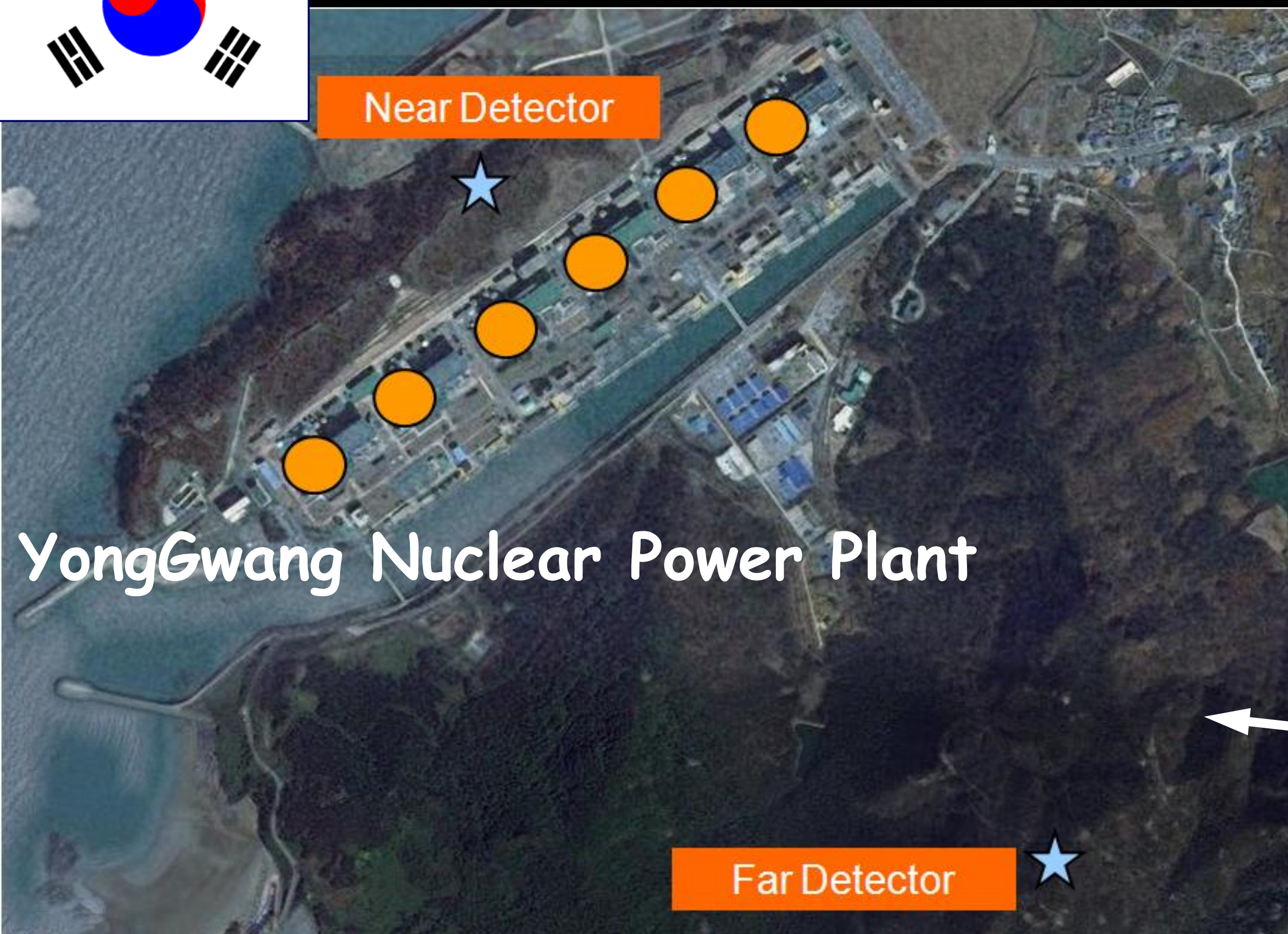
Spain
IFIC, Valencia
IFAE(Bacelona)

Switzerland
U. Bern
U. Geneva
ETH Zurich

United Kingdom
Imperial C. London
Queen Mary U. L.
Lancaster U.
Liverpool U.
Oxford U.
Sheffield U.
Warwick U.
STFC/RAL
STFC/Daresbury

USA
Boston U.
Colorado S. U.
Duke U.
Louisiana S. U.
Stony Brook U.
U. C. Irvine
U. Colorado
U. Pittsburgh
U. Rochester
U. Washington





RENO ν θ_{13}

KNRC
Korea Neutrino Research Center

Detector Construction & Closing (Jan. 2011)

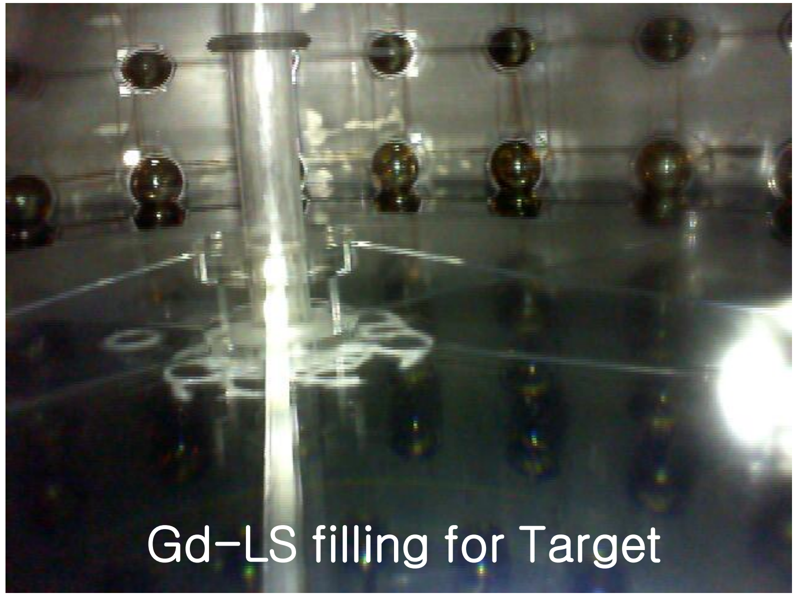
Near : Jan. 21, 2011

Far : Jan. 24, 2011

Completed RENO Detector (Feb. 2011)

Liquid(Gd-LS/LS/MO/Water) Production & Filling (May-July 2011)

Gd Loaded Liquid Scintillator



Gd-LS filling for Target

- Both near and far detectors are filled with Gd-LS, LS & mineral oil as of July 5, 2011.
- Veto water filling is completed at the end of July, 2011.

Water filling for Veto

LS filling for Gamma Catcher

Summary of RENO Status

- Construction of both near and far detectors are completed in Feb. 2011.
- All the liquids including Gd loaded liquid scintillator are produced and filled as of July 5, 2011.
- Dry runs were performed to check PMT and DAQ in March ~ May, 2011.
- Background data-taking has been made since the middle of June, 2011.
- Regular data-taking with near & far detectors began from August 1, 2011.
- Data reduction and calibration efforts are on progress.

