

Nuclear and Particle Facilities of the JHF Joint Project

February 16, 2000

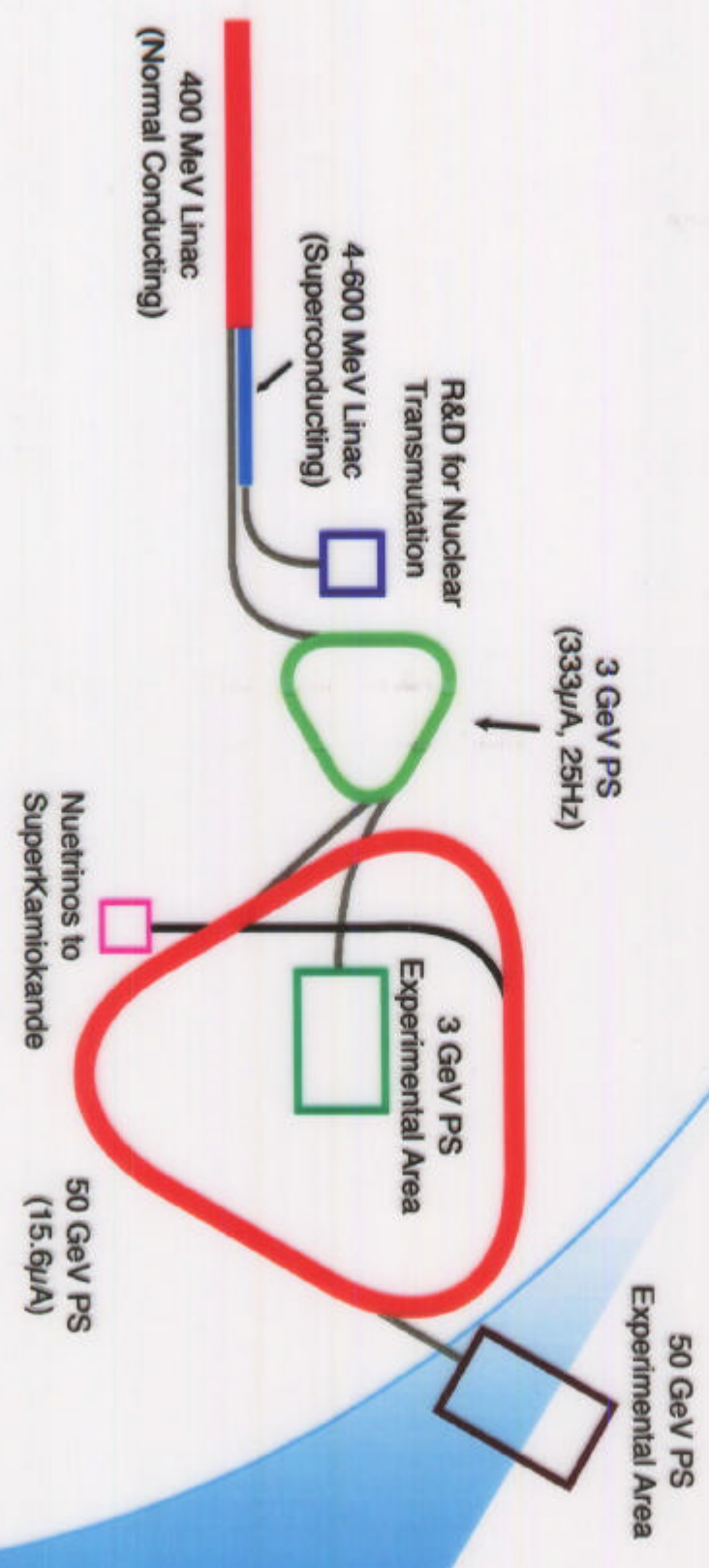
Kaon Decay Workshop

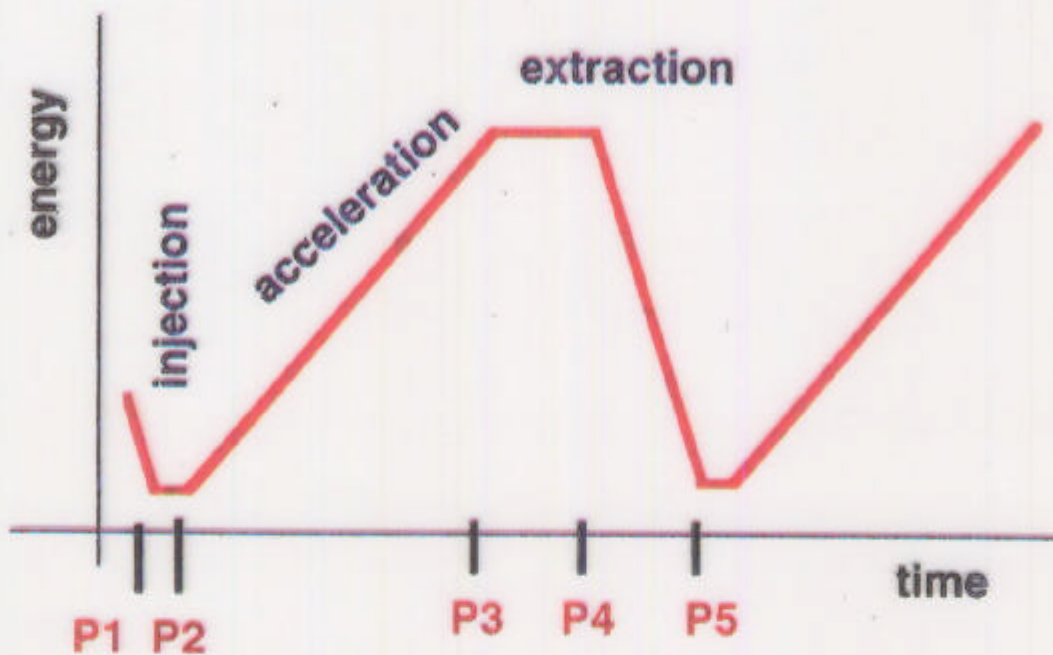
J.Imazato

IPNS, KEK

- 1) Experimental facility
- 2) High intensity beams
- 3) Particle physics experiments
- 4) Neutrino oscillation experiments
- 5) Nuclear physics experiments

