

Summaries of Test Beam Facilities in Asia

Osamu Tajima (KEK)



LCWS'08, Nov18, 2008



KEK FTBL (Fuji Test Beam Line)

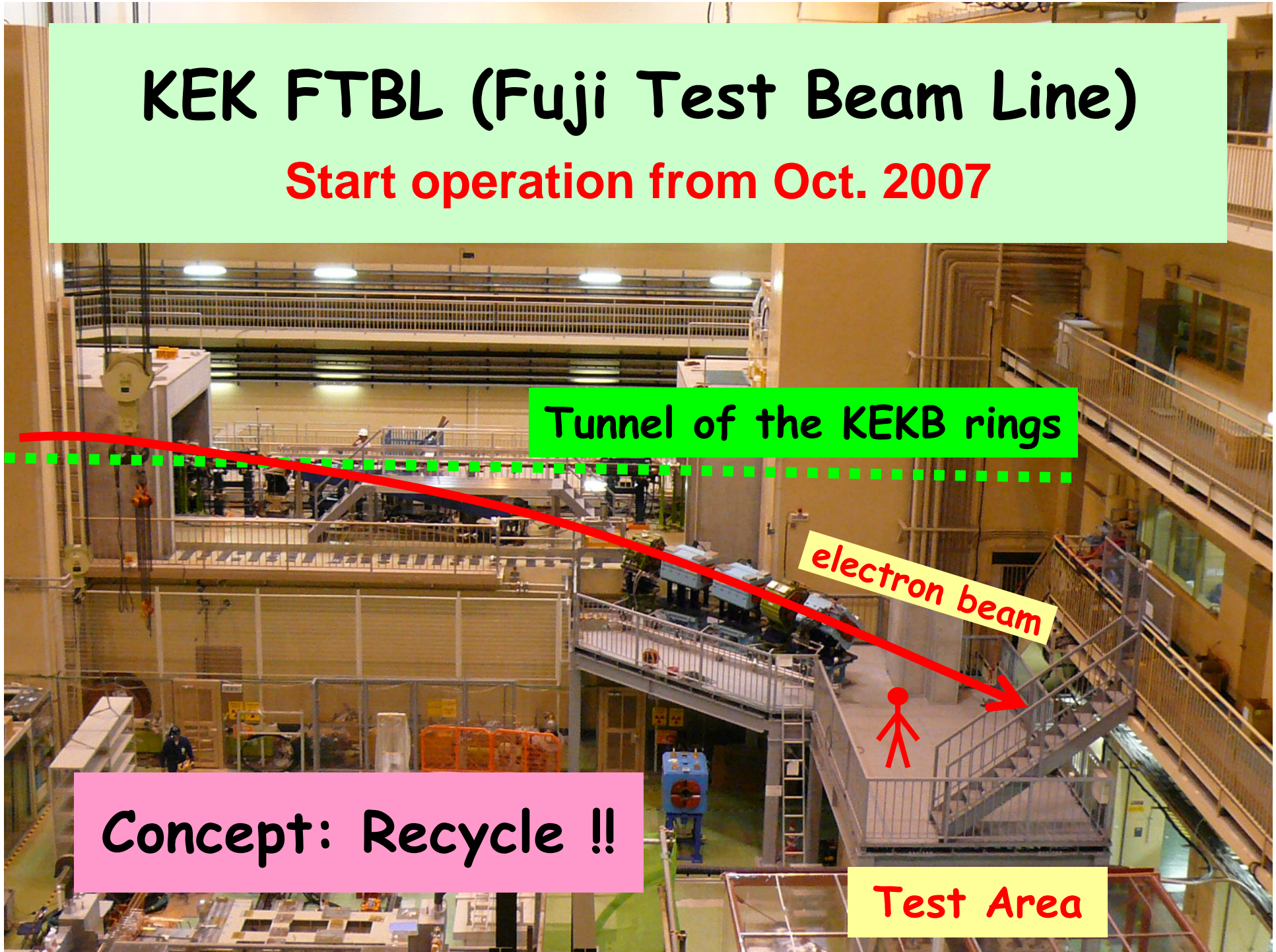
Start operation from Oct. 2007

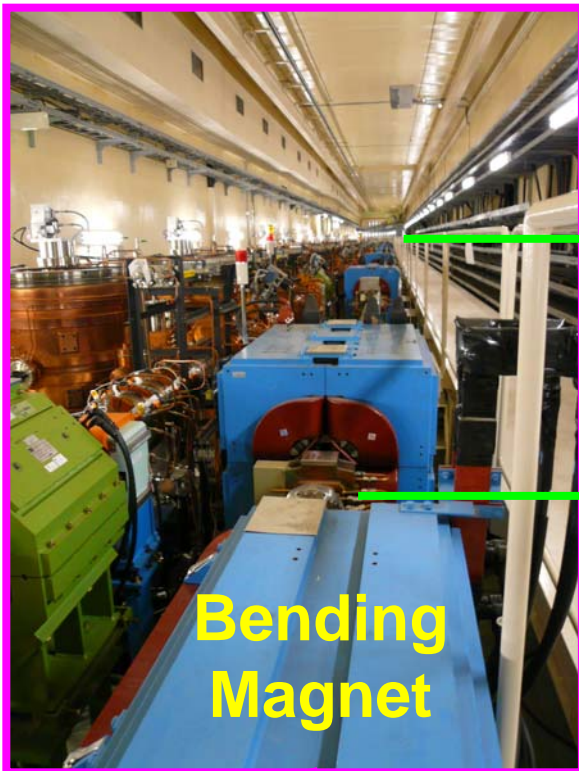
Tunnel of the KEKB rings

electron beam

Concept: Recycle !!