RENO Sensitivity on $\sin^2(2\theta_{13})$

- **Statistical errors (3 years of data taking with 70% efficiency)**

Near : $9.83\times10^5 \approx 10^6$ (0.1% error)
Far : $8.74\times10^4 \approx 10^5$ (0.3% error)

- **Systematic error : <0.5%**

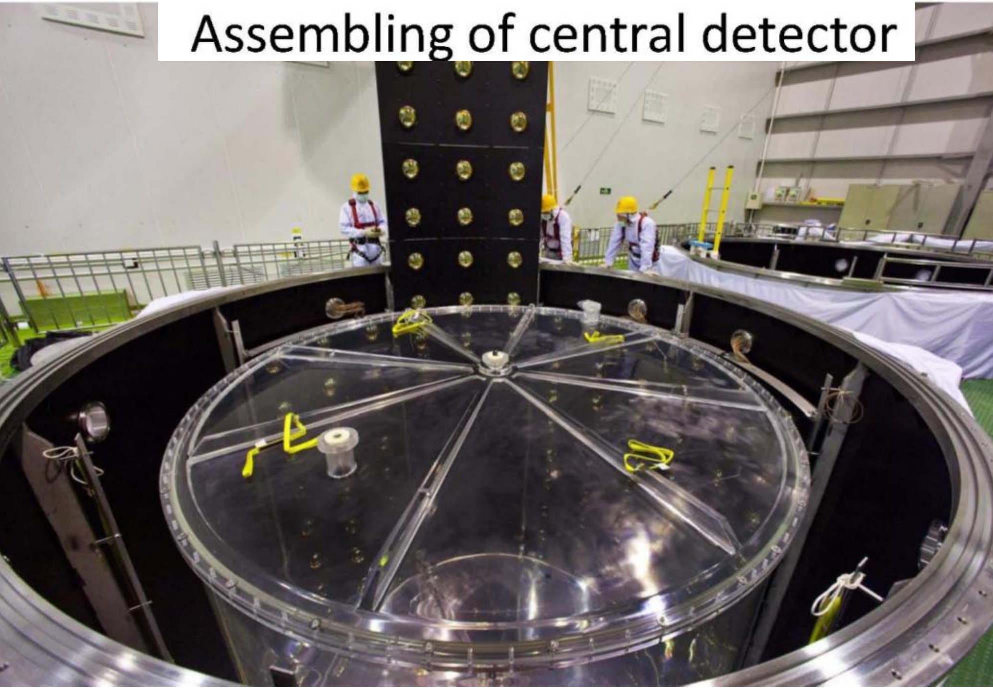
*** Sensitivity : $\sin^2(2\theta_{13}) > 0.02$ at 90% C.L.**

Daya Bay reactor ν experiment

-Precision measurement of ν mixing θ_{13} -

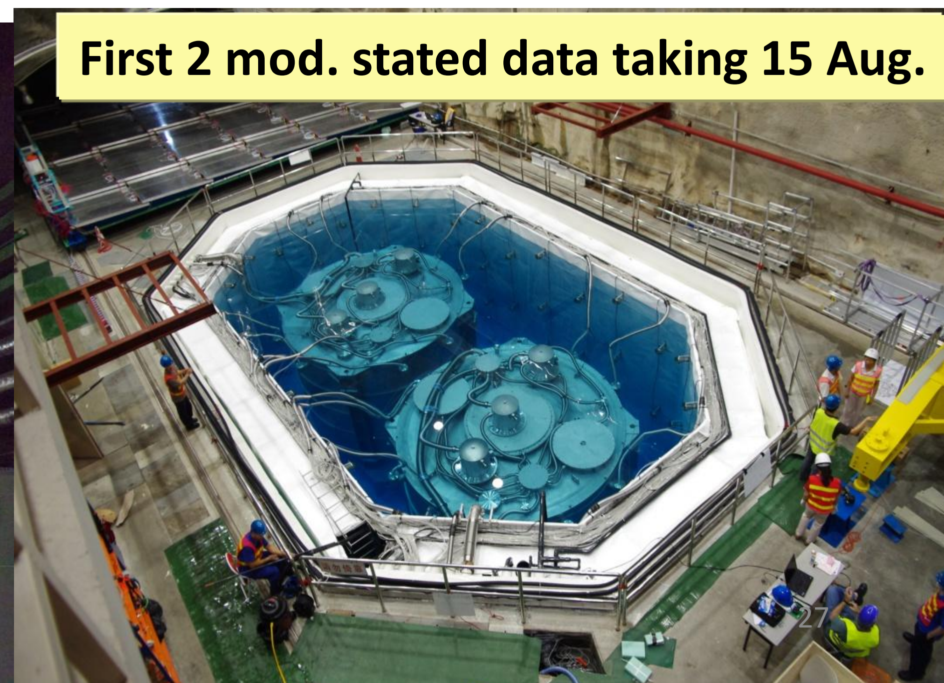
- Daya Bay NPP: 6 reactor cores, for a total of 17.4 GW
- Mountains near by, easy to construct a lab with enough overburden to shield cosmic-ray backgrounds
- Tunnel construction finished.
- Begin data taking: the Dayabay hall 15 Aug. 2011; the Lingao hall: end of 2011, the full configuration: Spring 2012
- Expect to reach sensitivity of 0.01 with 3 years of running.

Assembling of central detector



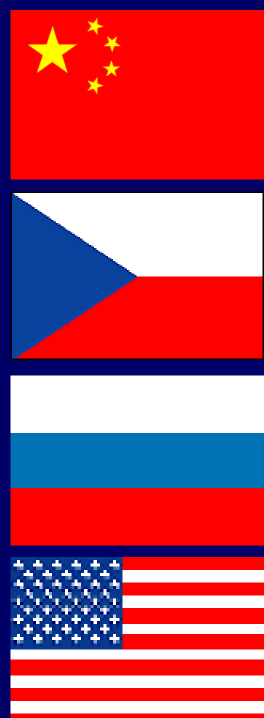
Tunnel (>3 km) construction finished

First 2 mod. stated data taking 15 Aug.



Daya Bay Collaboration

293 members, 46 Institutes, 4 Countries



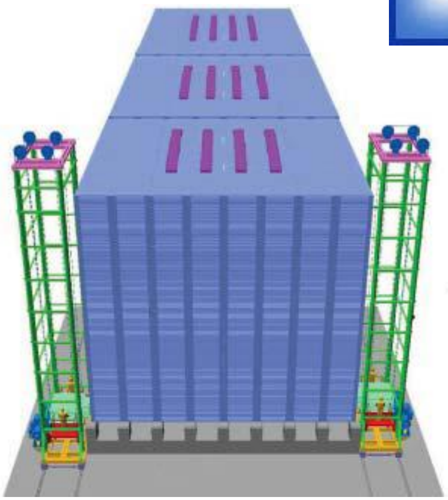
182 members (19 Institutes)

