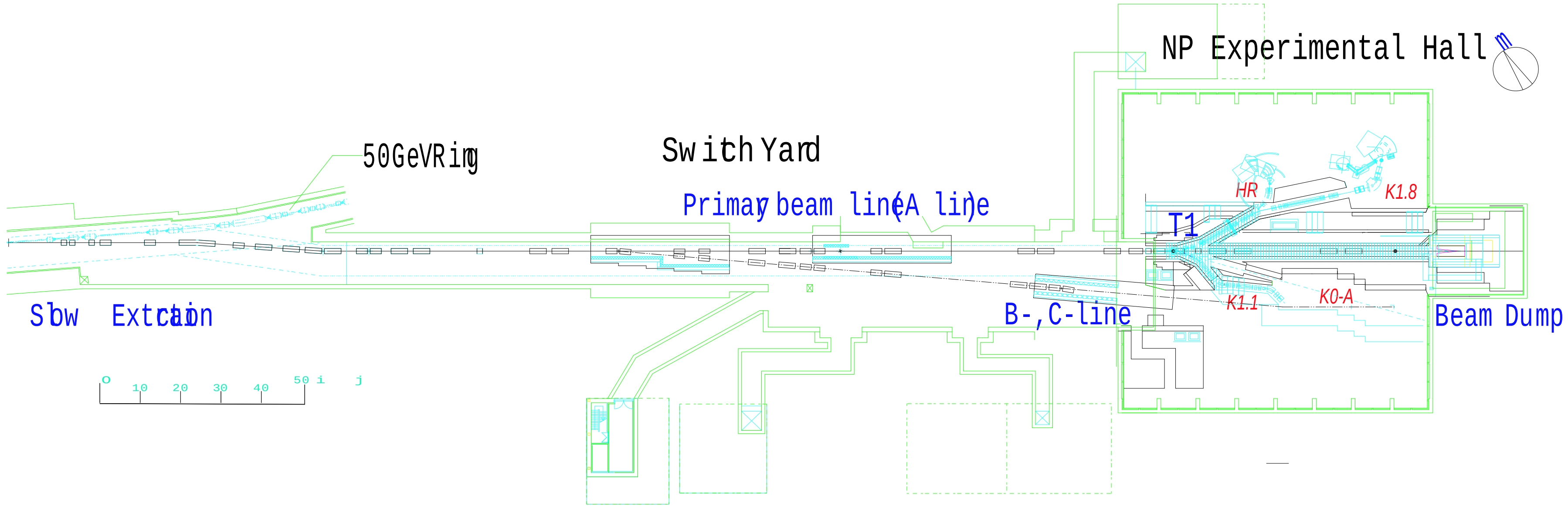

Issues on
Neutral Beam from B-line
(10 slides)