Configuration of the Accelerator Complex





P1 - P2(injection)	0.12 s
P2 - P3(acceleration)	1.9 s
P3 - P4(extraction)	0.7 s
P4 - P5	0.7 s
total	3.42 s

slow extraction of 50GeV

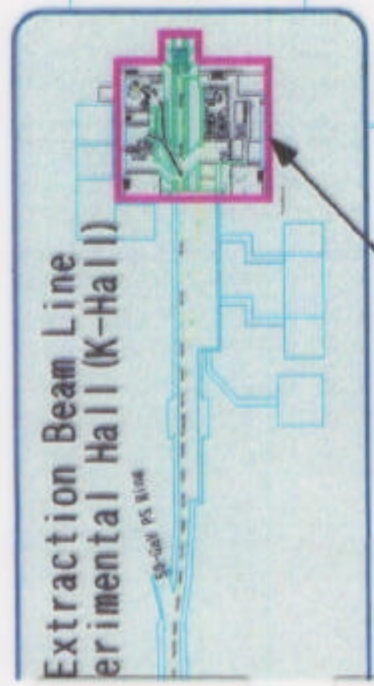
duty factor	0.20
average current	15.6 μ A

FIG. 3.3 Typical machine cycle of the 50-GeV ring

10-Jan-2001

K HALL

Area 3400m²



Extraction Beam Line
Experimental Hall (K-Hall)