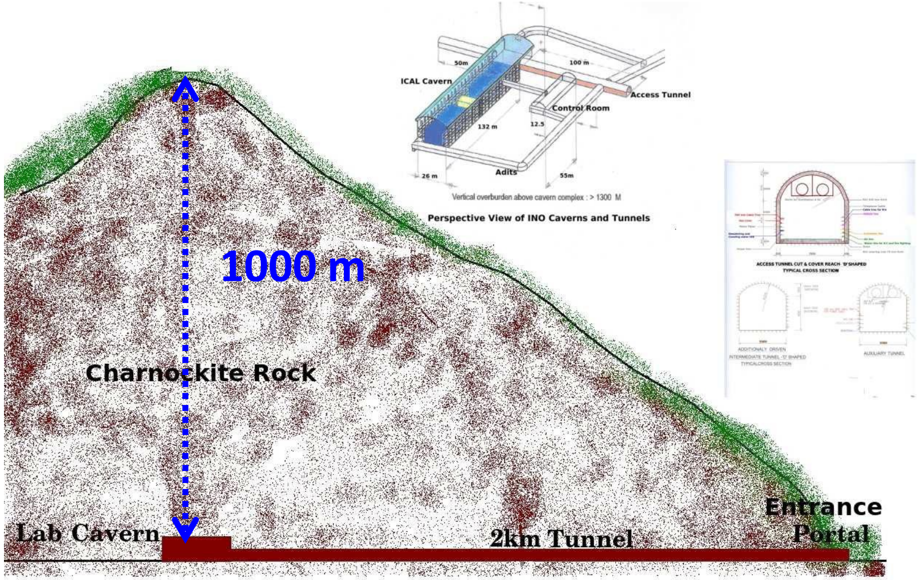
4 members (1 Institutes)

6 members (2 Institutes)

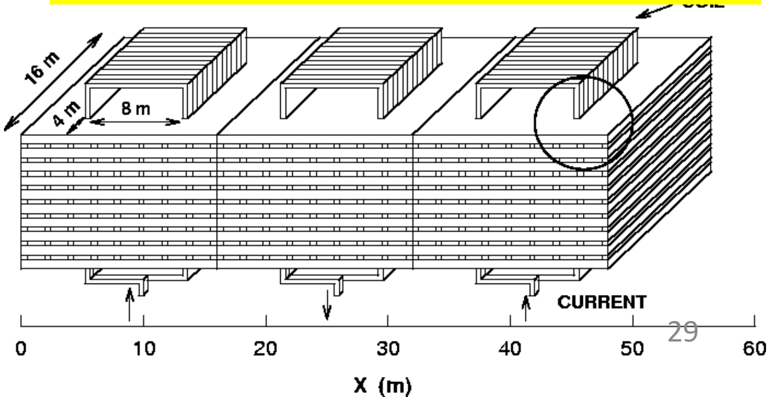
101 members (14 Institutes)

INO : India-based Neutrino Observatory

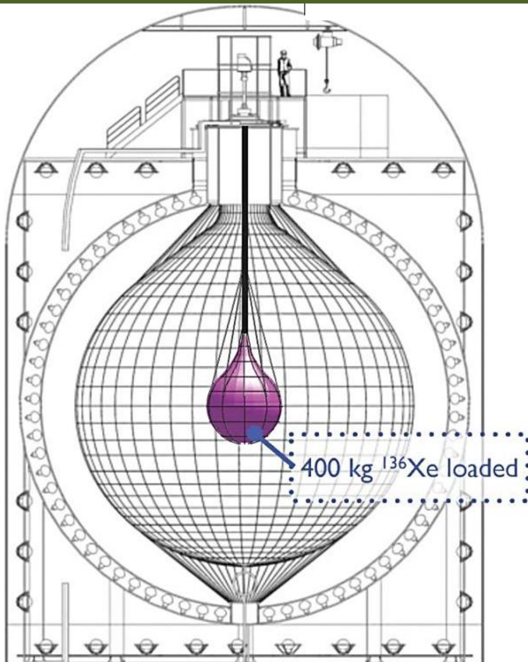


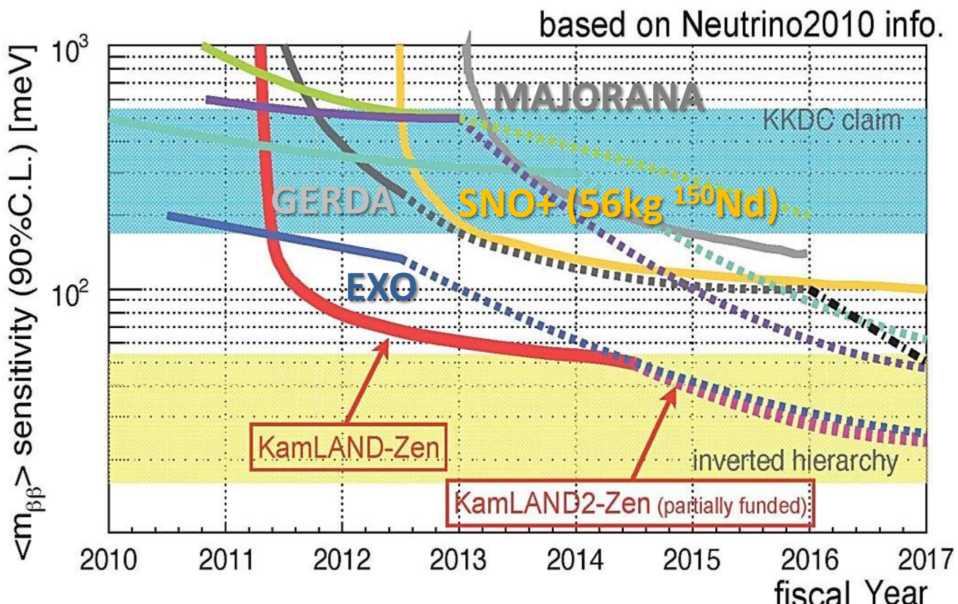


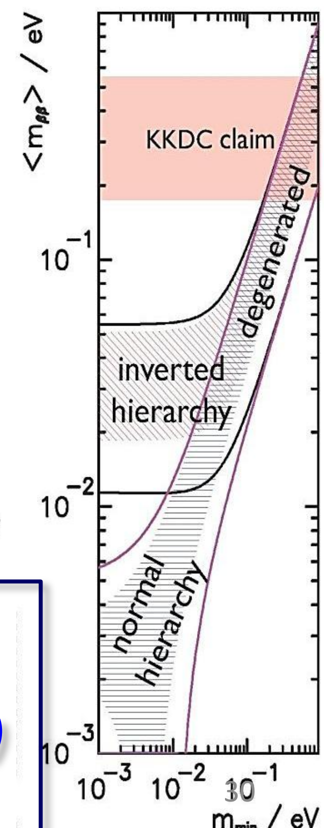
50 kton magnetized iron module(s) with 30,000 channel RPC



KamLAND-Zen
ββ-Decay Search





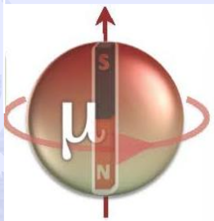


1st step : 400 kg ^{136}Xe
80~60meV (2~5yrs), Xe loading going on
2nd step : 1 ton ^{136}Xe (mirror + high-yield LS)
20meV(5yrs), (possible to 10 ton)

Muon physics

- A proposal of muon g-2 & muon EDM measurements at J-PARC
- mu-e conversion experiments at J-PARC
  COMET and DeeMe

Proposal to measure Muon g-2 and EDM at J-PARC MLF



g-2

Improve Precision by 5 (0.1 ppm)