Test Area



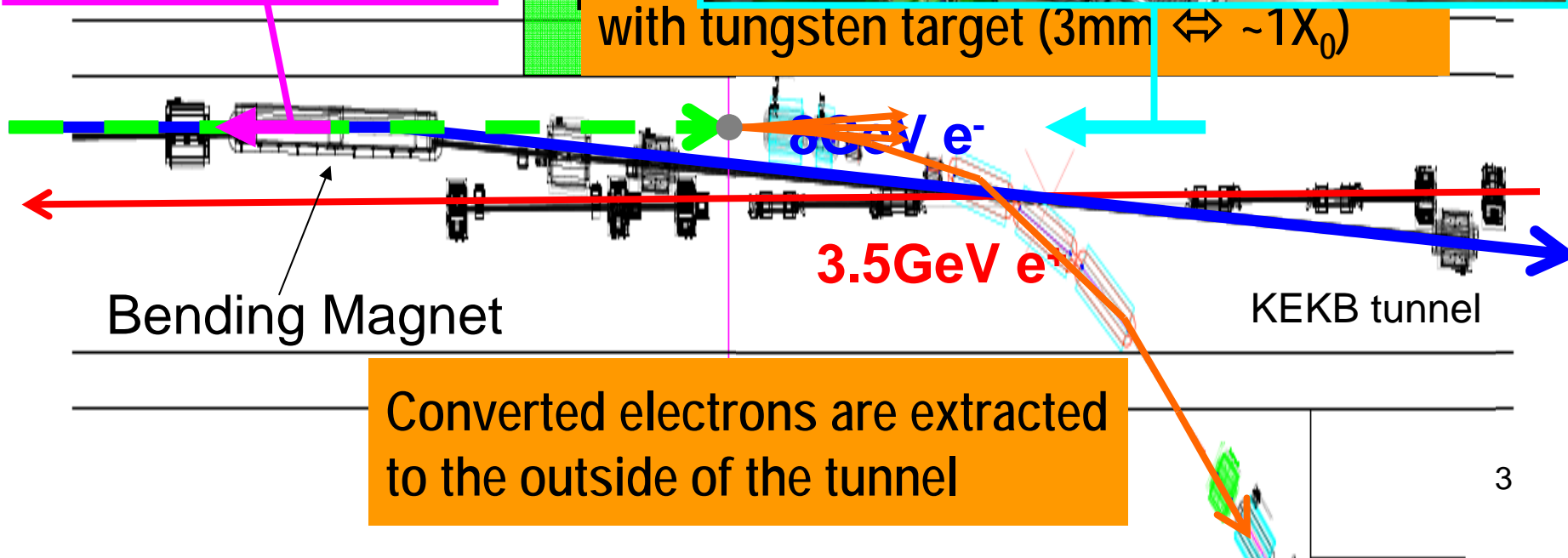


Bending Magnet

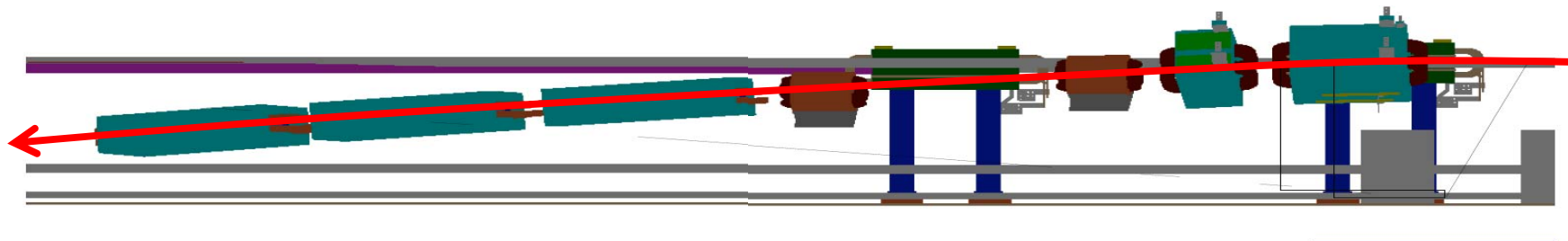
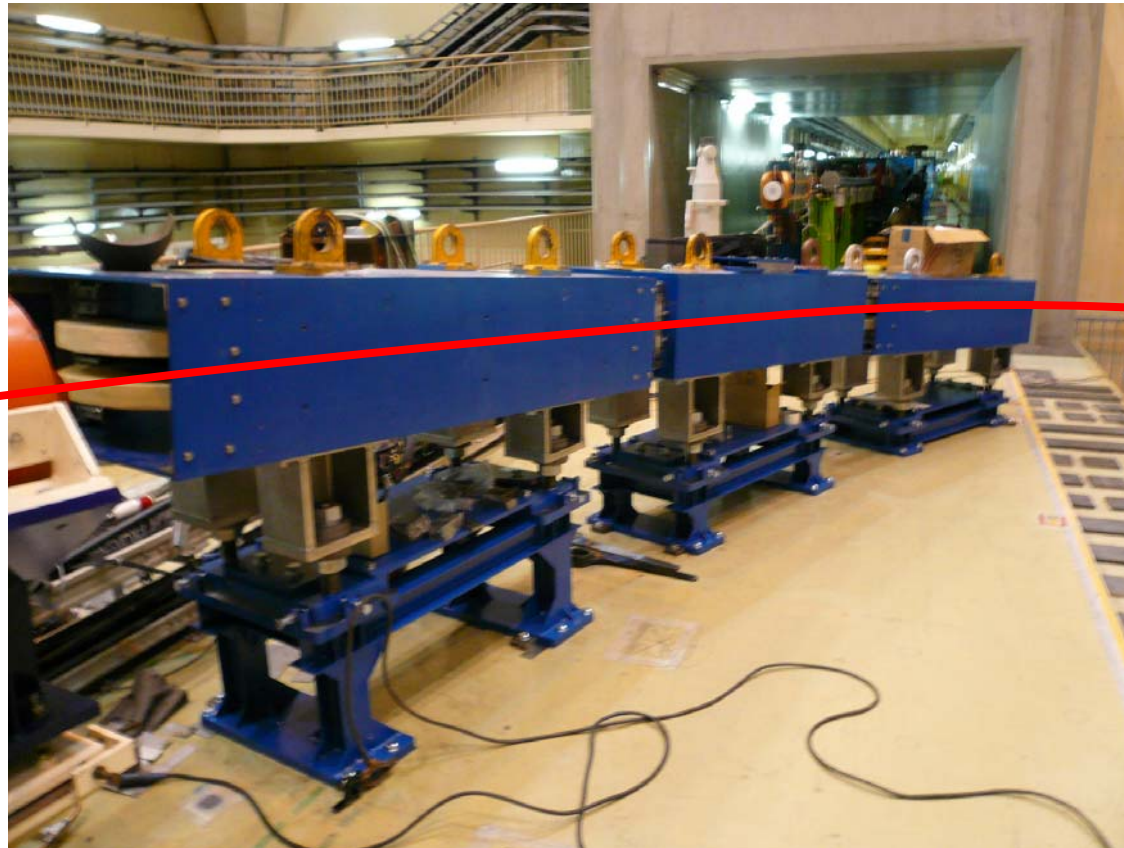
100m
straight
section