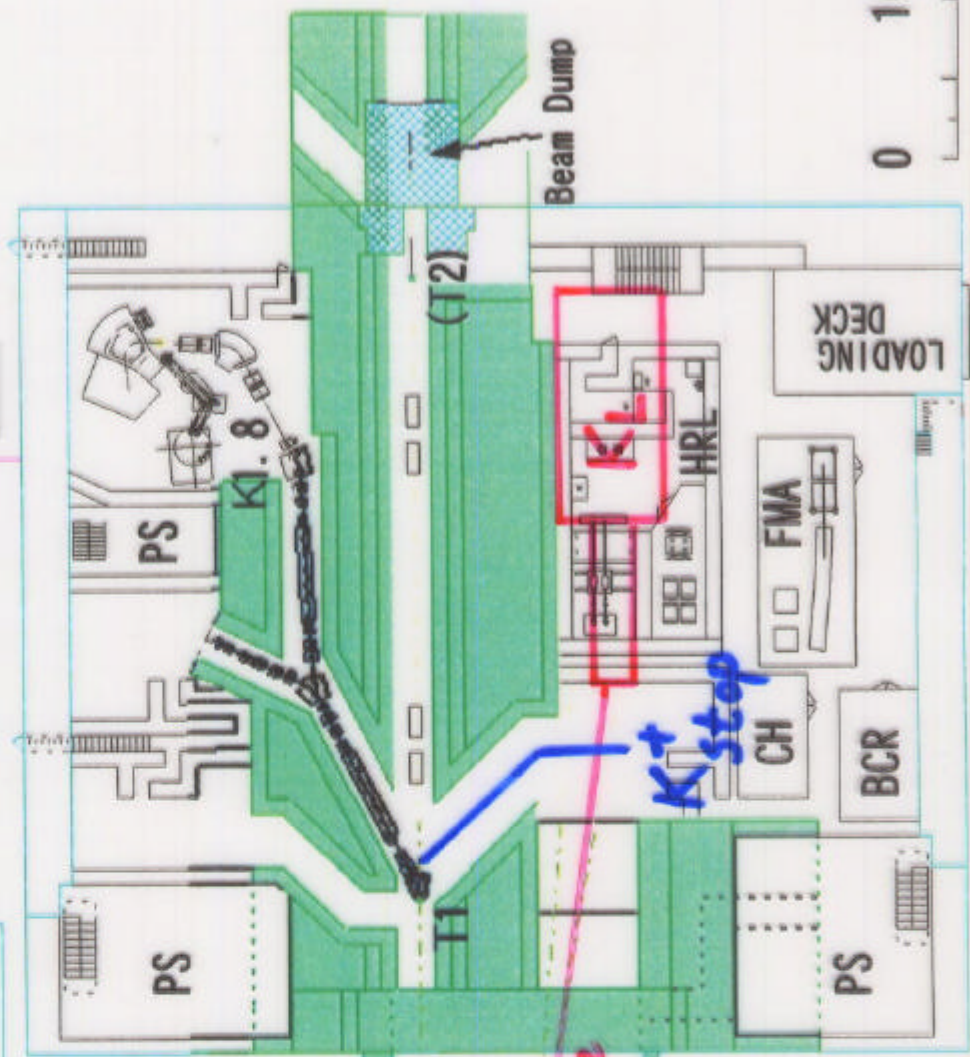
50-001 PS K104

K HALL

Air
Conditioner

Electricity He
Compressor

CH



A-Line

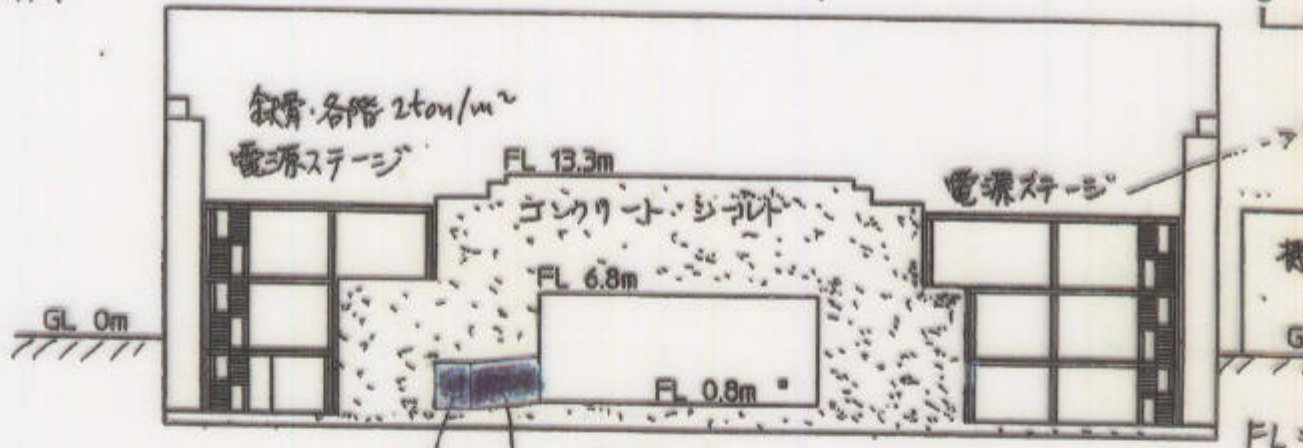
B-Line

K+ stop

- Production Target 1
