Current Activities and Plan of KEK

PANIC-2005
F. Takasaki

KEK has;

Two Institutes :

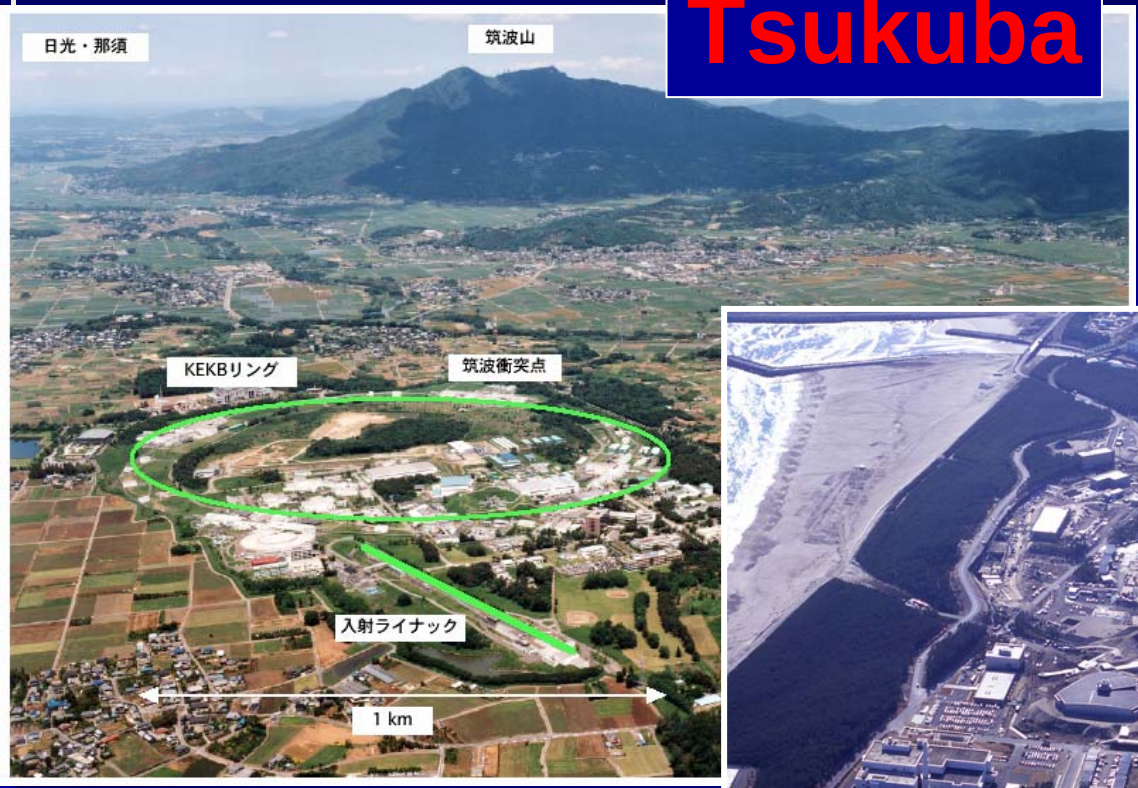
- Particle and Nuclear Studies
- Material Structure Science

and Two Laboratories,

- Accelerator Laboratory
- Applied Research Laboratory.

Two Campuses

Tsukuba



Tokai

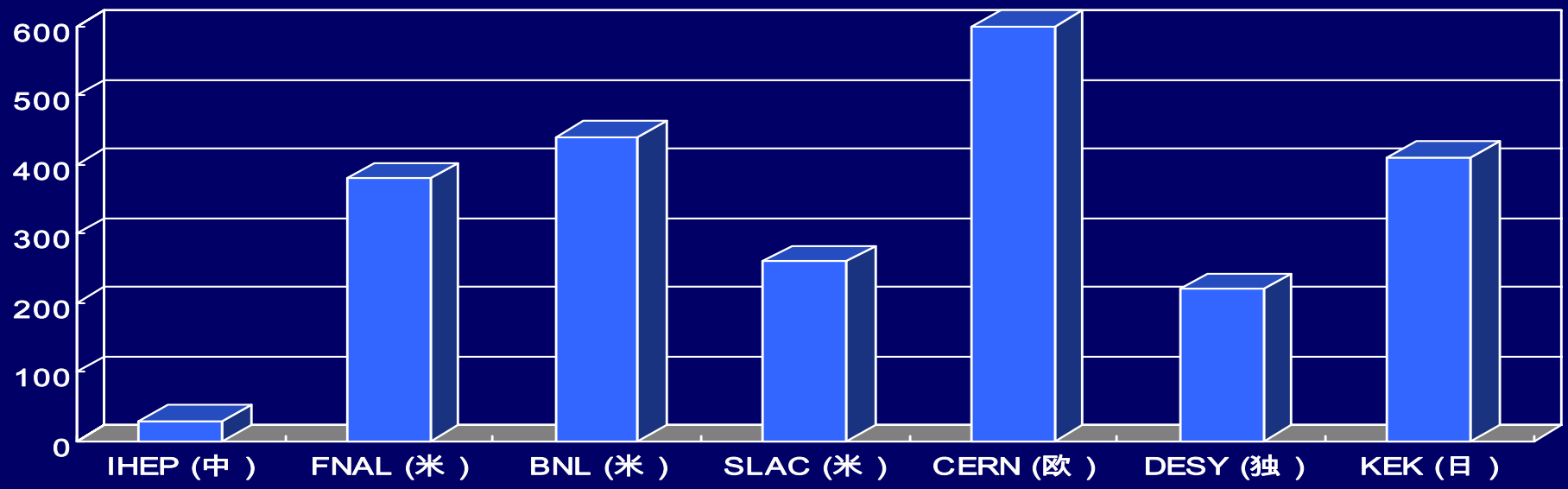
FY05 budget : 417 Oku-yen

HEP-related main items

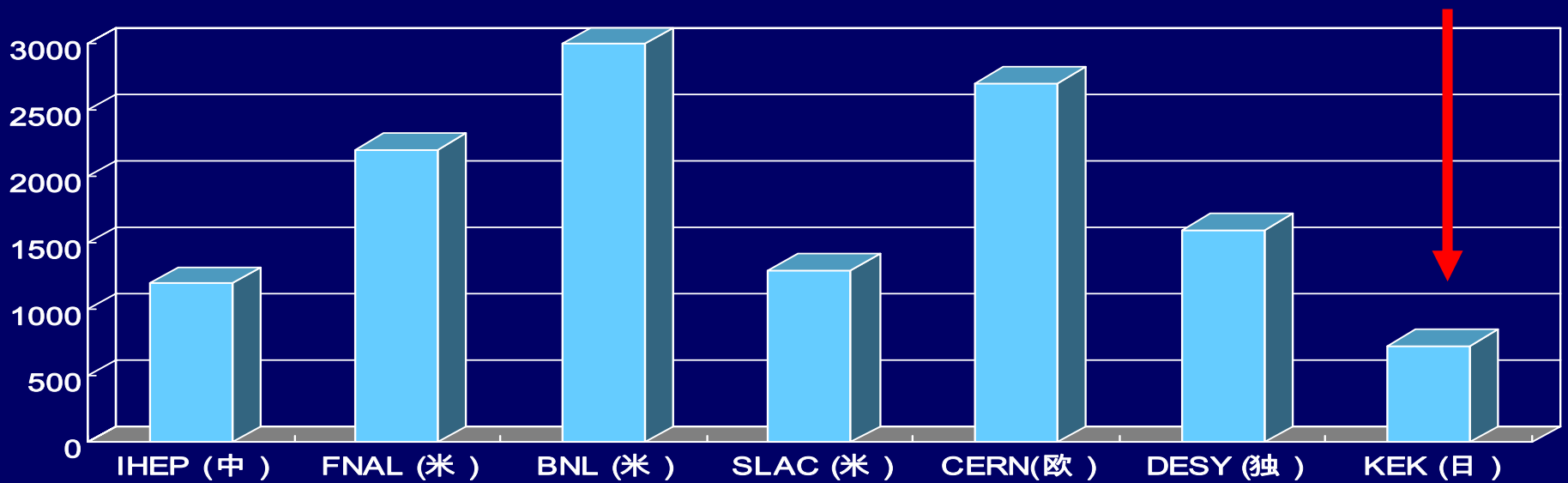
- Salaries: 72
- J-PARC construction: ..... 110 (↑ 27)
- Computers: 21
- Operations, R&Ds and others:
  - **Electricity etc.: ..... 50 (↓ 3)**
  - **KEKB/LINAC/Belle: 35**
  - **LC R&D : ..... 10(↑ 3)**
  - **PS/K2K, etc: ..... 8 (↓ 2)**
  - **LHC-ATLAS: ..... 4 (↑ 2)**
  - **J-PARC related: ..... 12 (↑ 3)**

As of 2002

Budget (Oku-Yen)



No. of Staffs CERN DESY KEK



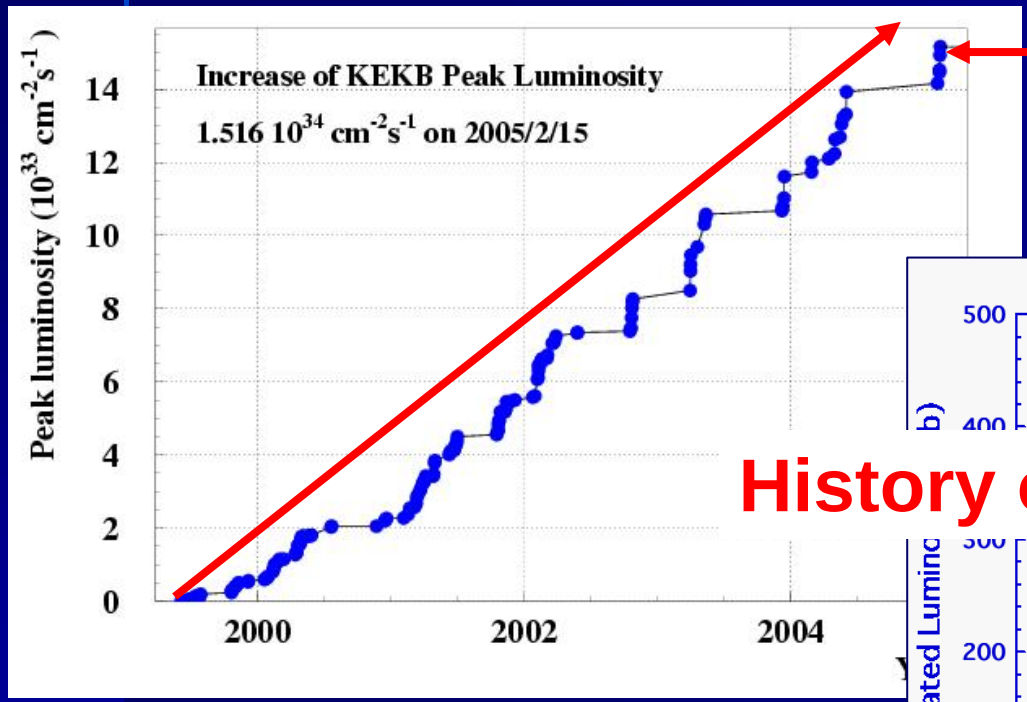
Current KEK's Activities on HEP

- **KEKB/Belle : running**
- **K2K → terminated**
- **J-PARC : construction**
- **ILC : active participation in ILC-GDE**