Charmed particle production target with tungsten target (3mm \leftrightarrow $\sim 1X_0$)



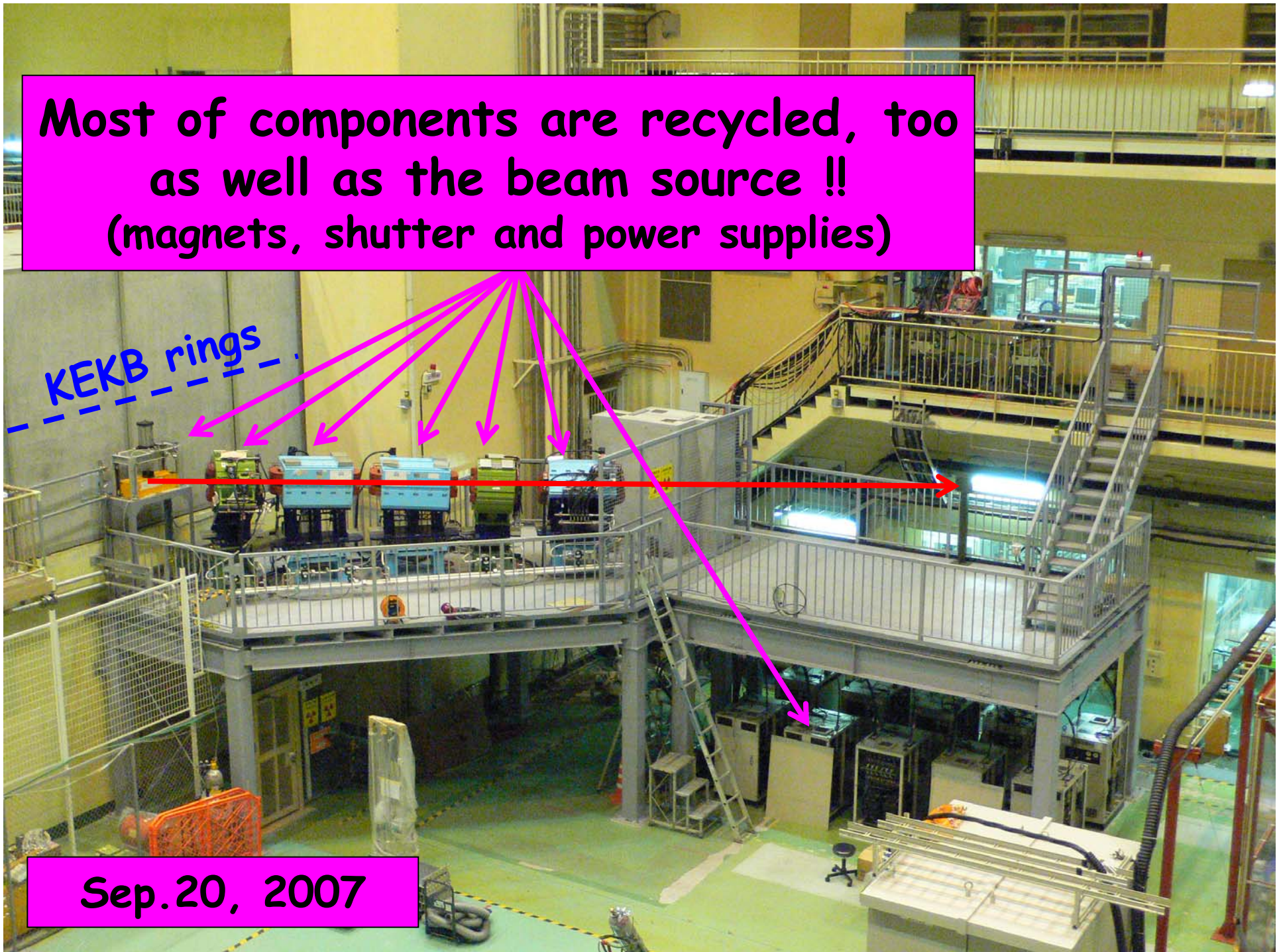
Roller Coaster Beam Extraction !!