Muon g-2@J-PARC

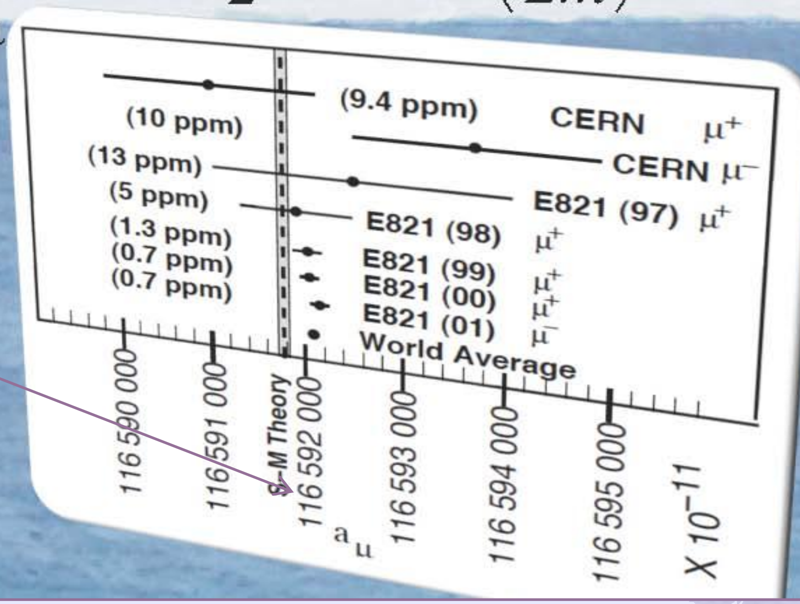
"Final Report" of Anomalous MDM

BNL- E821 Experiment : Phys.Rev.D73:072003,2006.

$$\Delta a_\mu^{(\mathrm{today})} = a_\mu^{(\mathrm{Exp})} - a_\mu^{(\mathrm{SM})} = (295 \pm 88) \times 10^{-11}$$

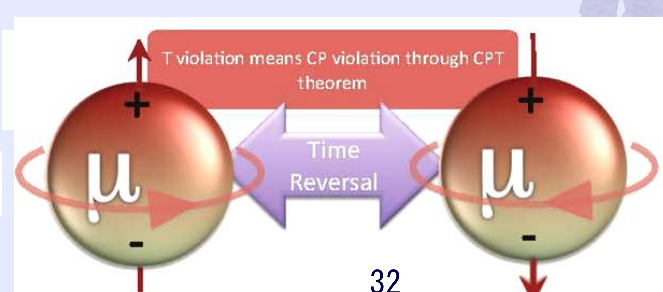
$$a = \frac{g-2}{2} \qquad \vec{\mu} = g\left(\frac{e}{2m}\right)\vec{s}$$

- E821 at BNL-AGS measured down to 0.7 ppm for both μ+ and μ−
- 3.4 sigma deviation from the SM
  - SM prediction OK?
  - New Physics?
- Need to explore further
- Preferably NEW METHOD!

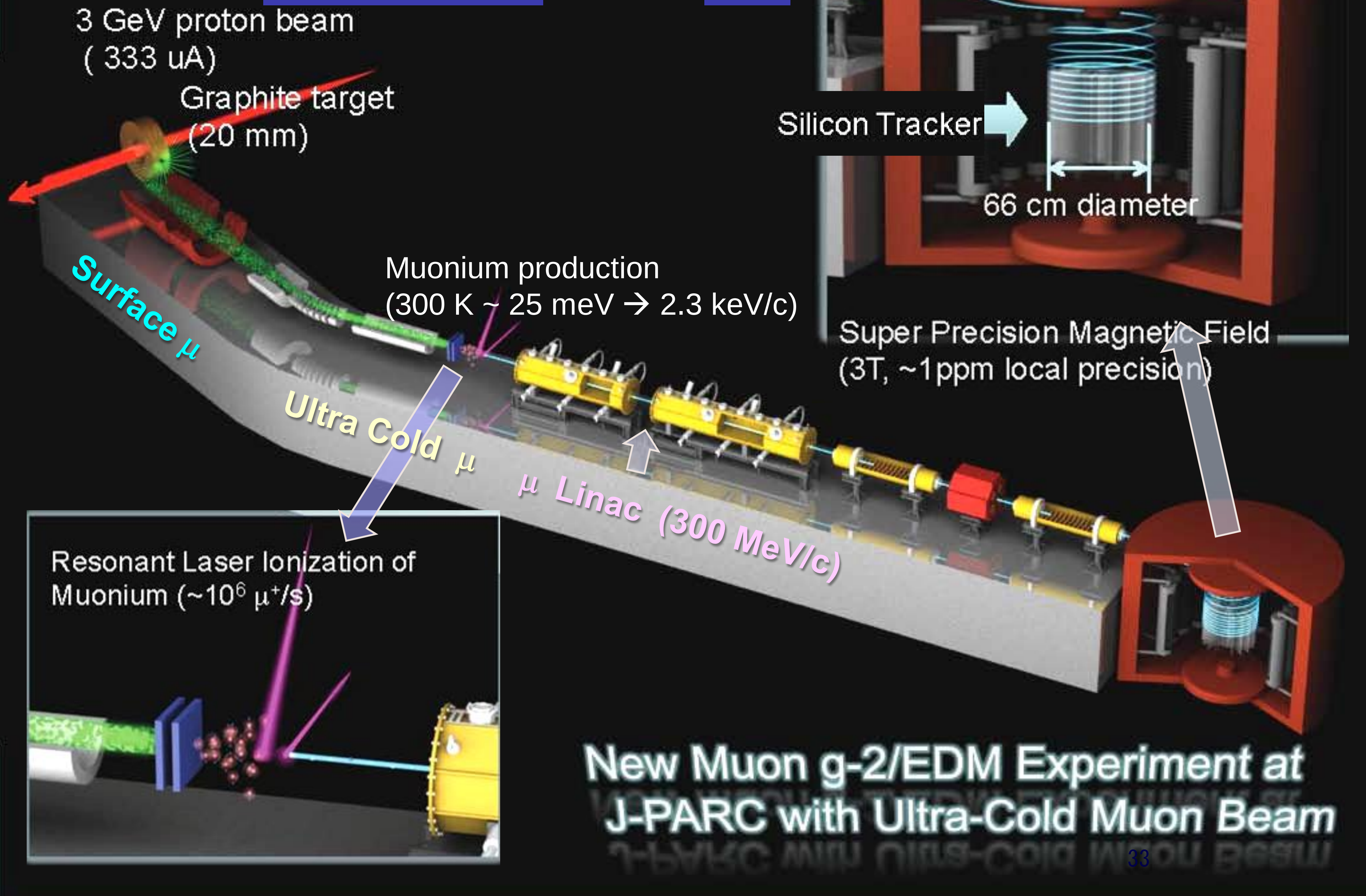


Improve Precision by 100

EDM



$$\vec{\omega} = -\frac{e}{m}\left[a_\mu \vec{B} - \left(a_\mu - \frac{1}{\gamma^2-1}\right)\frac{\vec{\beta}\times\vec{E}}{c} + \frac{\eta}{2}\left(\vec{\beta}\times\vec{B} + \frac{\vec{E}}{c}\right)\right]$$