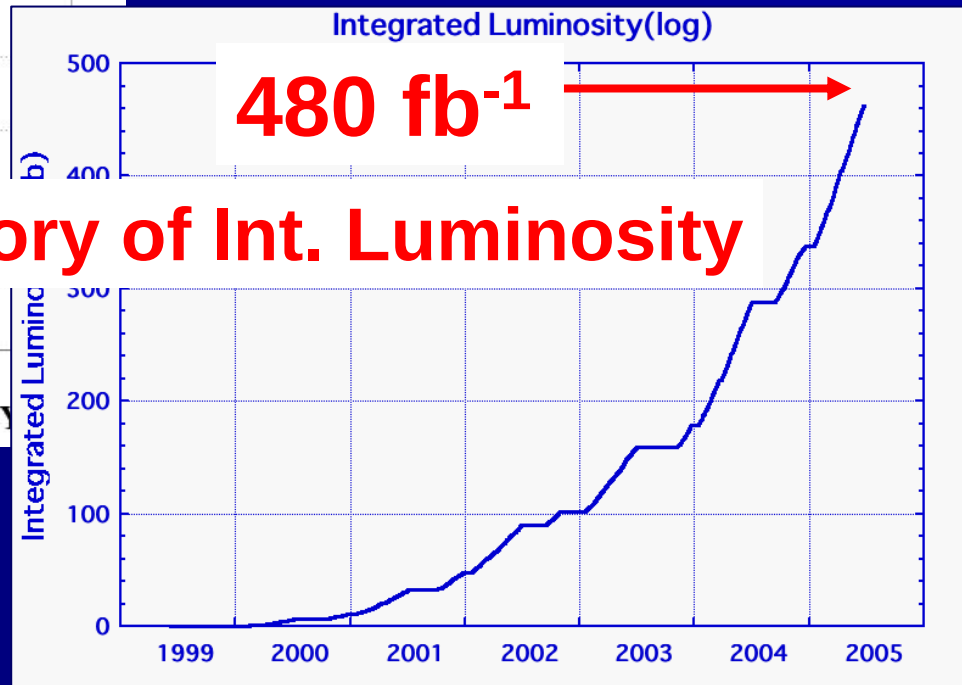
KEK B-Factory

Luminosity Records

History of Peak Luminosity



15.8 nb^{-1}/sec

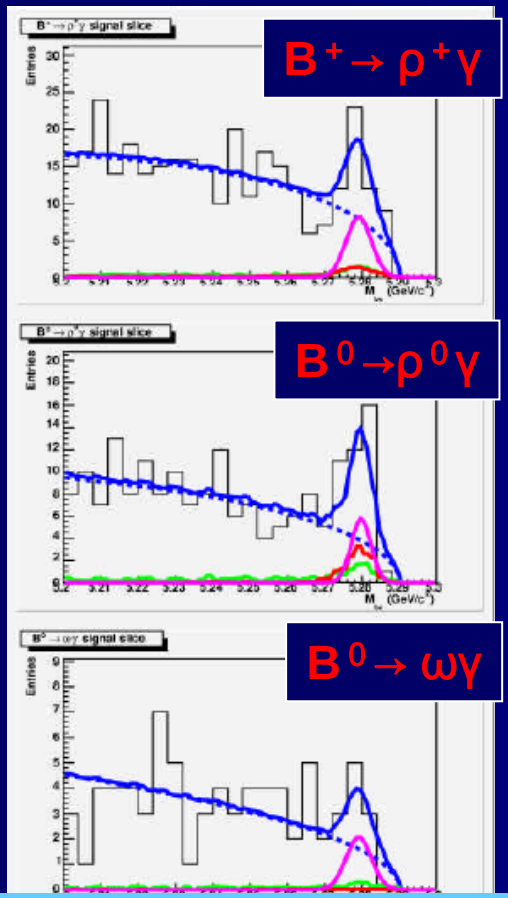


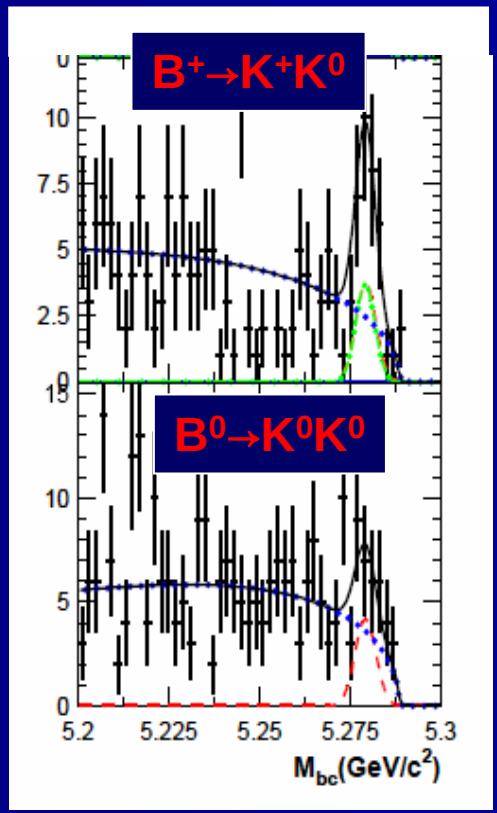
480 fb^{-1}

History of Int. Luminosity

Numerous Physics Results

Evidence for b → d Transition

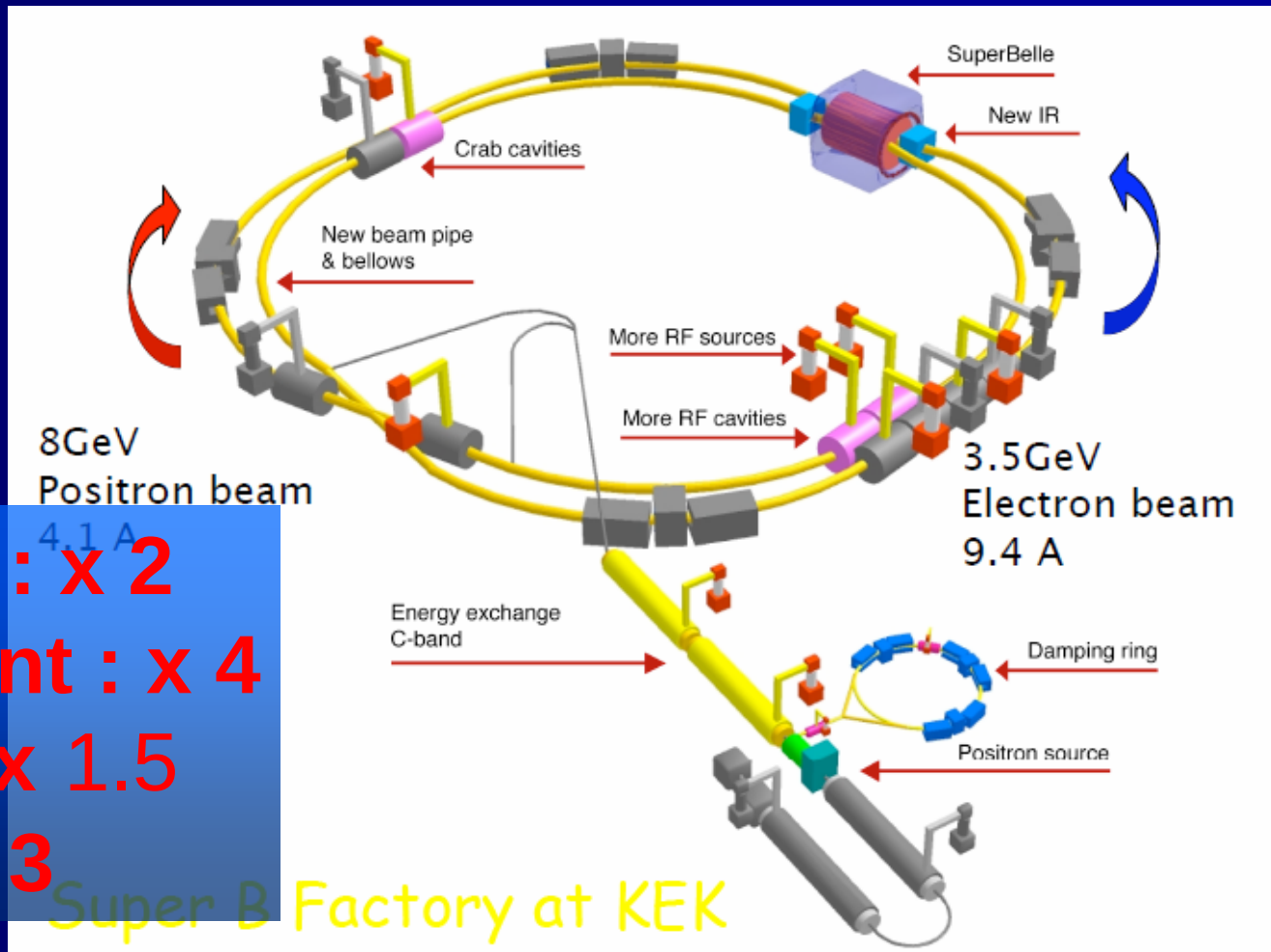




Br = 1.2 ±0.3 x 10^{-6} : 4σ effect

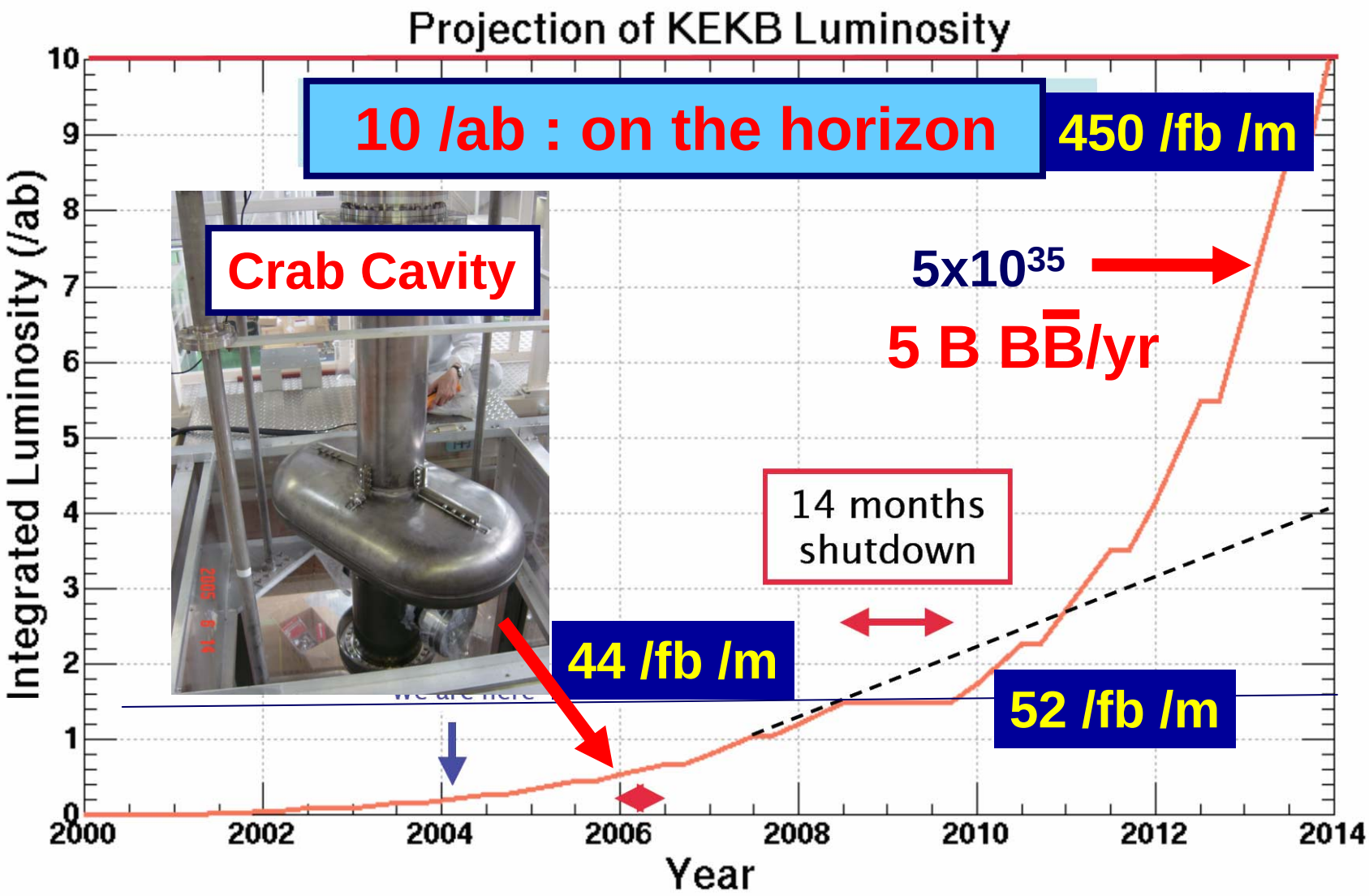
Super B Factory at KEK

$\mathscr{L}_{peak}$: 16 nb^{-1}/sec ➔ 400 nb^{-1}/sec

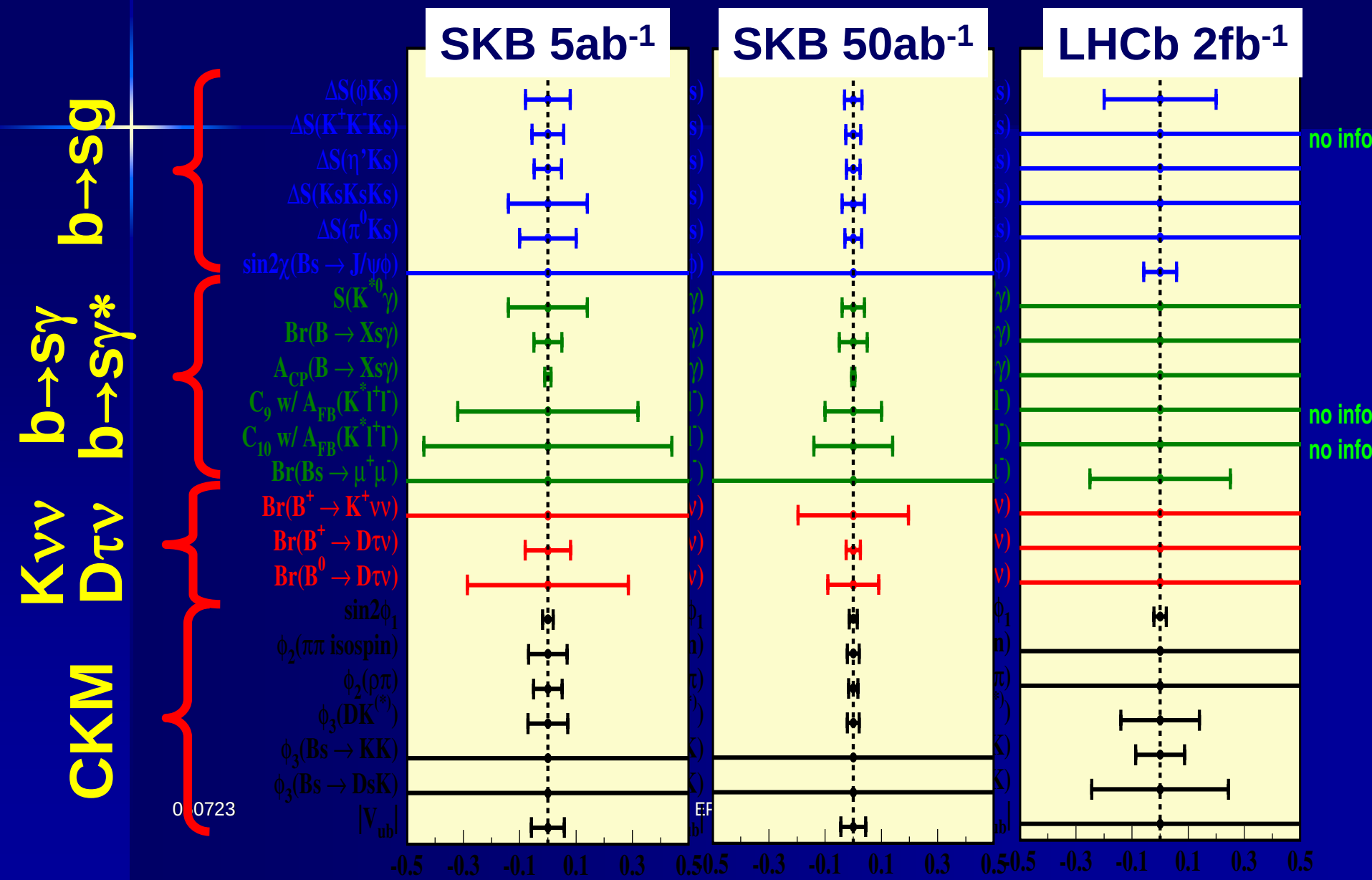


- Crab x-ing : x 2
- More Current : x 4
- Smaller σ : x 1.5
- Larger ξ : x 3

KEKB Luminosity Projection