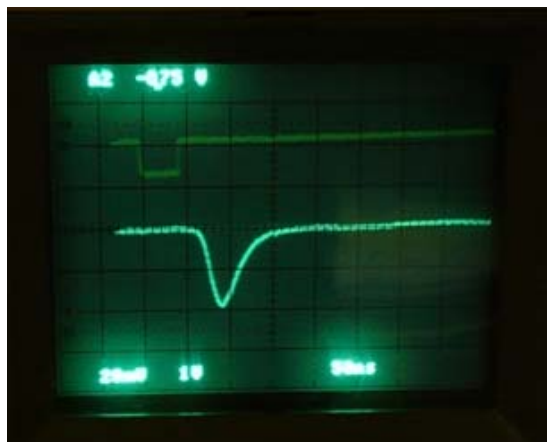
Most of components are recycled, too
as well as the beam source !!
(magnets, shutter and power supplies)

--- KEKB rings ---

Sep.20, 2007



First beam !! Oct.12, 2007



3GeV/c electron
detected by
lead-glass



15 Beam Tests were performed in a year
(2 weeks beam time for each)
see also <http://fujibeam.kek.jp/> (In Japanese)

FTBL One Year Celebration WS

富士ビームラインでの測定器研究

Friday 10 October 2008

from 13:00 to 18:00

Asia/Tokyo

at KEK (2号館一階大会室)

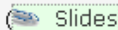
chaired by: Junji Haba (IPNS)

Description: 出席者: 順不同
三好敏喜 (KEK)、稲葉基 (筑波技術大学)、石塚正基 (東京工業大学)、田中浩基 (東京工業大学)、宇野彰二 (KEK)、新田和範 (京都大学)、青木和也 (理研)、前田順平 (東京工業大学)、林浩平 (KEK)、魚住聖 (神戸大学)、坪山透 (KEK)、中村勇 (KEK)、横山広樹 (筑波大学)、幅淳二 (KEK)、原和彦 (筑波大学)、塙慶太 (筑波大学)、松隈恭子 (筑波大学)、森隆志 (名古屋大学)、江川一美 (KEK)

[Friday 10 October 2008](#)

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13:00	Belle SVD upgrade (30')  ()	Toru Tsuboyama (KEK, High Energy Accelerator Research Organization, Physics department)
	KEK, TIT, HEPHY-Vienna	
13:30	T2K-Ingrid/Kyoto (30')  ()	新田和範 (京都大学)
14:00	ILC calorimeter (30')  ()	魚住聖 (神戸大学)
	Tsukuba U, Shishu U, Kobe U, Kyungpook U	
14:30	Phenix/Tsukuba (30')    ()	横山広樹 (筑波大学数理解析物質科学研究科原子核実験)
15:00	KASKA (30')  ()	田中浩基 (東工大)
	Tohoku U, TIT, Niigata U, Tokyo Met. U	
15:30	break	
15:45	Belle RICH group (30')  ()	足立一郎 (KEK)
	KEK, Ljubljana, Nagoya U, Toho U, Tokyo Met. U, Chiba U	
16:15	Beam survey/Tsukuba (30')  ()	松隈恭子 (筑波大学数理解析物質科学研究科素粒子実験)
16:45	TOP counter/Nagoya (30')  ()	森隆志 (名古屋大学)
17:15	Calibration/practice (15')  ()	Shoji UNO (IPNS)
	Kyoto U, Sokendai, Toho U.	

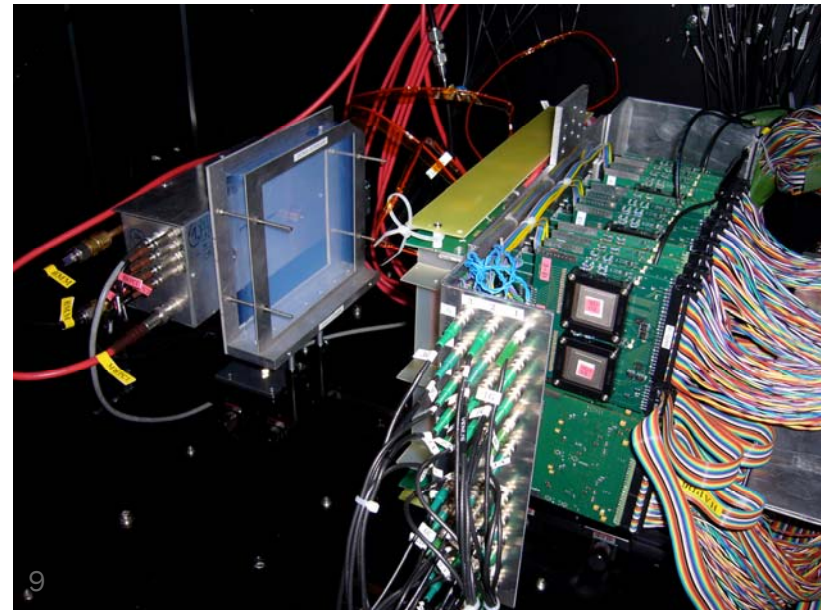
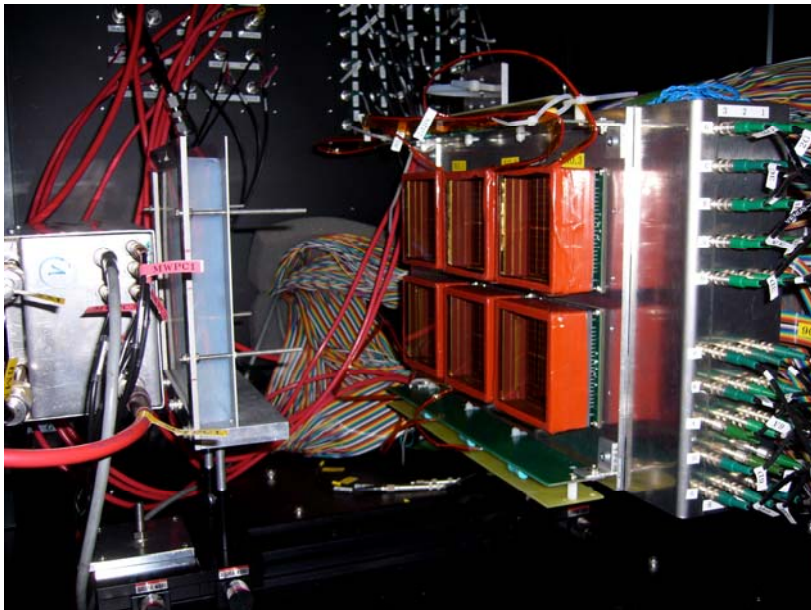
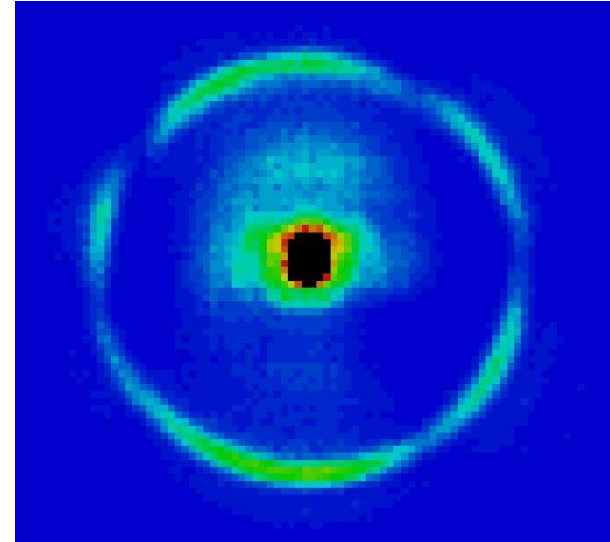
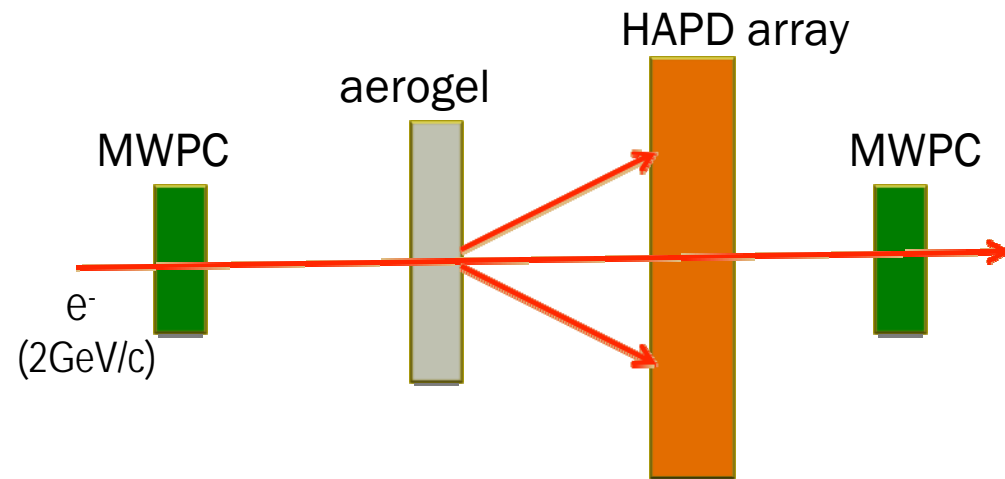
Achievements of the beam tests are reported by users⁷