- 8 : K1.8 Beam Line
- : High Radiation Lab
- : Field Measurement Area
- : Beam Line Control Room
- : Counting House, etc.
- : Magnet Power Supply Stage

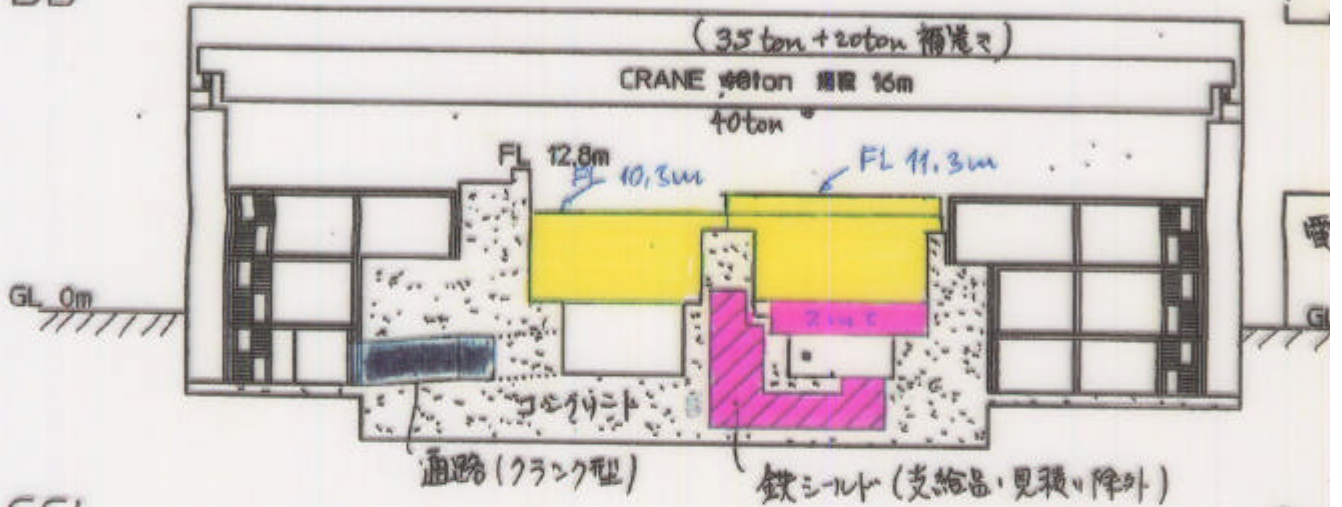
0 10m

AA'