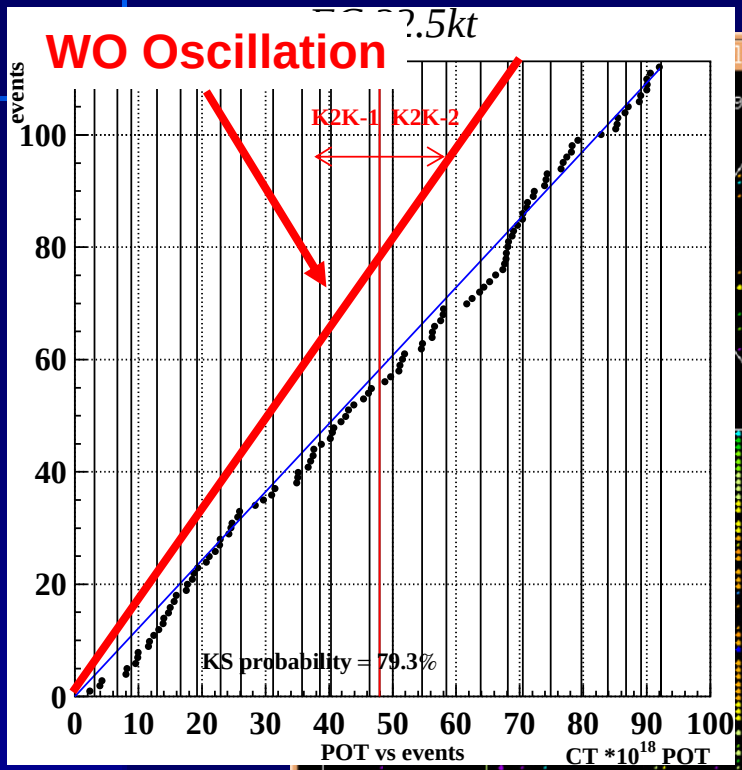
Physics Reach at Super KEKB

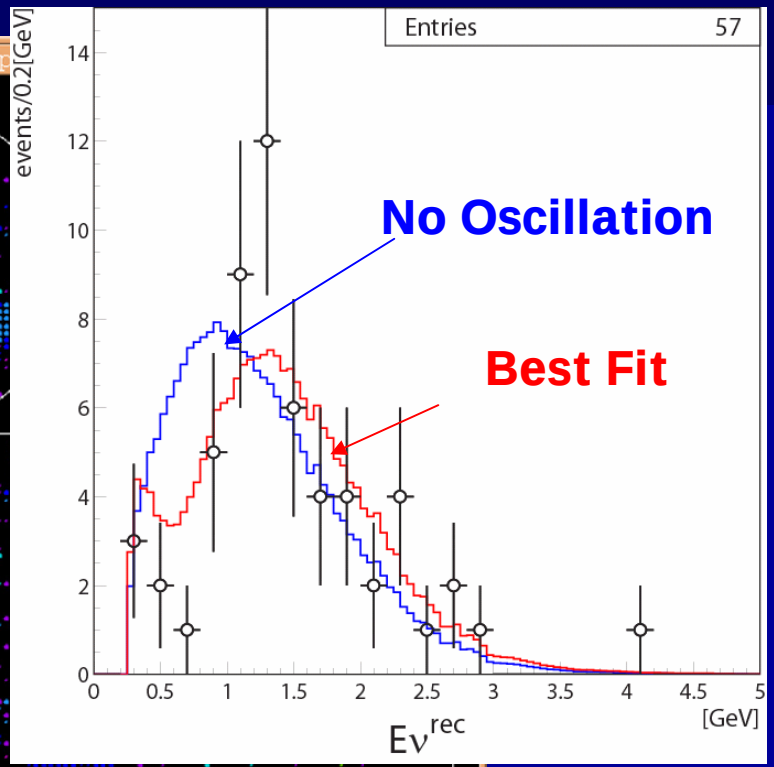


K2K Experiment

terminated

Confirmation of ν_μ - Oscillation





Deficit of ν_μ events

- **Obs: 107**
- **Exp'ed: $150.9^{+11.5}_{-10.1}$**

# of events: 3σ
Spectrum : 2.6σ
Combined : 4σ

J-PARC Project

Three Goals

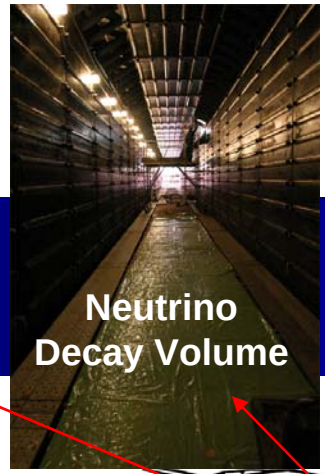
- **Materials & Life Sciences**
- **Nuclear & Particle Physics**
- **R&D toward Transmutation**

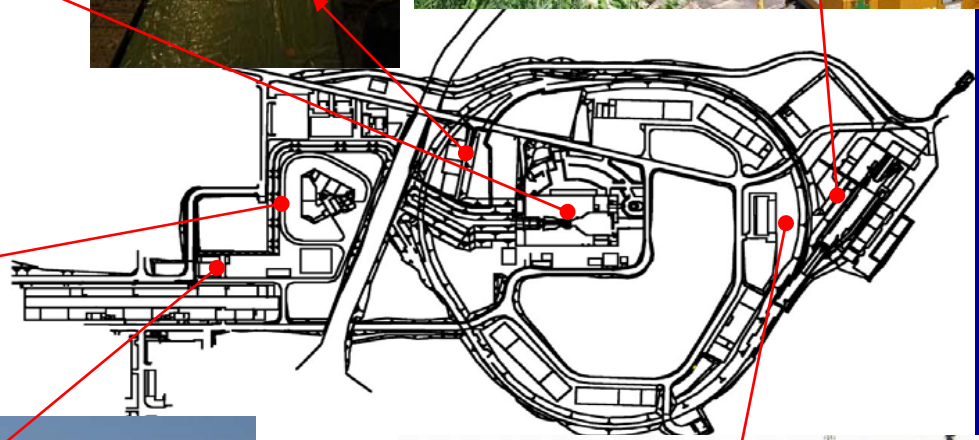
Construction will be completed by the end of JFY2007 except for the Neutrino beam line, which will require one more year to be completed.