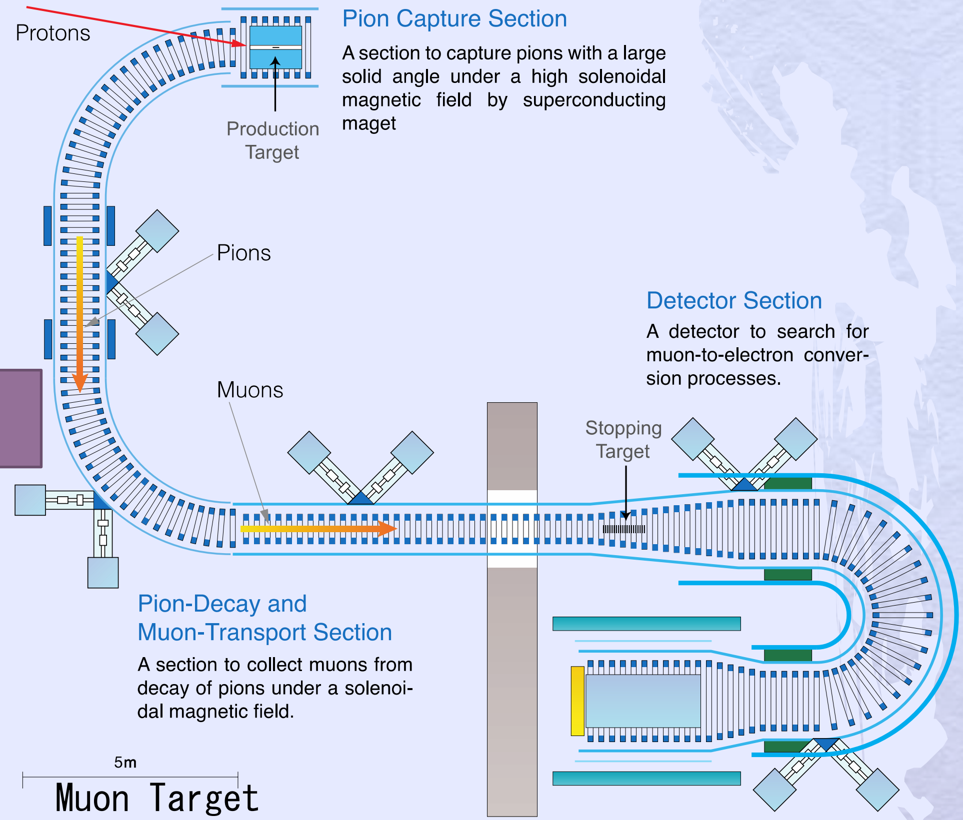
Mu-e conversion experiment

$$\mu^- + (A,Z) \rightarrow e^- + (A,Z)$$

Past limit SINDRUM II 7×10^{-13}
(MEG 2.4×10^{-12} for $\mu \to e\gamma$)

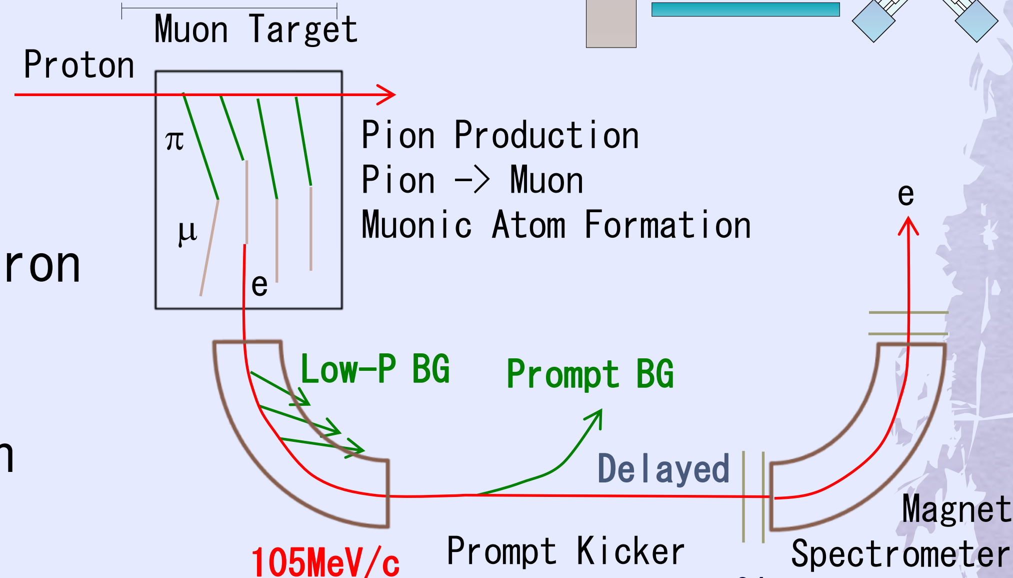
COMET at J-PARC hadron hall

- Target sensitivity 10^{-16} @90% C.L. using aluminum target



DeeMe at J-PARC MLF

- A single mono-energetic electron
  - 105 MeV
  - Delayed: ~1 μS
  - 10^{-14} S.E.S for 2 years run



Energy frontier project

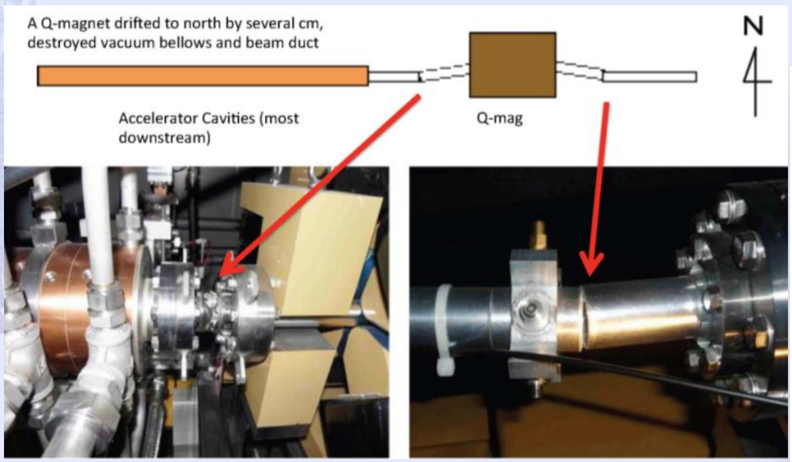
- ILC R&D
- R&D for High Luminosity LHC, and CLIC