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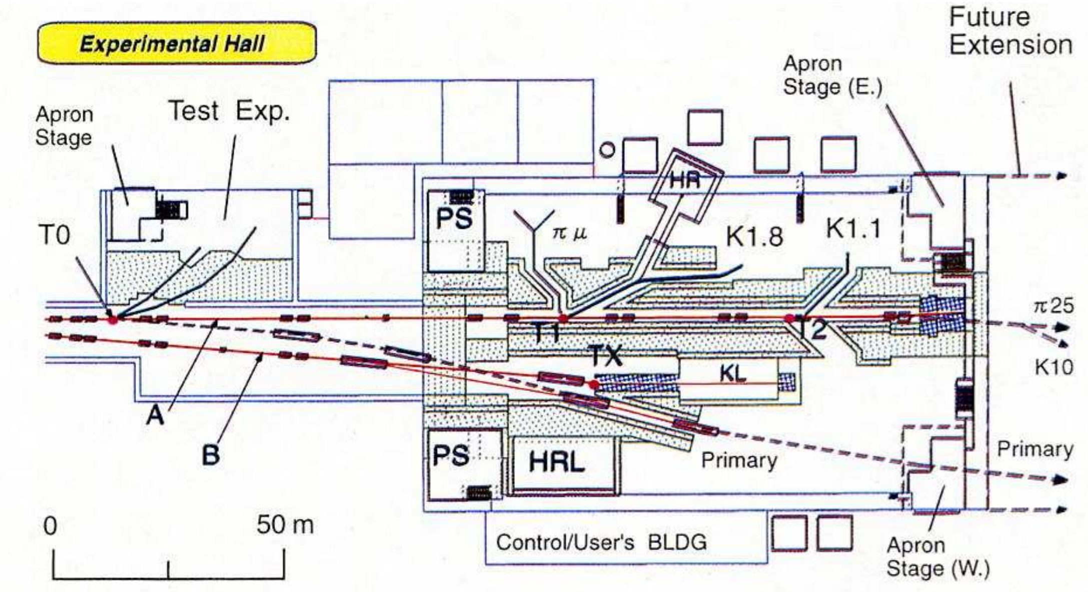
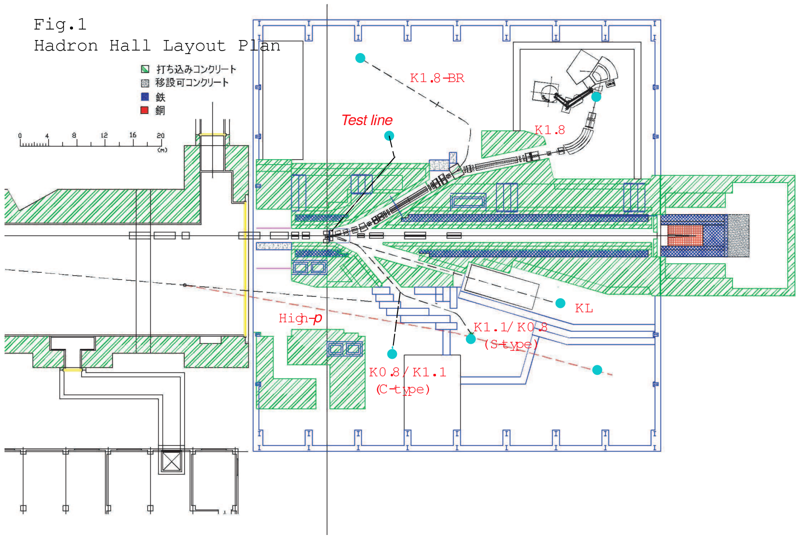
why B-line ??

In the original layout (July 1999):



- two primary lines
- secondary channels by T1, T2 (for A) and TX (for B) targets.
- KL channel was at B-line:
  - 50GeV protons, 10 degree (high K_L momentum: 1-8 GeV/c).
  - Parameters would be optimized by K_L^0 experimentalists.



- 30 GeV protons, one primary line
- K1.8, K1.1, KL

  from a single target (Aline, T1)
- 16 degree, 6m to the collimator,

  20m to the entrance.
  - constraints

    not by experimental conditions.
  - little room for extention

    nor further modification

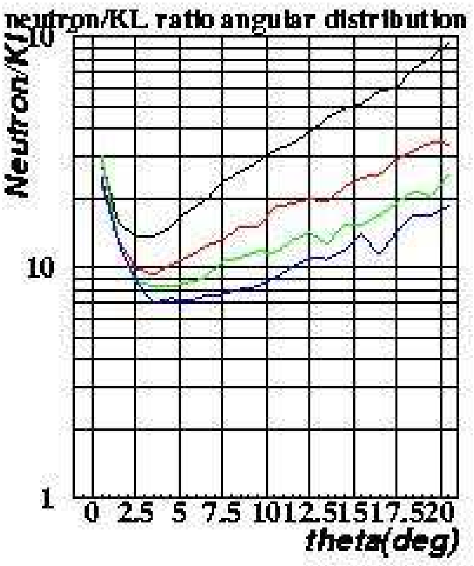
<u>not optimized for high-precision measurement in the future</u>