The First Beam Test Silicon Vertex Detector for sBelle

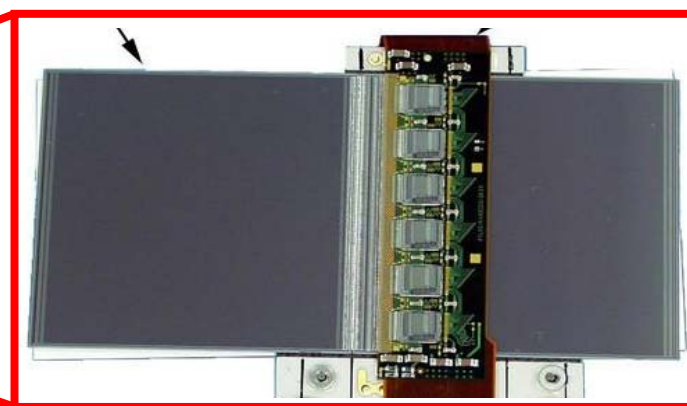
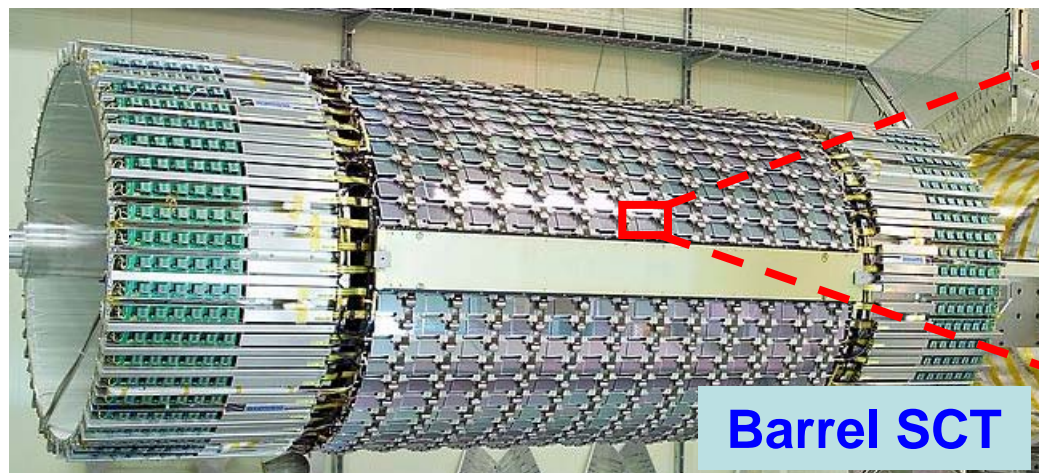