Status of Construction of J-PARC

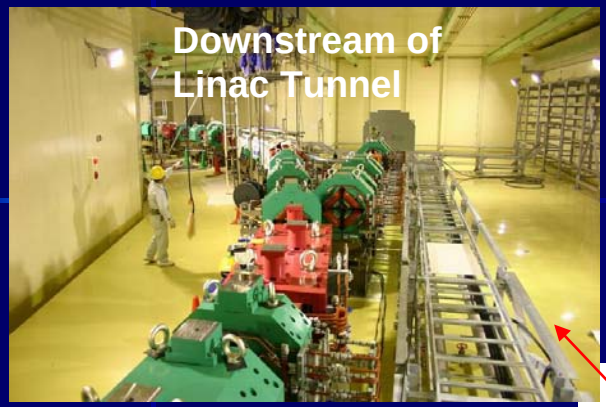
Hadron Experimental Hall
50 GeV
Materials & Life
Experimental Hall
Neutrino
3 GeV
Linac
Sept. 15, 2005

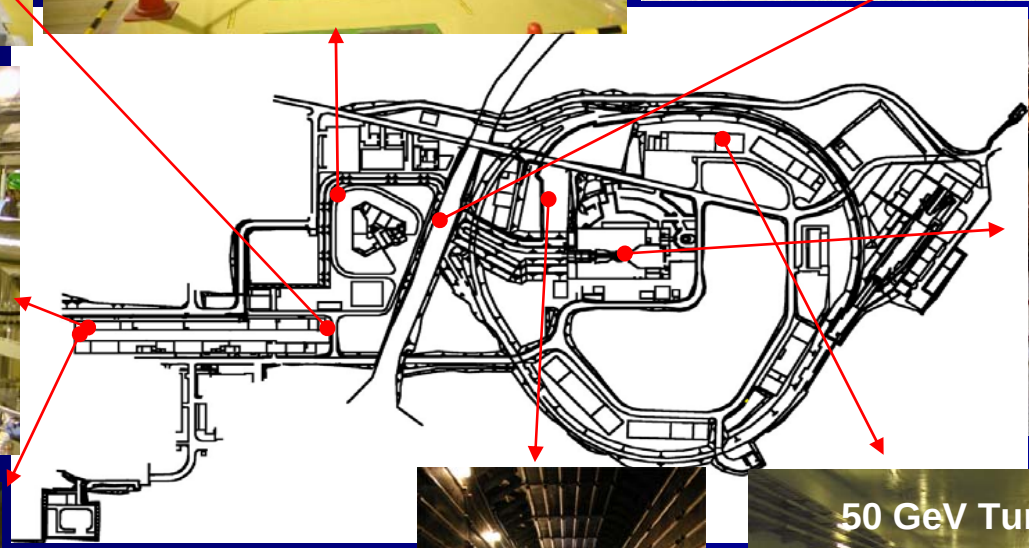
Construction for Buildings





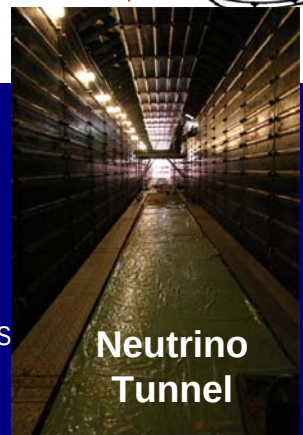
Installation has started.

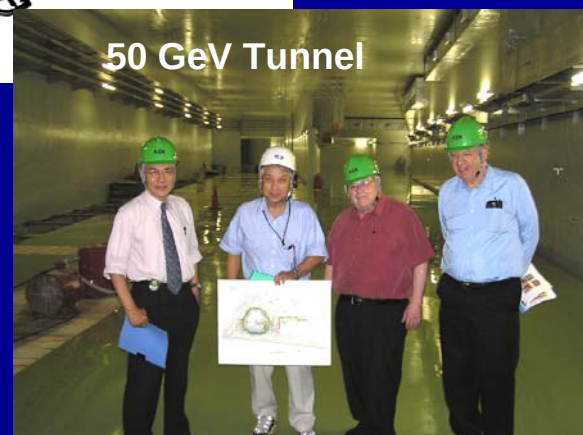




Tunnel
Tour

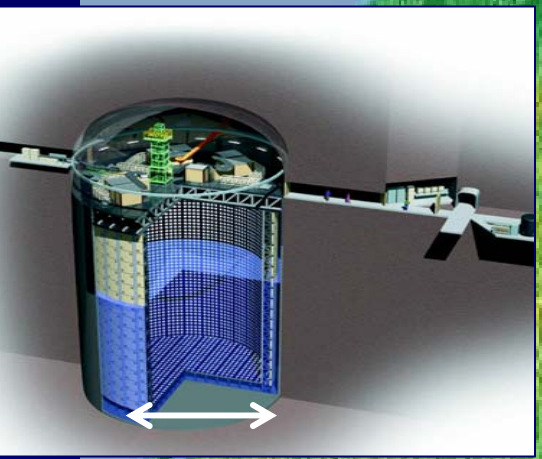
EPS



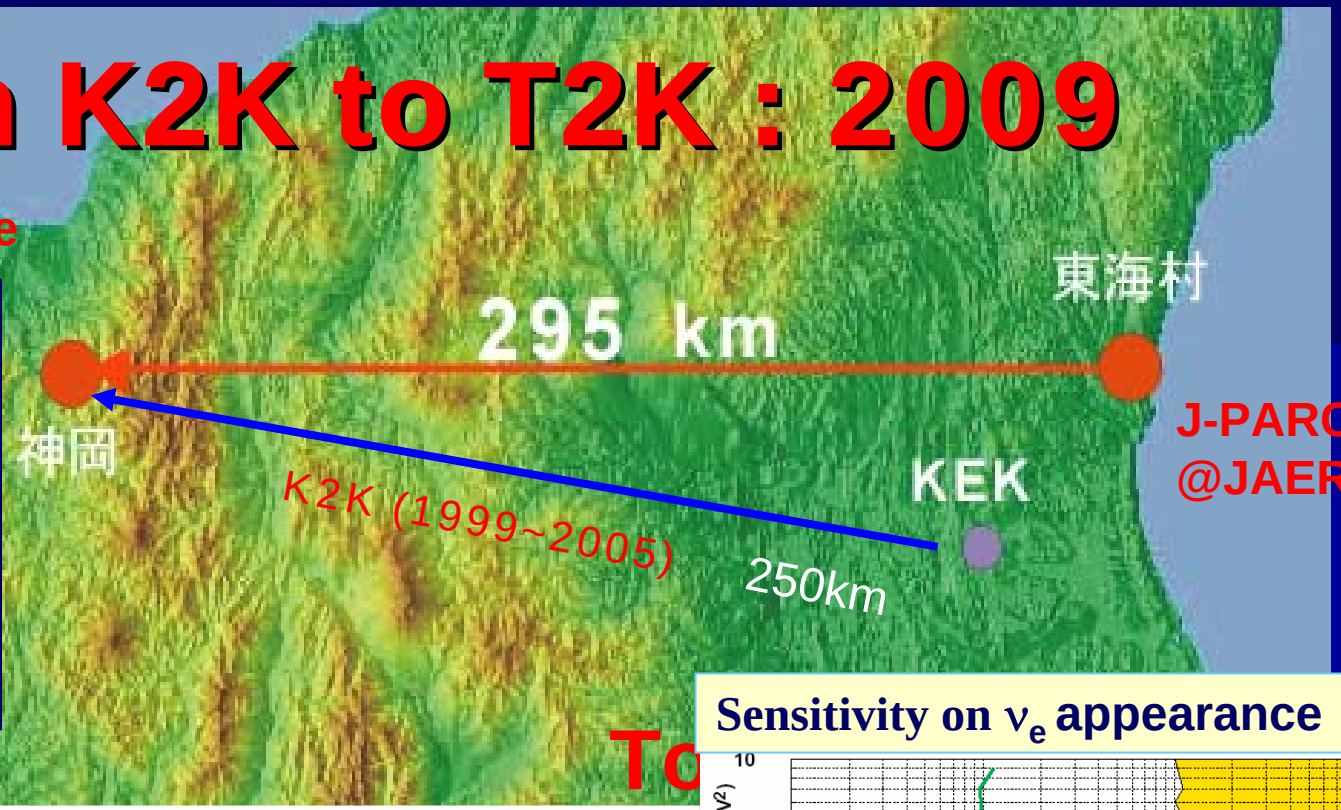


From K2K to T2K : 2009

Super-Kamiokande



40 m

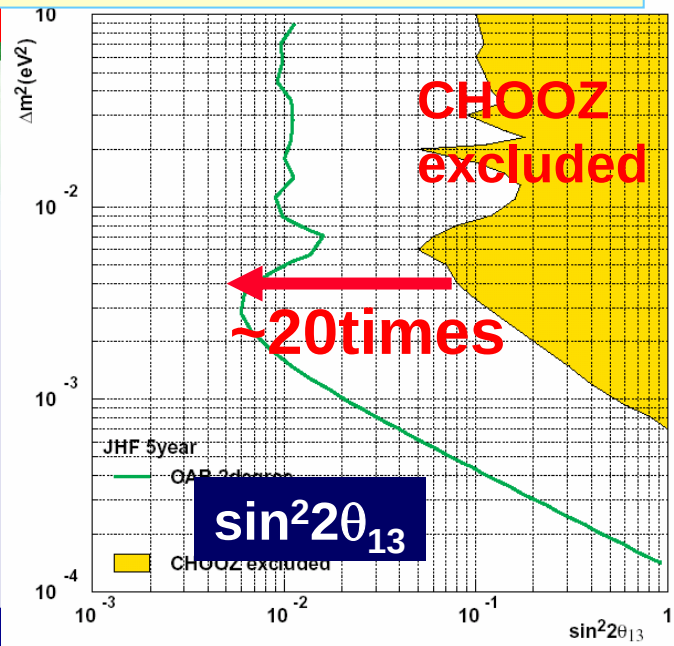


Off-axis sub-GeV ν_μ Beam

~3000 ν_μ CC int./y (w/o osc.)
in 5 year opeartion

- ν_e appearance discovery
- ν_μ disapp. presice meas.