high energy Neutral Beam

50GeV protons, smaller extraction angle

- pros:
  - larger K_L^0 flux, smaller n/K_L^0
  - boosted $\longrightarrow$ larger acceptance
  - lower γ inefficiencies
- cons:
  - pencil beamline: collimation of high-energy particles
  - long decay-region/fiducial-volume
  - large, segmented detector
  - hyperons survive $\longrightarrow$ backgrounds ($\Lambda \rightarrow \pi^0 n$, ..)
    long beamline to reduce them ($c\tau_\Lambda$=7.89cm)

Initial studies in E.Tanaka(Osaka)'s master thesis

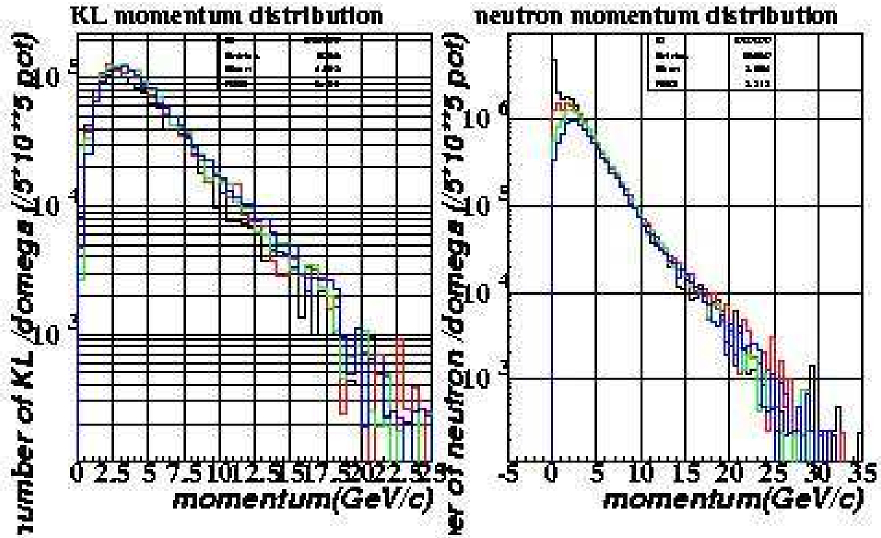


target yield:

- $1.0\lambda_I$ length, 0.6cm^ϕ cylinder
- Pt Ni Al Be

$\Longrightarrow$ n$/K_L^0$ is minimum at 4-6 degree.

low energy neutrons
from heavy materials,
but are below π^0 threshold
(800 MeV$/c$)



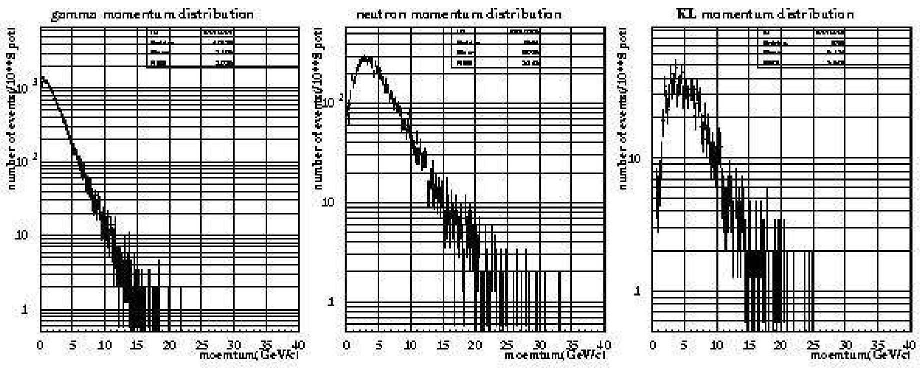


Figure 3.1: These momentum distributions of gamma(left),neutron(center),K_L(right) with no absorber.