International Linear Collider

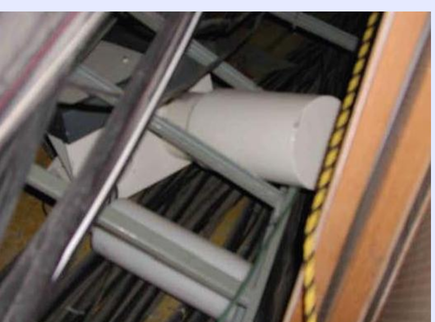
ATF

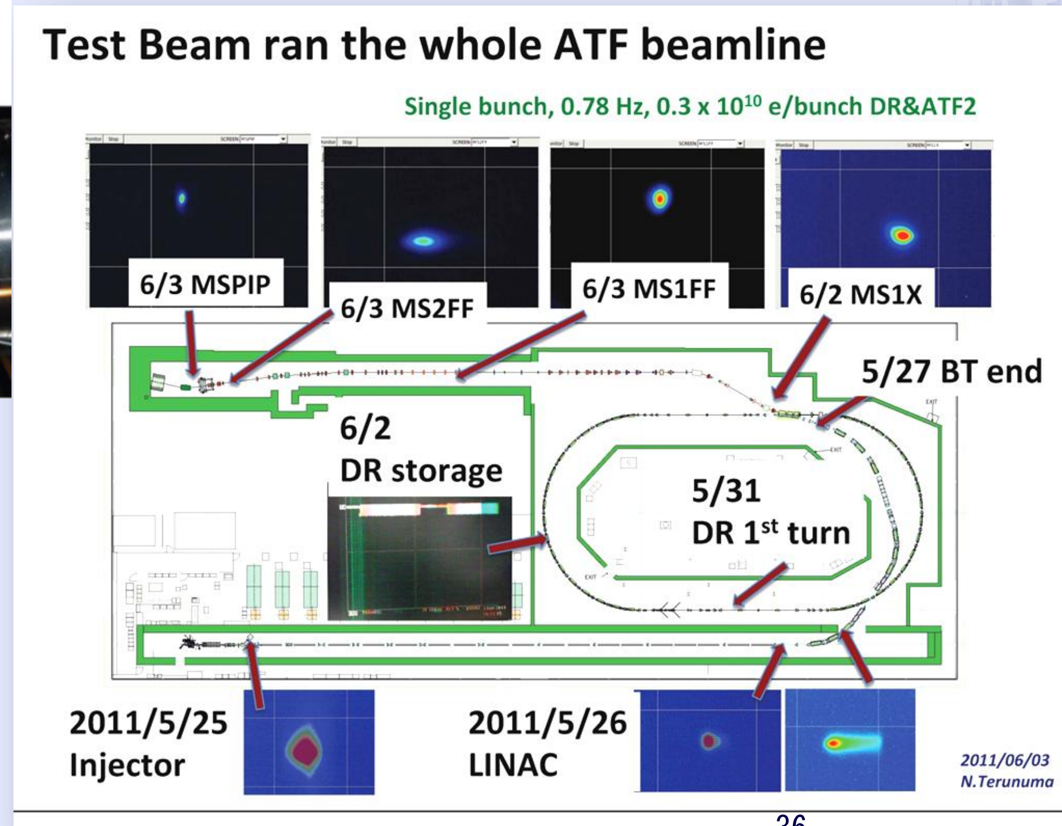
STF

Test Facility



ATF

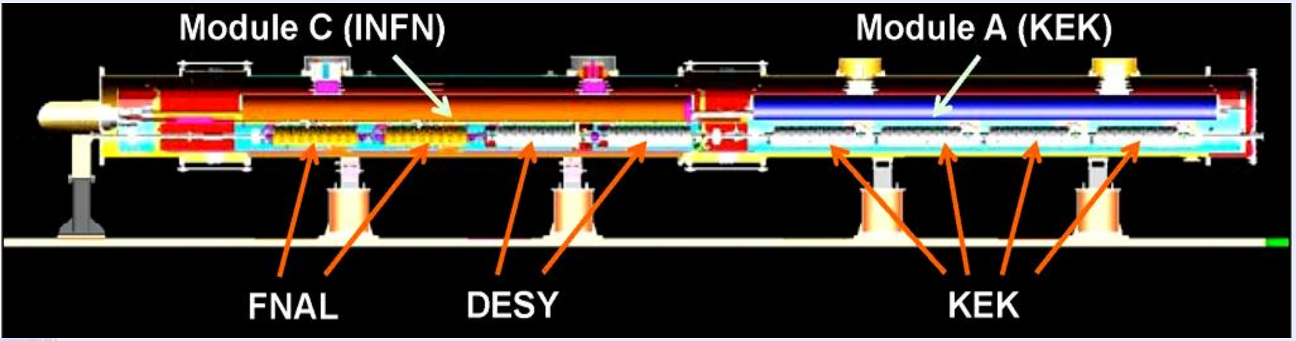




S1-Global

The first step of ILC

2009 ~ 2011.2.25



Plug compatibility of SCRF system was successfully demonstrated by international collaboration.

~240 members, 44 Institutes, 13 countries & entity

China
IHEP
Tsingha U.

CERN

France
CELIA U. of Bordequx
CNRS
LAL
LAPP
LLR-Ecole Polytechnique

Germany
DESY

India
V.J.T.I.

Japan
Hiroshima U.
KEK
Kyoto U.
Nagoya U.
Okayama U.
Seikei U.
Tohoku Gakuin U.
Tohoku U.
U. Tokyo
Waseda U.

Korea
Kyungpook U.
PAL
Pusan U.

Russia
Inst. of Appl. Physics
BINP
JINR
Tomsk Polytech. U.

Spain
IFIC

Switzerland
PSI

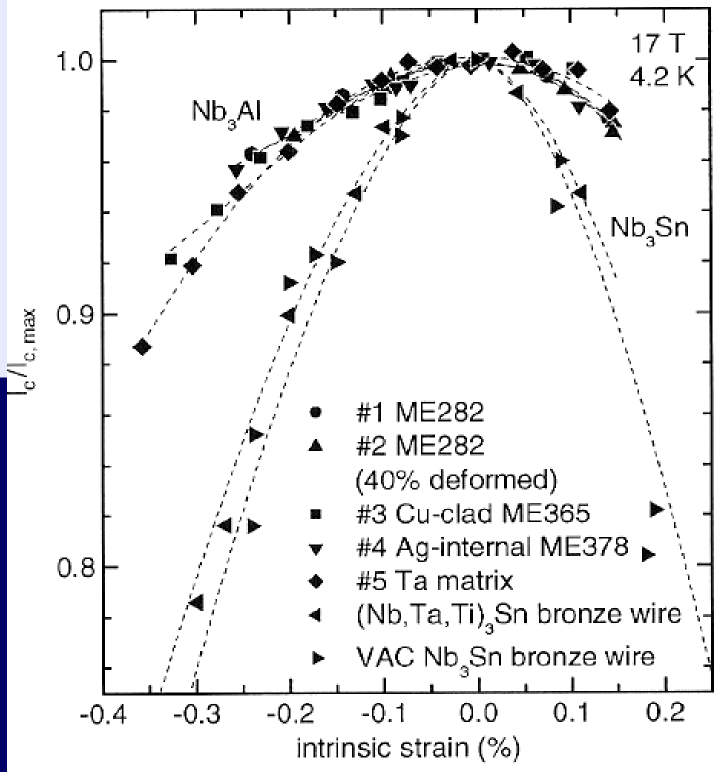
UK
CCLRC
Cockcroft Inst.
Daresbury Lab.
Royal Holloway, U. of London
U. Collage London
U. Liverpool
U. Oxford
U. Birmingham

Ukrine
Kharkiv Inst. of Phys. & Tech.