They came from Vienna

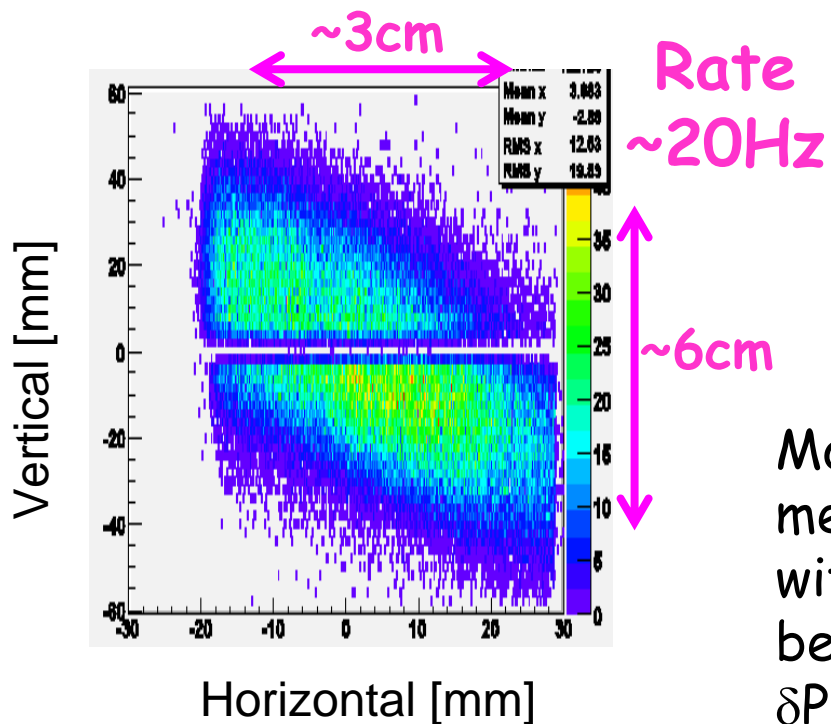
Aerogel Rich: Cherenkov Ring Image by HAPD at the first time in the world !!



Beam Profile Measurement by ATLAS SCT



by U. Tsukuba under grad. students



Momentum spread was also measured by the combination with strip scintillators in the beam extraction line.
 $\delta P/P \sim 1\%$

Beam Test for ILC Calorimeter

Nov 16th 2007 : kick-off meeting
17th ~ 21th : Setup & Commissioning
22th ~ 29th : Data taking (including 4 days of beamtime extension)
29th : withdrawal

People

D. Kong (KNU)
K. Kawagoe (Kobe)
D. Jeans (kobe)
T. Kaneko (Kobe)
H. Ikeda (Kobe)
K. Ueyama (Kobe)
T. Takeshita (shinshu)
S. Uozumi (shinshu)
M. Nishiyama (Shinshu)
Y. Sudo (Tsukuba)
T. Ikuno (Tsukuba)
H. Yamazaki (Tsukuba)
Y. Takahashi (Tsukuba)
K. Hara (Tsukuba ATLAS)
T. Meguro (Tsukuba ATLAS)
K. Hanawa (Tsukuba ATLAS)