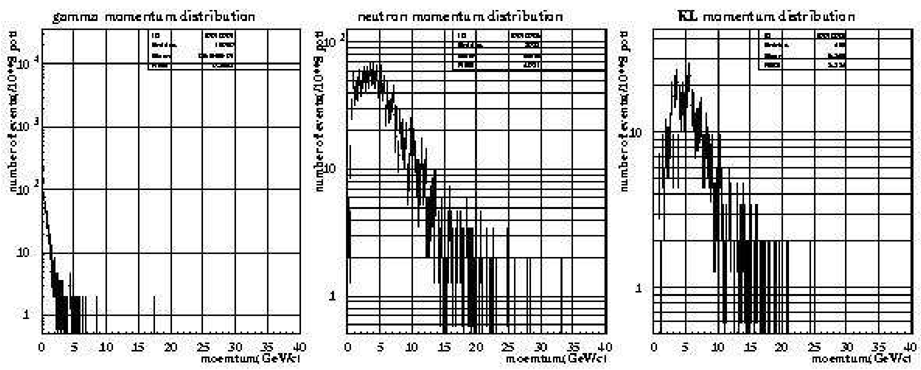


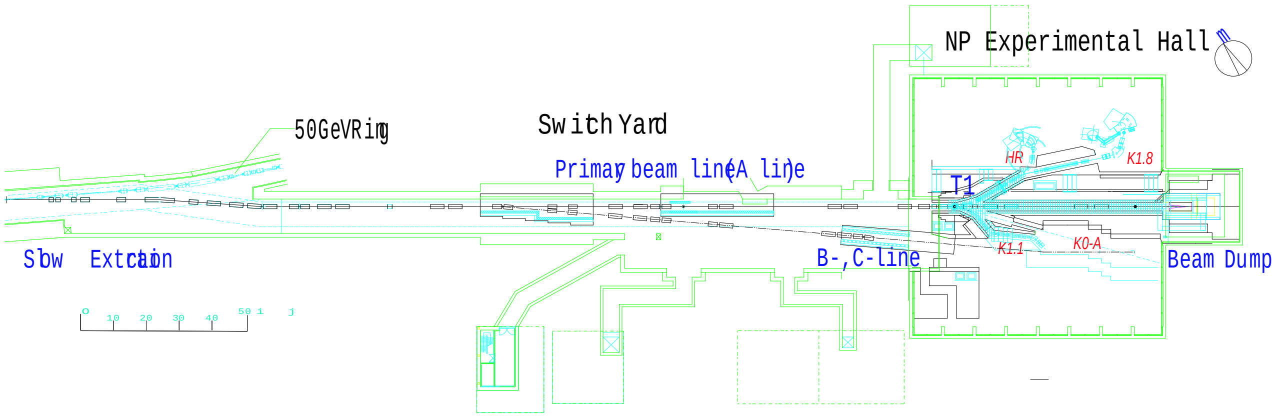
Figure 3.2: The momentum distributions of gamma(left),neutron(center),K_L(right) with a 0.75 λ_I long Be and a 9 X_0 long Pb absorber.

neutral beamline:

- Be absorber ($0.75\lambda_I$),
  Pb converter ($9X_0$)
  $\Longrightarrow$ n$/K_L^0$ imporved by 2
- 50m beam
  (reduce hyperons)

proton flux we really need, beamline length, ..
should be determined by detector simulations.