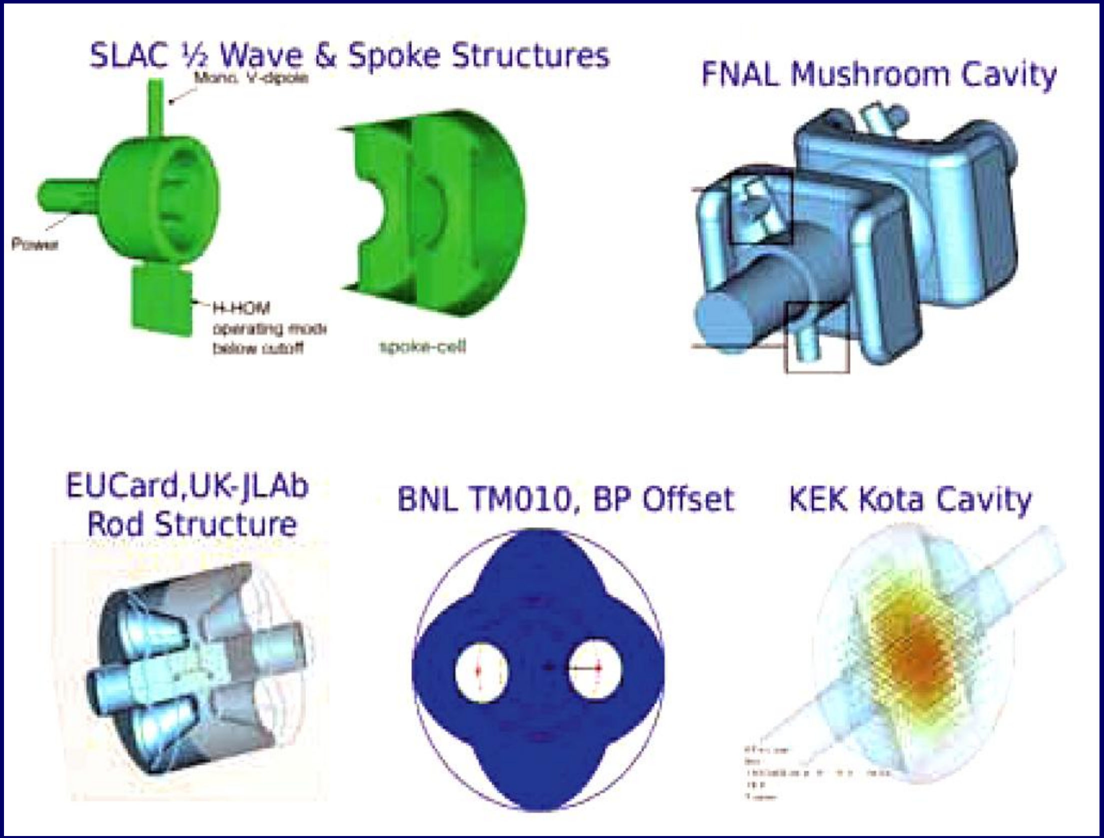
USA
BNL
Cornel U.
FNAL
LBNL
SLAC
U. Notre Dame

LHC Luminosity Upgrade

IRQ Development Required for Luminosity Upgrade

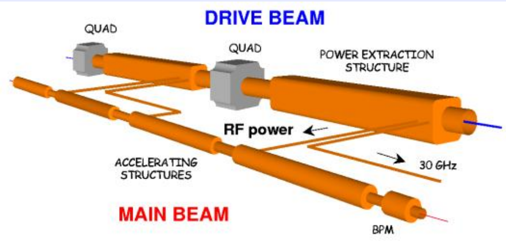


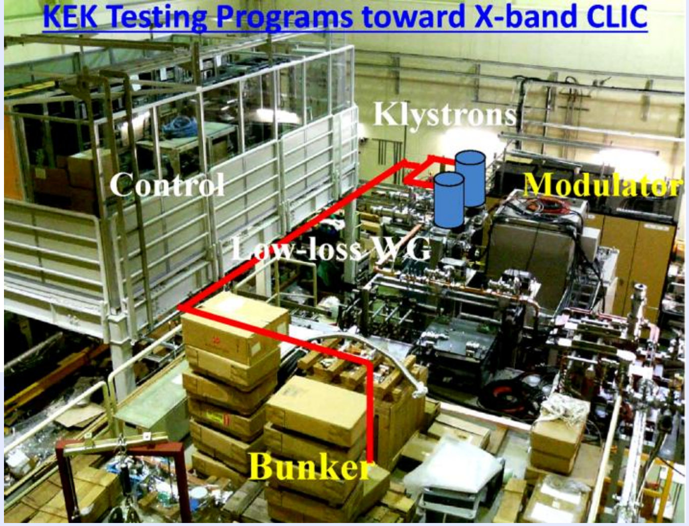
Supercond. Sci. Technol. 18 (2005) p. 284.
by N. Banno et al.



Luminosity Increase of LHC using Crab Cavities

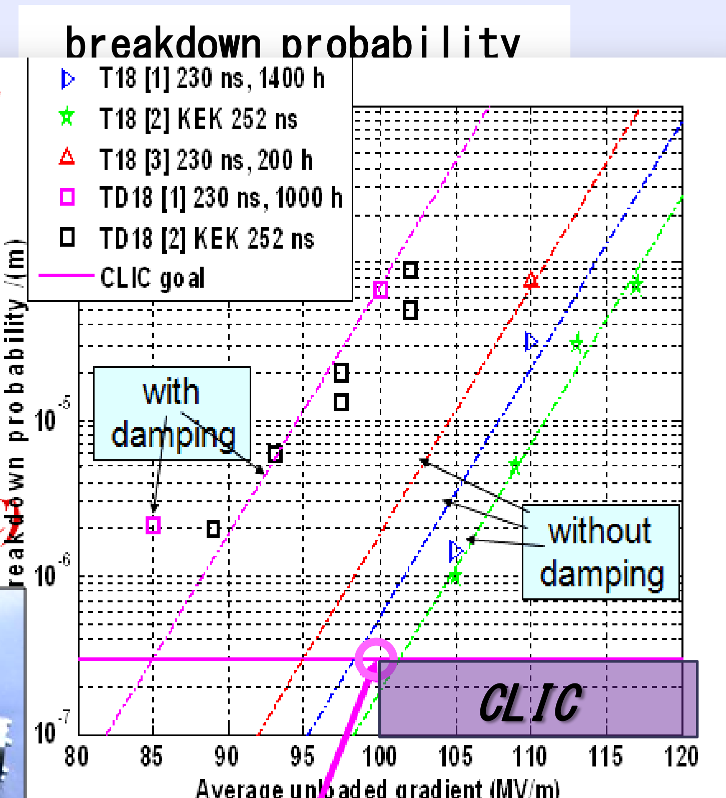
CLIC



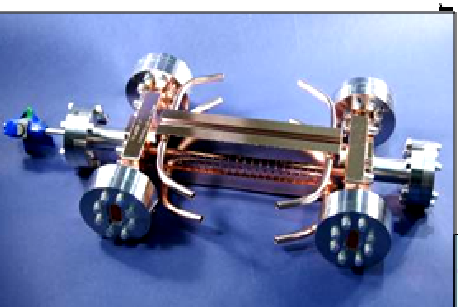


J. P. Delahaye/CERN : ICHEP2010

Nominal CLIC Accelerating Structure Performance achieved by global collaboration (CERN-KEK-SLAC)