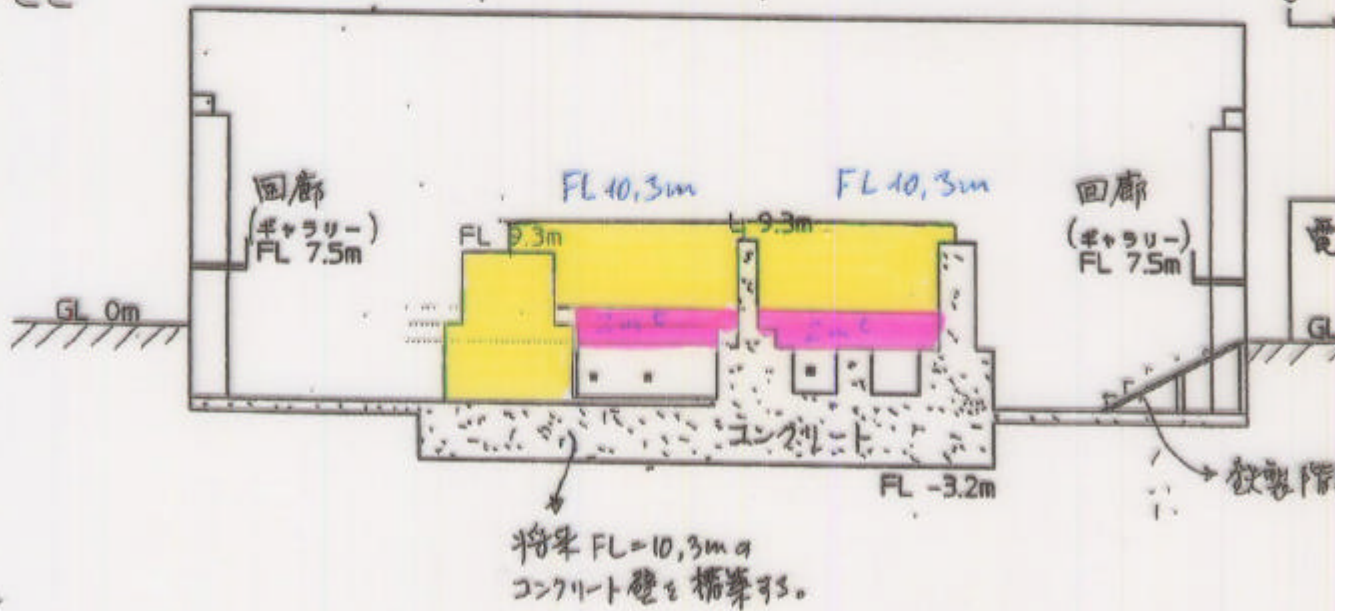


通路断面 通路(クランク型)

BB'



CC'



- Budget for the full-size experimental hall?
- Extendibility of the hall?
- Budget for a neutrino beam line?

- International cooperation

- 1) Beam channel design
- 2) Magnet recycling
- 3) High-intensity beam elements

- Call for LoI and proposals

LoI : sometime this year?

General LoI already for:

- 1) Hypernuclear physics
- 2) Hadron physics
- 3) Neutrino oscillation

- Construction Group

- 1) Joint team of KEK and JAERI
- 2) PS division of IPNS-KEK
- 3) Subgroups for construction
target, beam monitor, magnet *etc.*

High-intensity Beam

Radiation problem requires:

- low beam loss
- thick radiation shielding
- remote handling at maintenance
- radiation-hard magnets
(MIC magnet etc.)