B-line Facilities (to be requested as Phase-2)

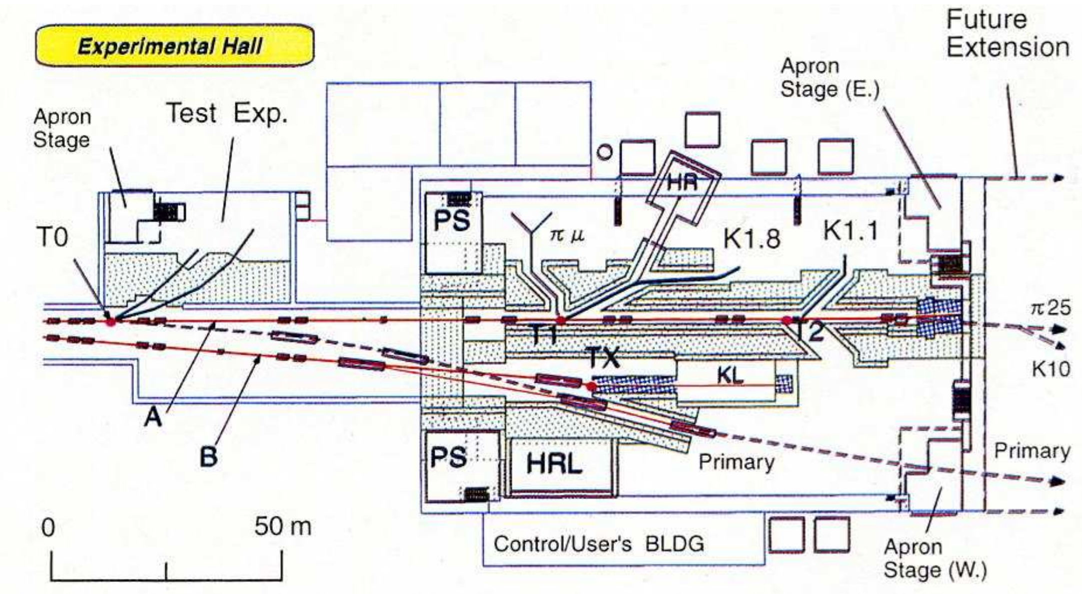


1. Switching Magnet in SwitchYard

- ElectroStatic Septum + Lambertson Septum magnet (Fe-sheet)
  - beam loss of 2% by this scheme
  - not much later than the time high-intensity beam comes continuously.

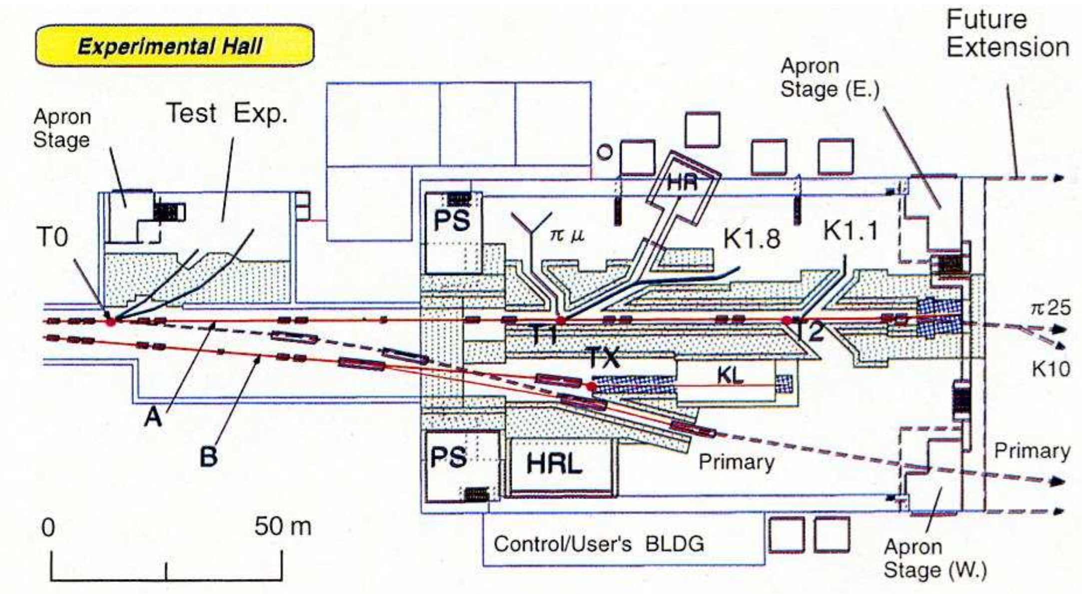
2. Beam Transportation to the Hall

- magnets (+ their Power Supply)
  - get un-used magnets from outside (to reduce cost) ?