CLIC goal:100 MV/m loaded with BR<3 10-7/m



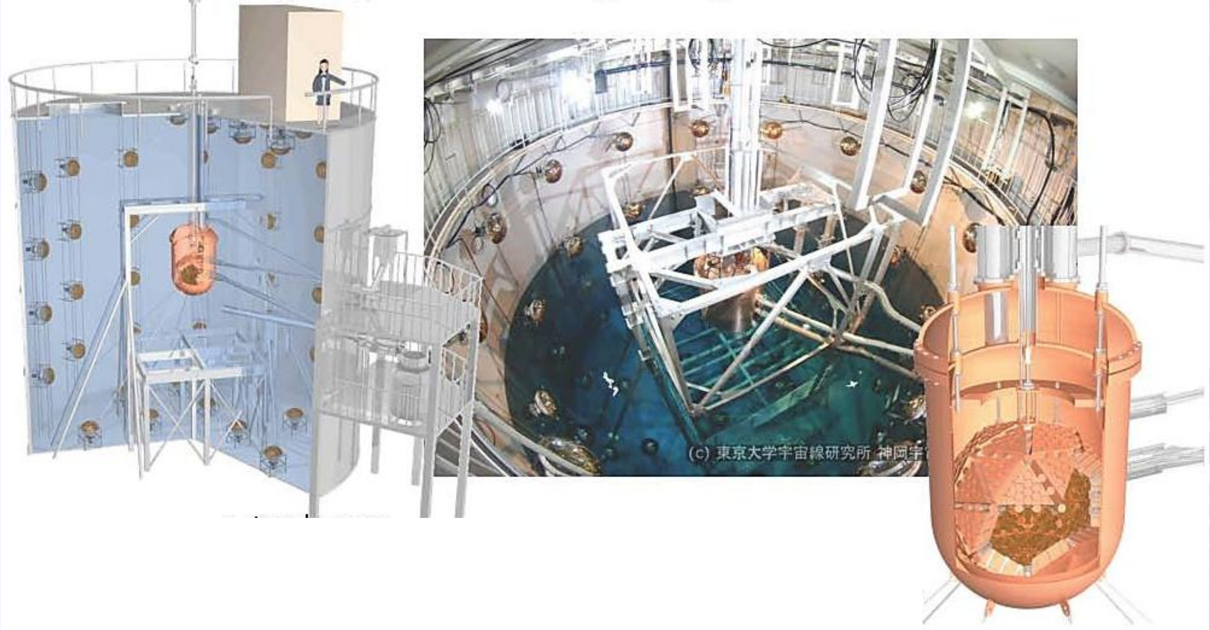
CLIC - ILC Collaboration

1) **Ultra-low beta-function**
   Limited by QF1, CLIC considers providing one with larger aperture
2) **Ground motion feedback/feed-forward**
   Ground motion sensors on each relevant magnet to predict beam orbit
3) **Test of quadrupole stabilisation in ATF extraction**
   Could be best way to verify stabilisation performance with beam
4) **Developing damping ring extraction kickers systems**
   Would need ATF3 to verify kicker performance
5) **CSR induced beam instability in ATF-DR**
   Experiments to distinguish between theories
6) **DR optics, emittance tuning & IBS studies**
7) **Superconducting wiggler for ATF**
8) **BPM tests**
   CLIC main linac BPMs developed by FNAL tested at ATF2; more in future
9) **Contributions to ATF2/3 operation**

Dark matter search

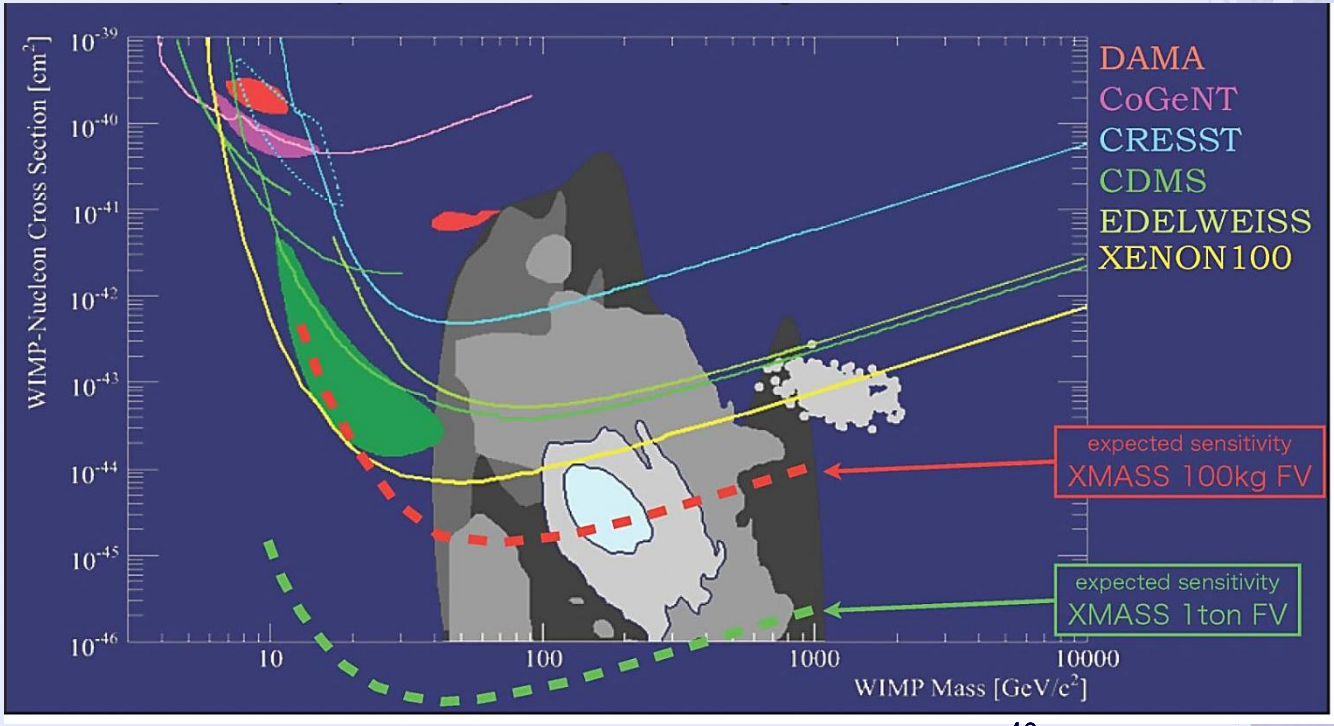
- XMASS in the Kamioka mine
- A new underground lab in China

XMASS
Dark Matter Search:
Xe-loaded Sci.



High Scalability

1st →	2nd →	3rd
100 kg	1 ton	10 ton



Jinping underground lab. of Tsinghua Univ. (2500m rock overburden)

China Dark Matter Experiment

CDEX-TEXONO 1kg scale HPGe detector run!

- 20g HPGe test running now!
- 1000g PCGe detector in CJPL!

Summary

- KEK and IHEP have strong accelerator-based high energy physics programs.
- In addition to two accelerator laboratories, there are many on-going and planned non-accelerator experiments in the Asian region.
- Countries in the Asia-Pacific region are important partners for international collaboration.