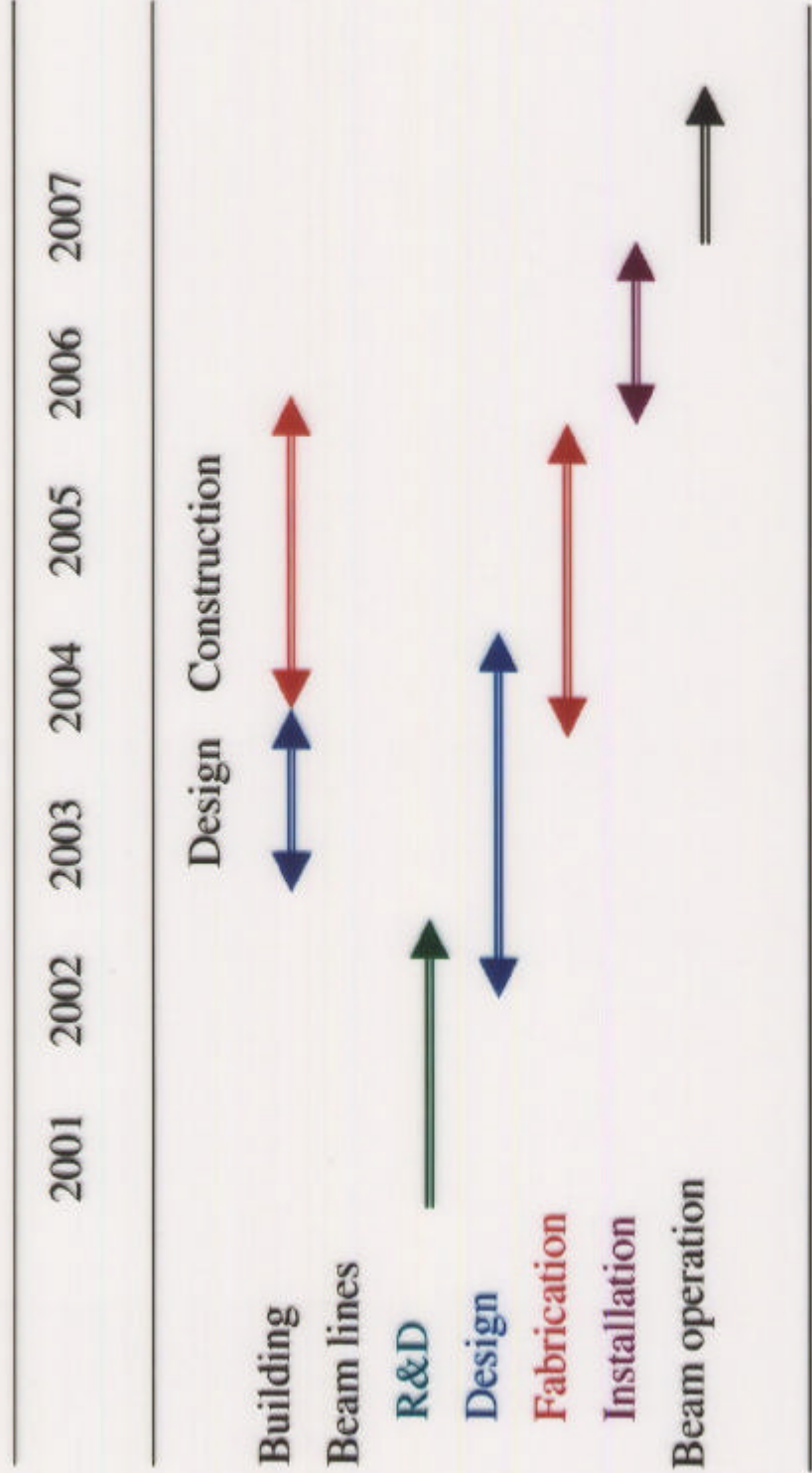
Beam heating requires cooling of:

- production target
- beam dump
now being designed

New developments are necessary for:

- beam monitor
now being developed
- beam scraper etc.

Time Schedule



Particle Physics Program

- CP violation in K decays
- CKM parameters
- T violation in K decays
- CPT violation
- Lepton flavor violation

Neutrino Physics Program

- ν_μ disappearance
- Precise measurement of Δm^2 and mixing angles θ_{23} and θ_{13}
- ν_e appearance
- NC measurement

$$P_{a \rightarrow b} = \sin^2 2\theta \sin^2 \left\{ \frac{1.27 \Delta m^2 [\text{eV}^2] L [\text{km}]}{E_\nu [\text{GeV}]} \right\}$$

Nuclear Physics Program

- Spectroscopy of $S=-2$ systems
- Hypernuclear γ -ray spectroscopy
- Hyperon proton scattering
- Others (primary beam scattering etc.)

Summary

- 50-GeV PS will deliver first beam in 2007 and it will become a center of intensity-frontier science.
- Although the budget is very limited we will try our best to install as many beam lines as possible, from the beginning.
- International interest and support (e.g. contribution to beam line construction) are very important.
- New ideas for particle physics experiments are now required. We wait for LoI and proposals.