Sensitivity on ν_e appearance

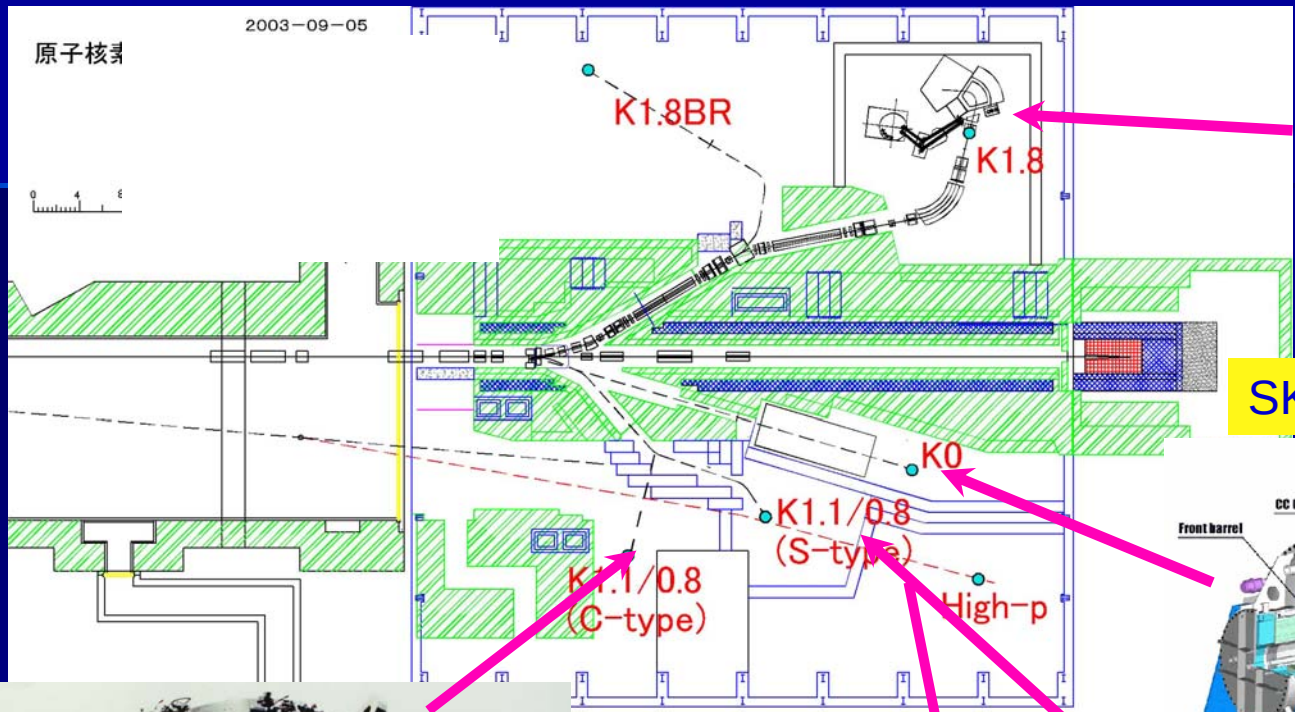


T2K Collaboration

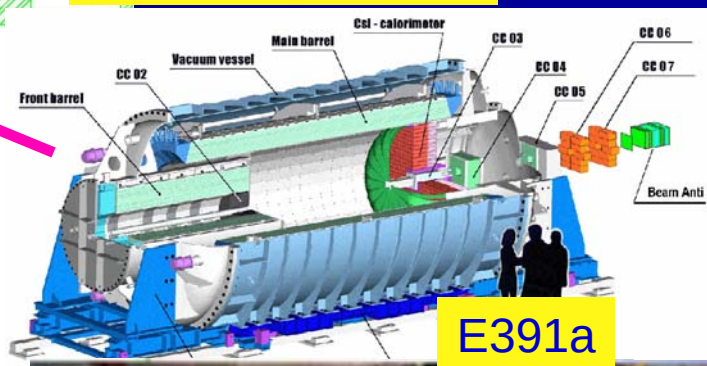
- **Formed in May 2003**
- **12 countries, 53 institutions**