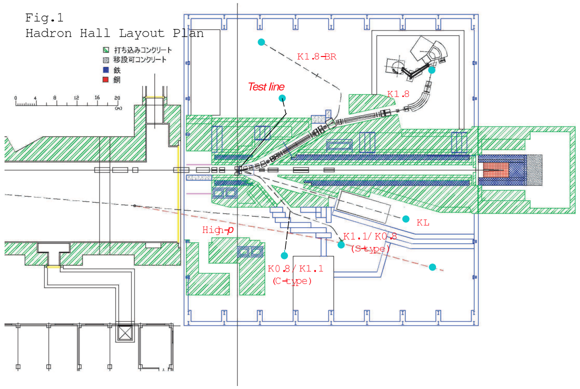
3. Target X

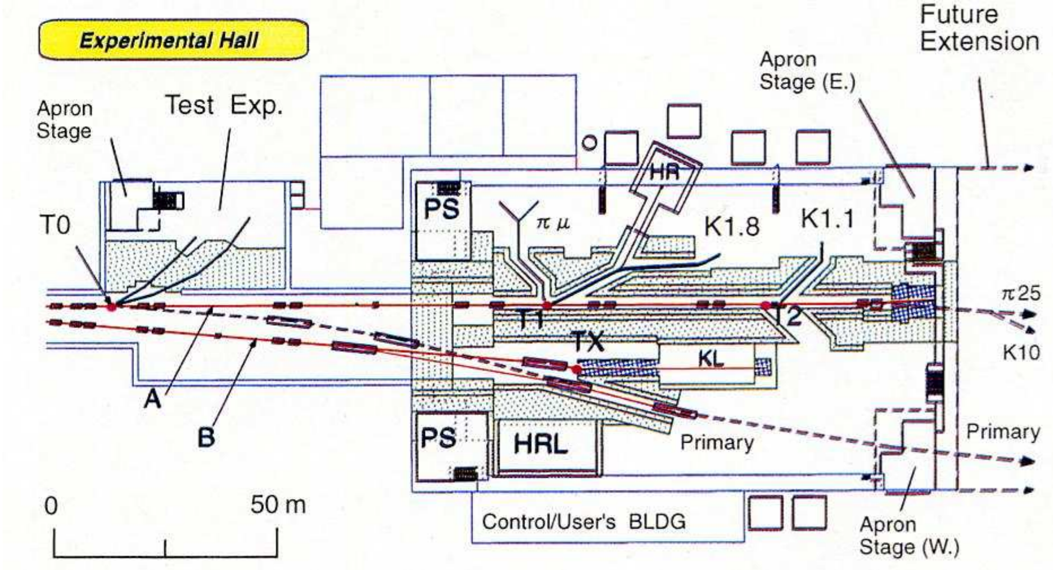
- production target for pencil beamline
  - Water-cooled Rotating Disk (for T1): viewing from non-zero extraction angle, this is not a small homogeneous target.
  - conventional one: how can we cool it ? (would limit the proton flux ??)



4. Beam dump

- stop the beam in a limited space
  - where ? (immediately downstream of the target)
  - how ? (small beam spot)
  - avoid being a source of accidentals into the detector





5. and ...

- concrete/Fe shield (droven into the ground) for radiation protect
- "load" of the target, dump, detector to the floor
- water, electricity, ...
- extend the Hall (to store the beamline and detector).