  ~150 collaborators
- **Spokesperson: K.Nishikawa**

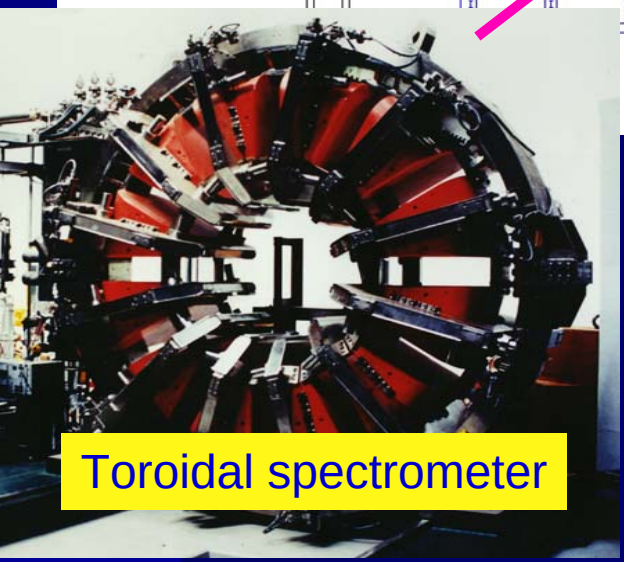
Hadron Hall Experiments



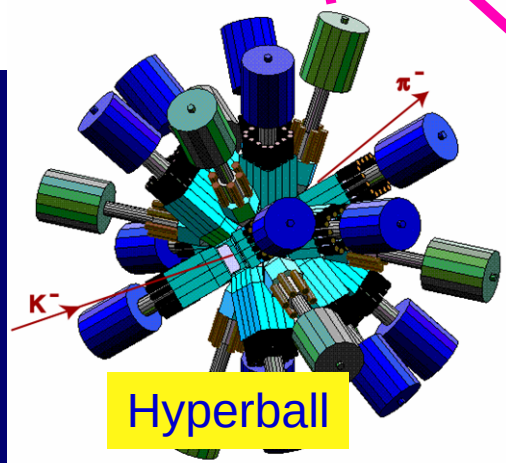
SKS spectrometer



E391a



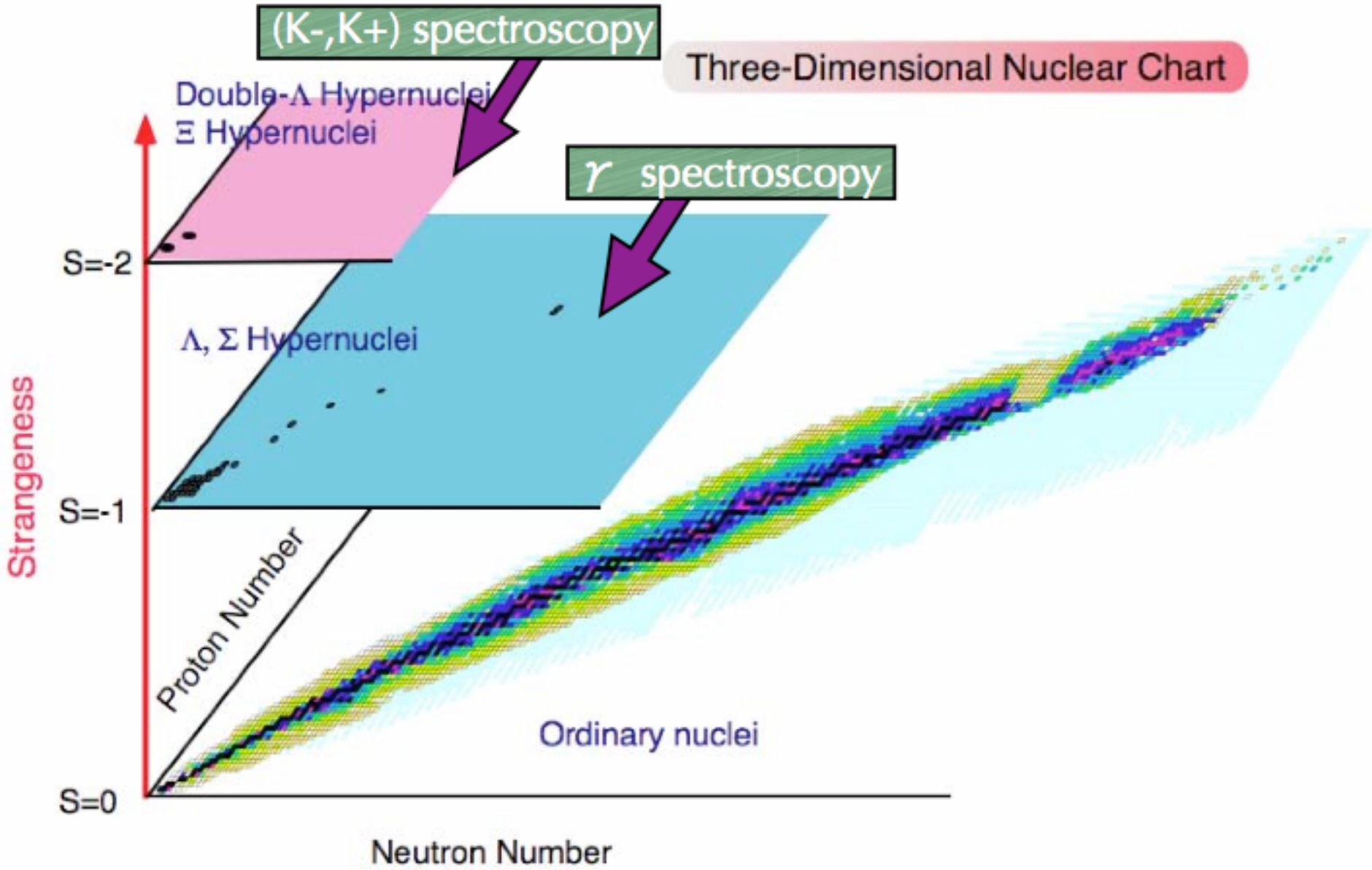
Toroidal spectrometer



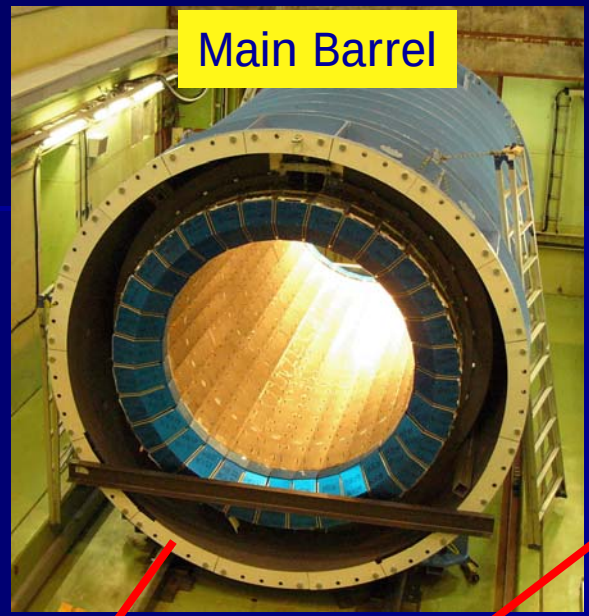
Hyperball

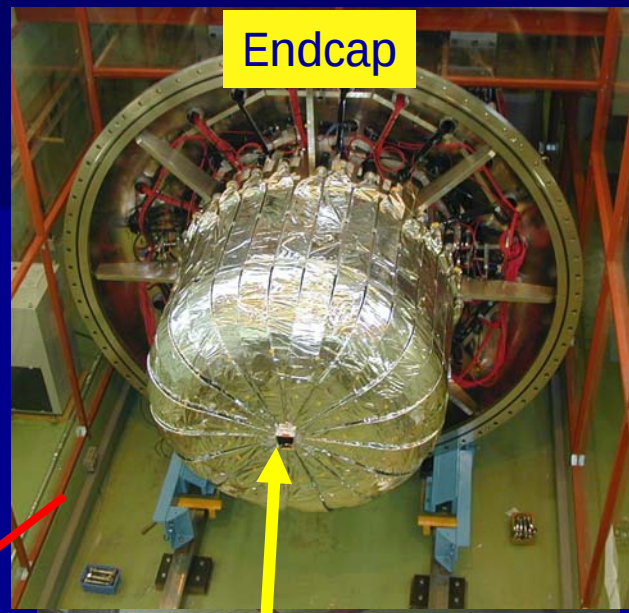
SPES-II

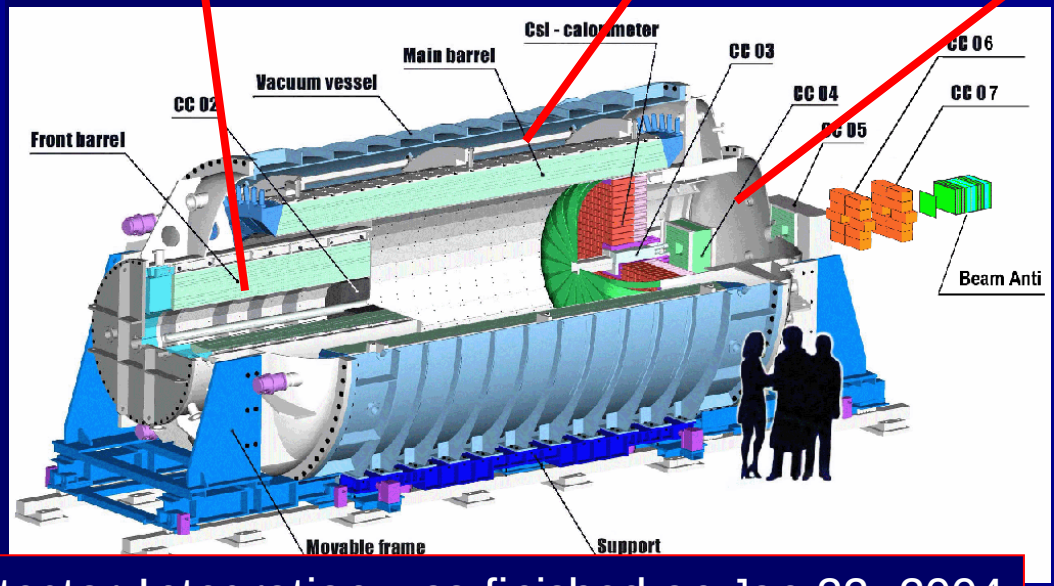
Hyper-nuclei



KEK-E391a detector

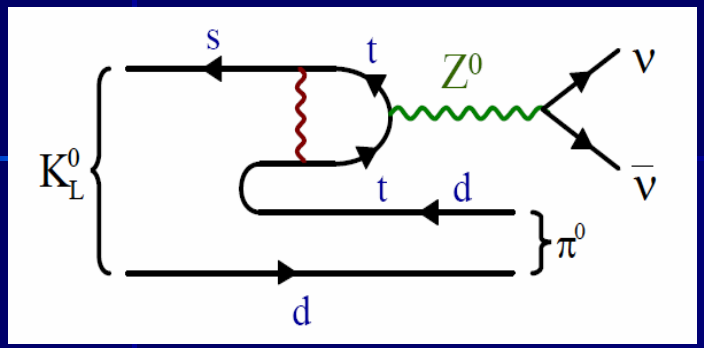


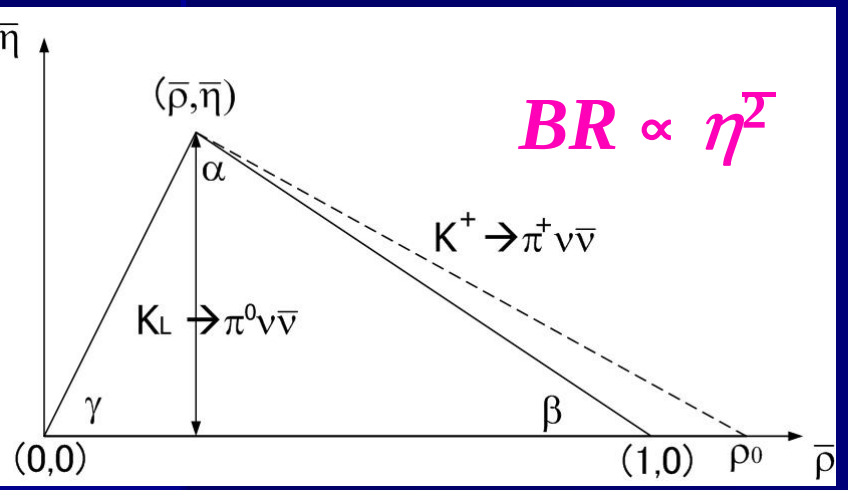




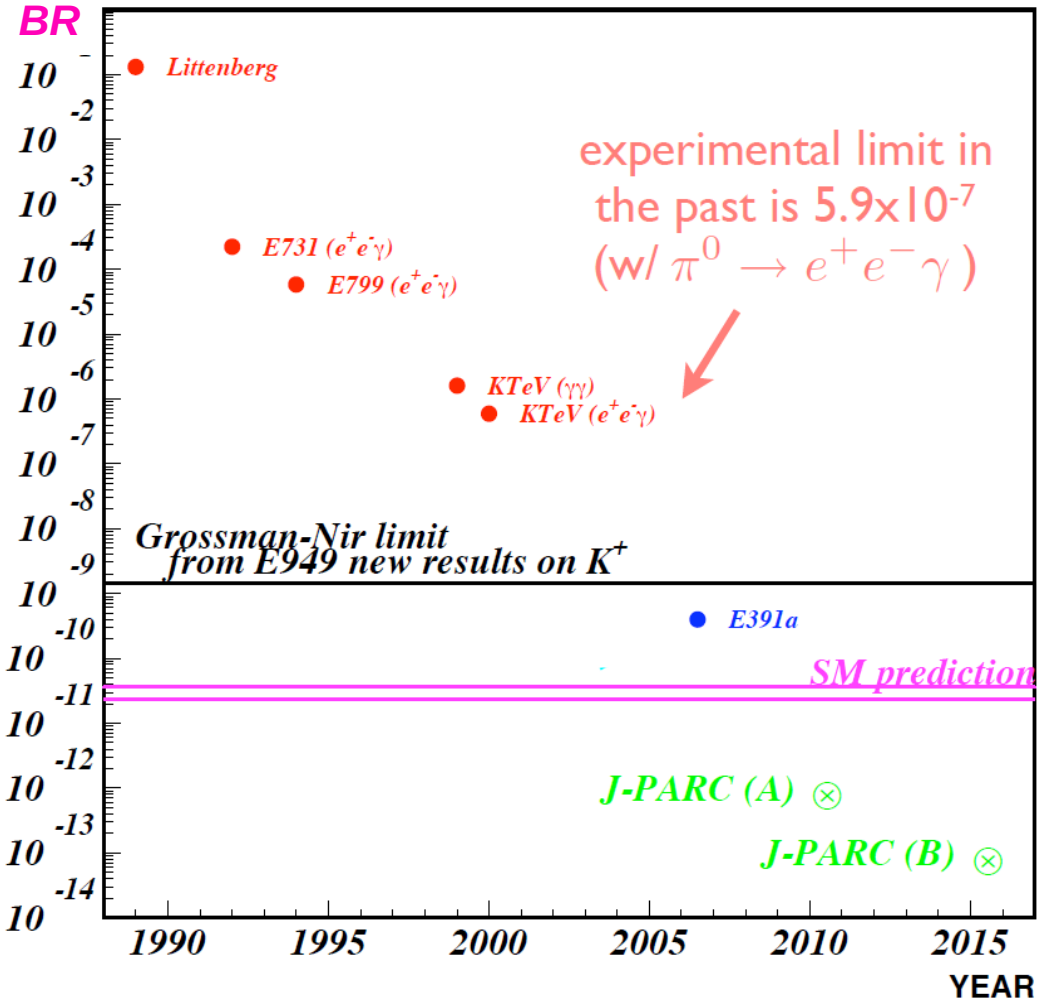
Detector Integration was finished on Jan 22, 2004

$K_L \to \pi^0 \nu\bar{\nu}$ rare decay -CP violation-

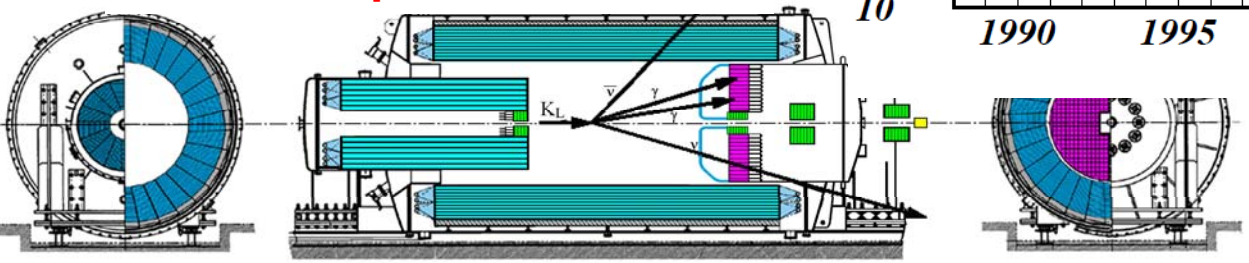




$BR \propto \eta^2$



KEK PS experiment : E391a



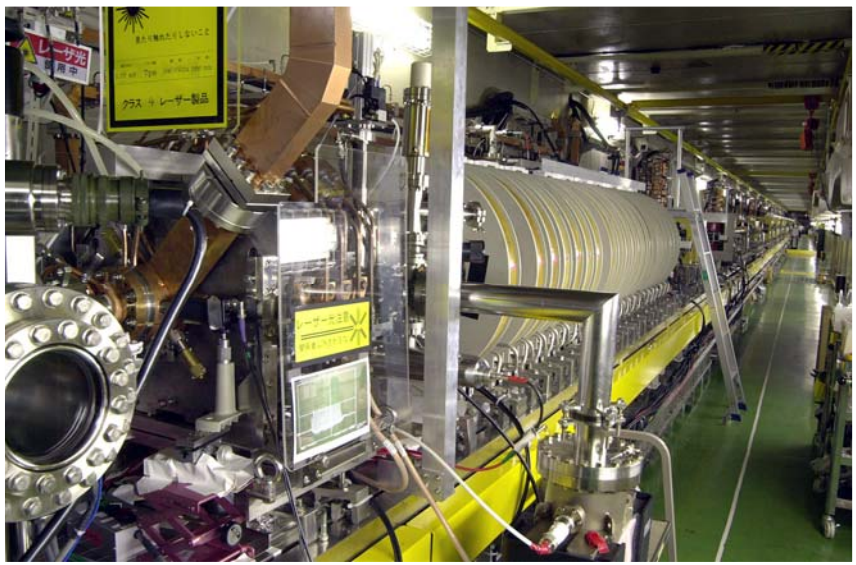
Toward ILC

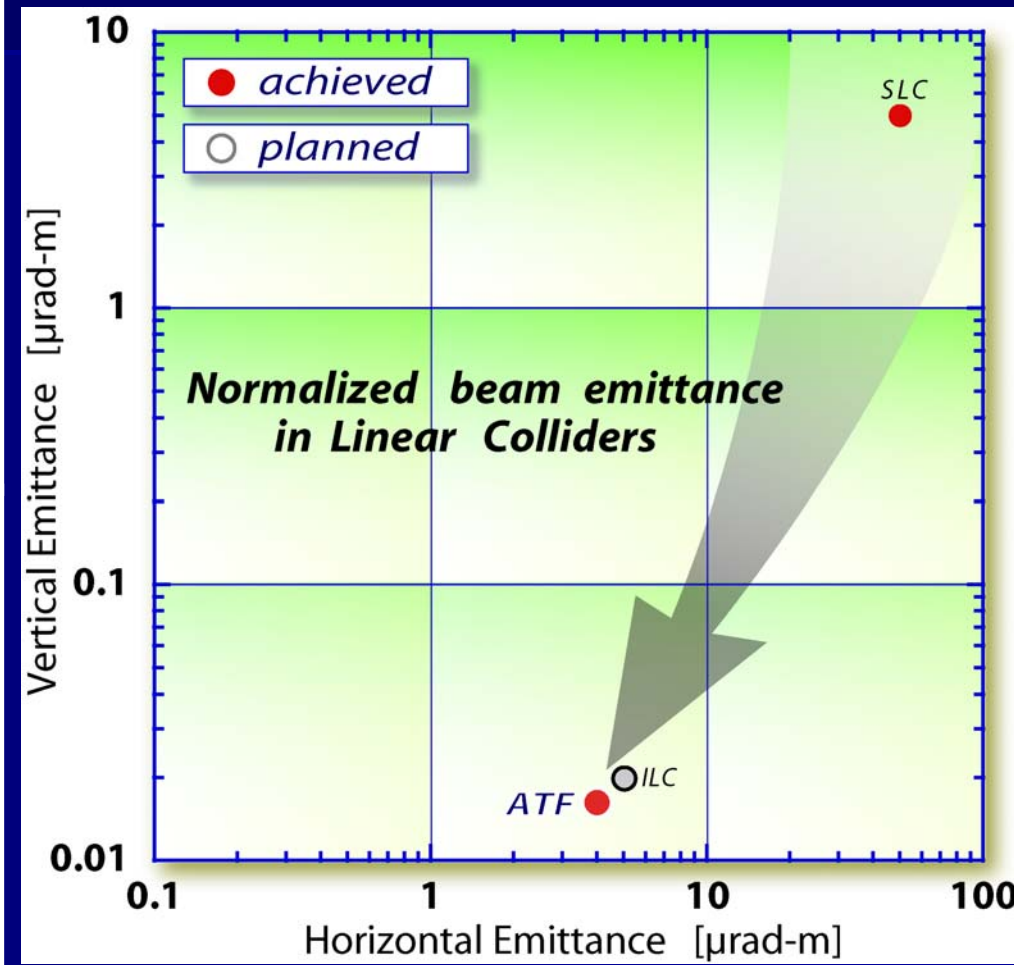
KEK will

actively participate in the design works and R&Ds to realize the ILC within the frame work of the GDE.

KEK's ATF and STF will serve for this purpose.

KEK R&D effort - 1; ATF

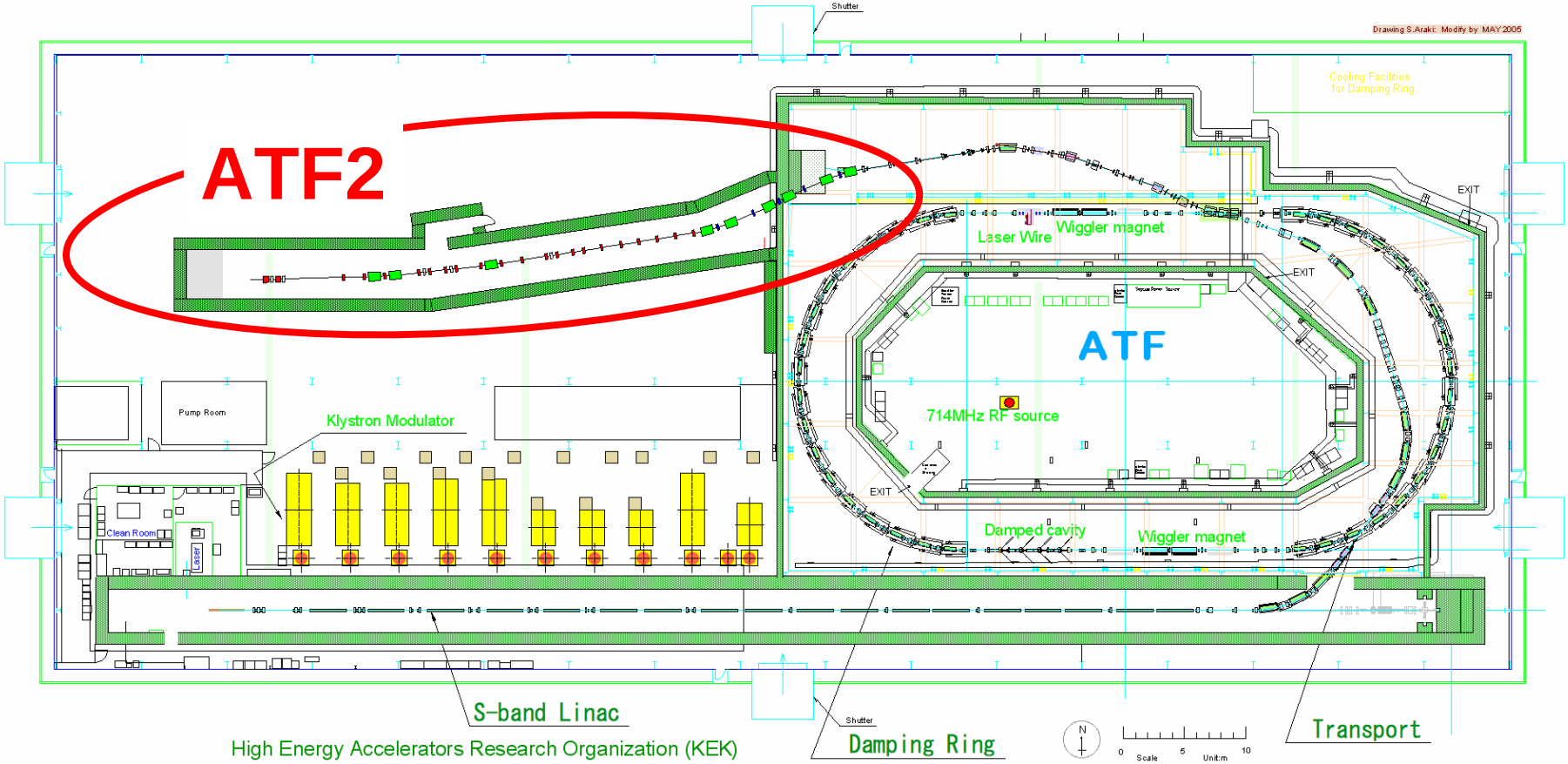




ATF International Collaboration

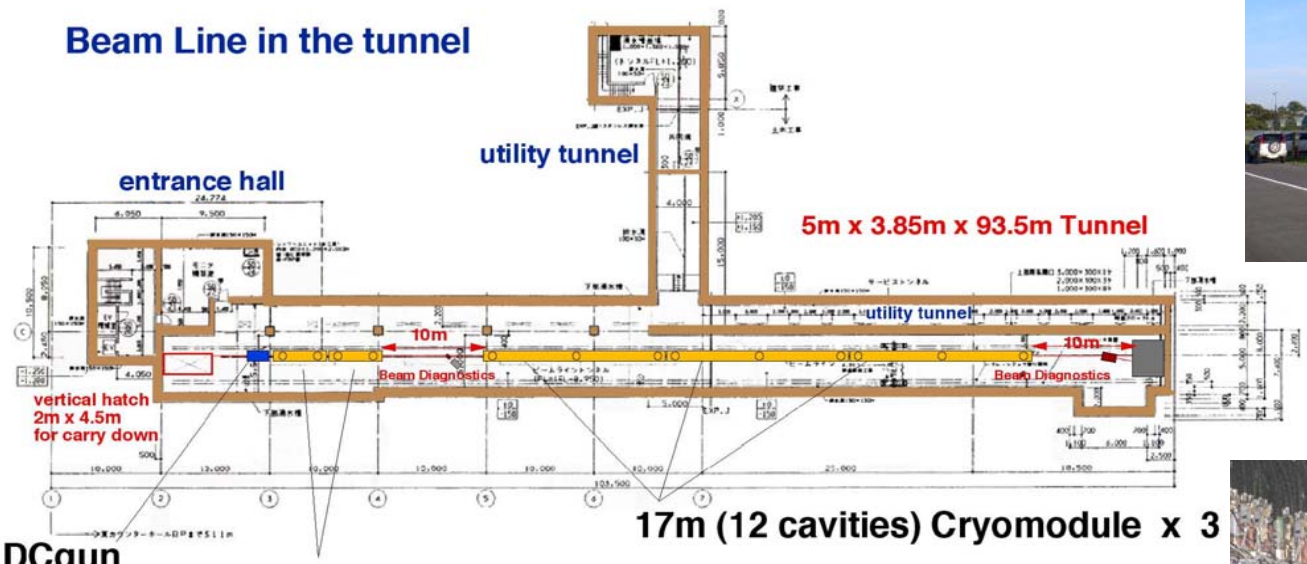
Beam Instrumentation Studies for ILC

ATF2 LAYOUT



KEK R&D effort - 2; STF

700 MeV Linac with SRF tech. by 2007



17m (12 cavities) Cryomodule x 3

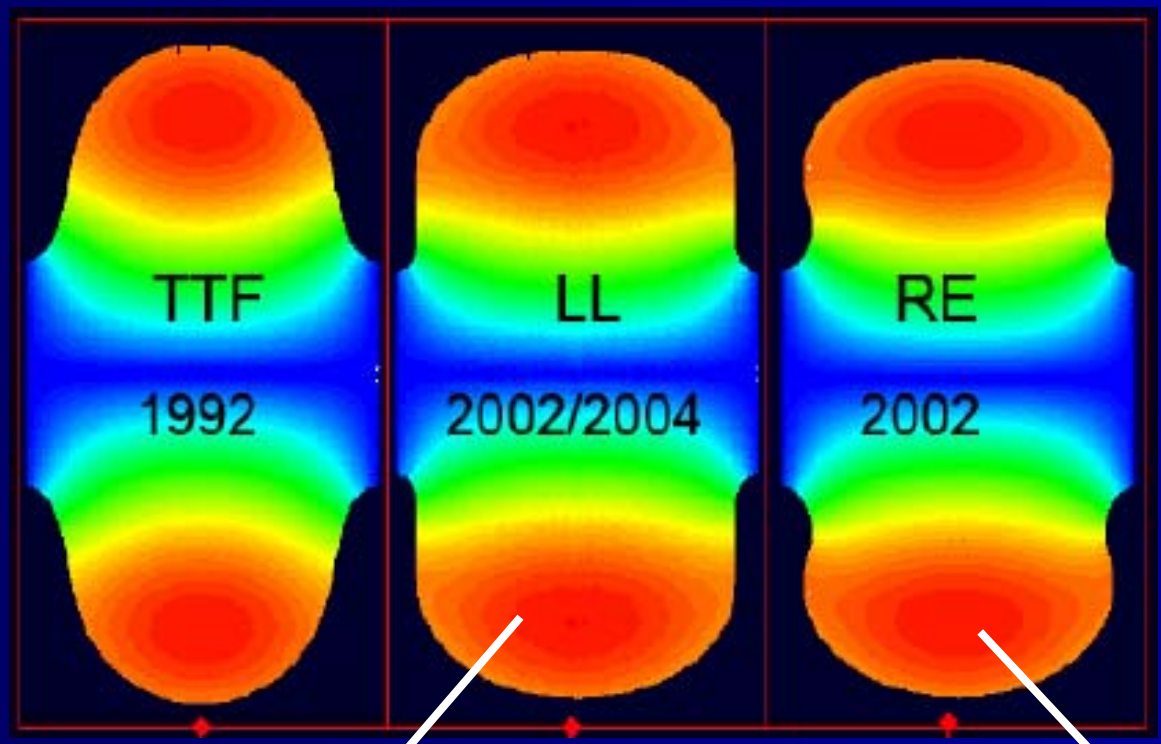
DCgun
(later RFgun)

5m Cryomodule(4 cavities) ; 35MV/m
+
5m Cryomodule(4 cavities) ; 45MV/m

V2.2 Hitoshi Hayano, 02

New progress on LL/RE Cavities

K. Saito et al



46.5 MV/m 51.2 MV/m

Plan for Future

Current discussion in the Japanese HEP community

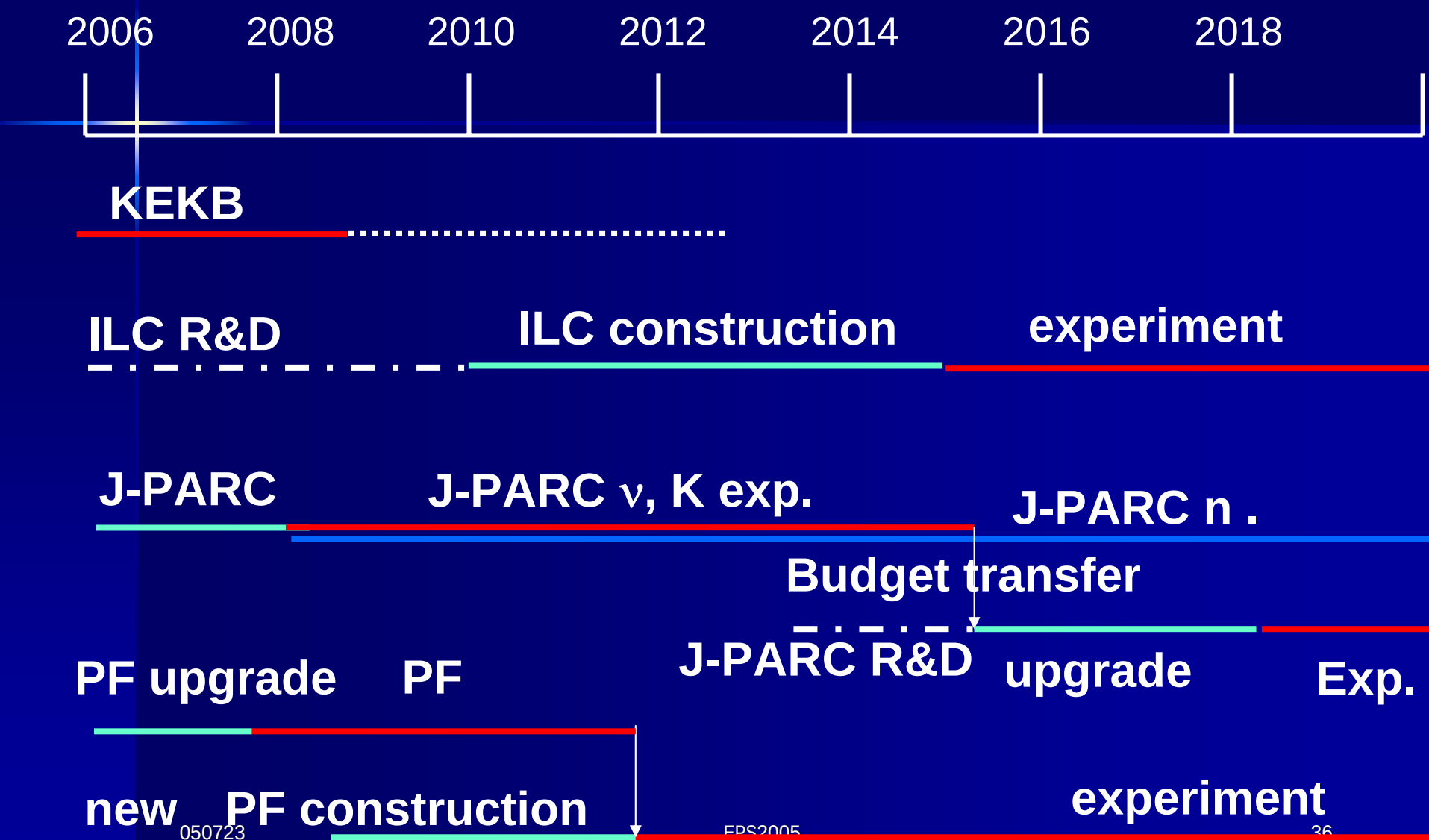
Possible Choice

- ILC :
- Super-KEKB : < 450 Oku-Yen
- J-PARC → 4 MW PS :
  > 500 Oku-Yen

KEK's Plan

DG is willing to establish KEK's research plan for the coming decade in a year or two.

Possible Scenario



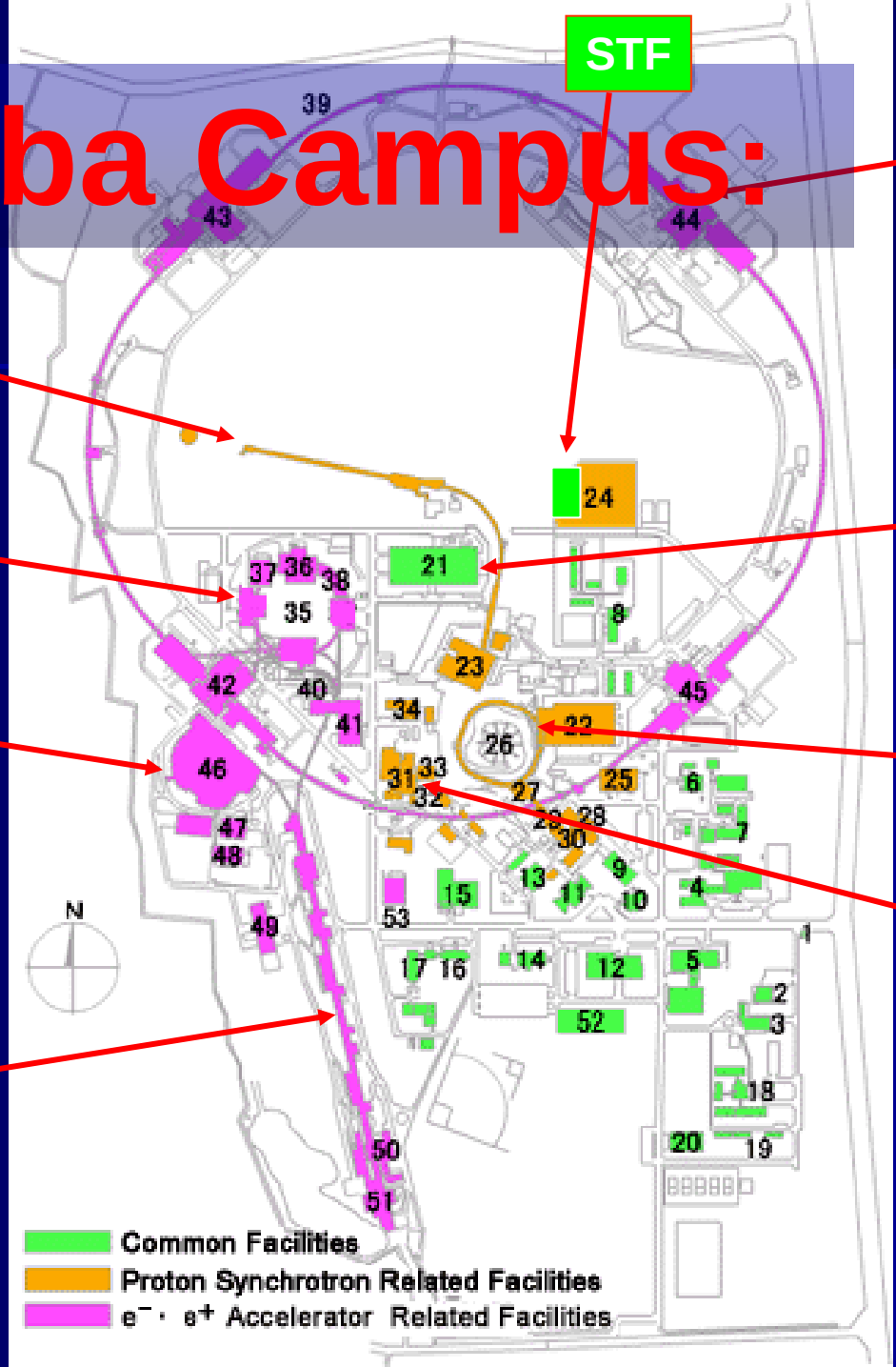
Conclusion

KEK has had an exciting Physics program.

KEK has started discussions on the research program for the coming decade.

Supplement

Tsukuba Campus:



BELLE

KEKB
(8GeVe^-x3.5GeVe^+)

K2K Td

6.5GeV PF-AR

2.5GeV PF

e^+ & e^- LINAC

ATF (Accelerator Test Facility)

12GeV PS
Td in Dec '05

Neutron source
Muon muon source
Td in Mar '06