J-PARC

LINAC

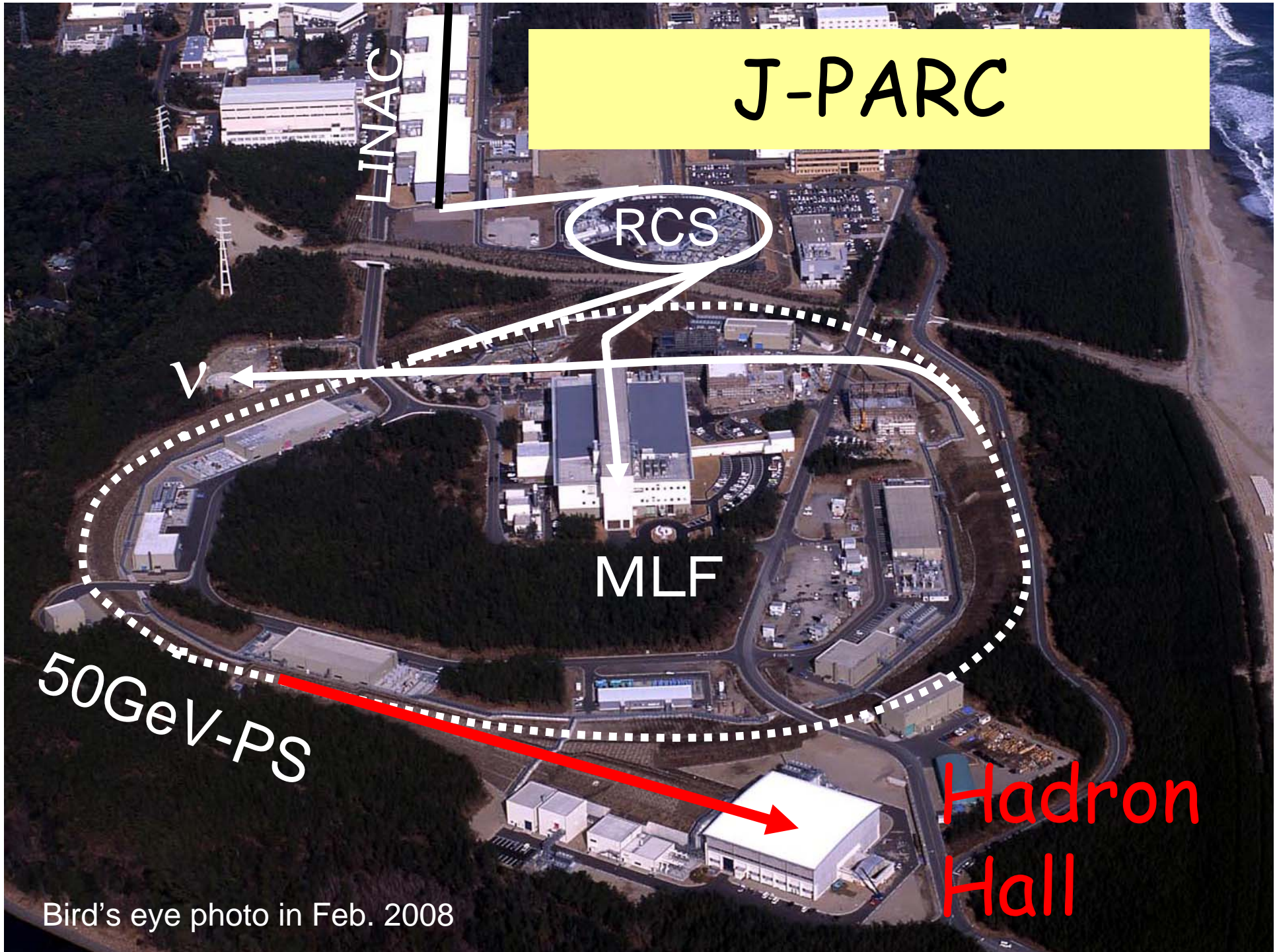
RCS

MLF

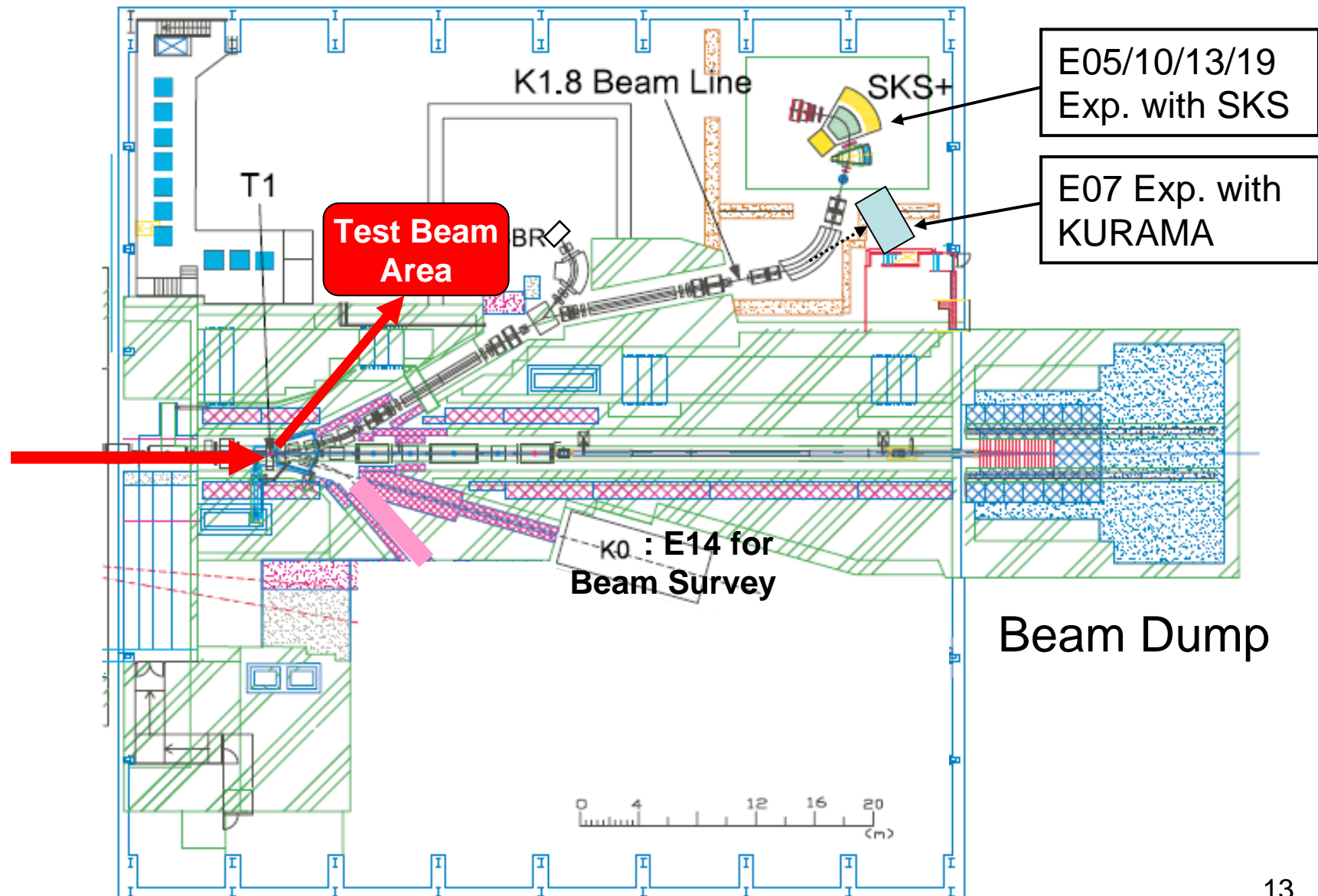
50GeV-PS

Hadron
Hall

Bird's eye photo in Feb. 2008



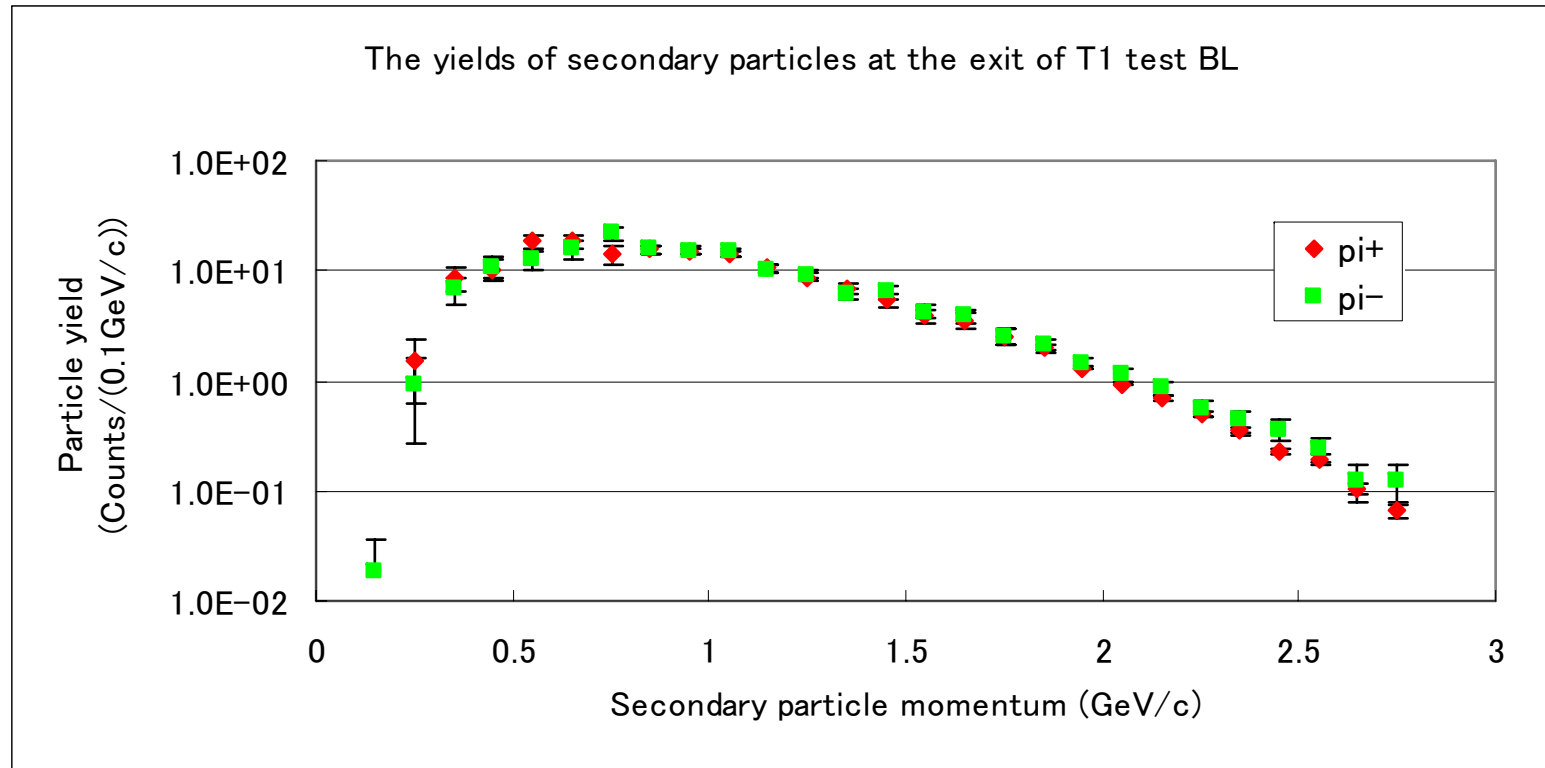
J-PARC Hadron Hall, at the end of 2009



K1.8BR Area



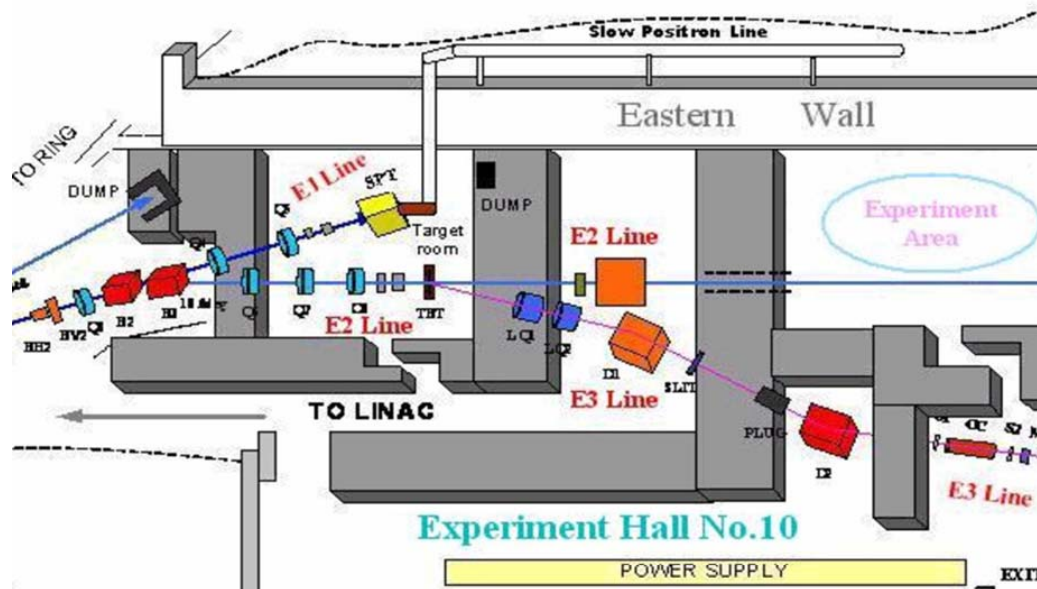
Yield calculation based on SW Formula



- Yield Calculation: Sanford-Wang Formula
 - Primary Beam Energy: 30GeV
 - Primary Beam Intensity: $8.0E+11$ ppp (1.2kW)
 - Target: Beryllium (Ni: Yield $\sim A$)
 - Extraction Angle: 50°
 - Solid Angle: 0.043 msr
- Simulation Code: MARS15

IHEP Beijing

(Li Jiakai)



- **Beijing Test Beam Facility (BTF) provides**
 - Primary electrons, 1.1-1.5 GeV/c E1&E2
 - Secondary e , π , p , 0.4 - 1.2 GeV/c (E3)
 - E3 area is equipped with Cherenkov, TOF, MWPC.
- **Last season (437hours) ended on 28th, March 2008.**
 - Test of low energy X-ray telescope for the HXMT project (all-sky Hard X-ray survey).
 - Test of MRPC (Multi-gap resistive plate chamber) for STAR experiment
 - Test of CVD diamond film detector to measure irradiate flux and dose rate for BEPCII & III.
- **Long shutdown 2008-2010 for upgrade**
 - Improve beam optics, beam monitors and alignment scheme
 - Equip "TPC+GEM" detector in the spectrometer for double particle ID and momentum resolution of 0.5%
 - Equip pulse dose measuring instruments in irradiation area.

IHEP Protovino (Alexander Vasiliev)

- 8 beam channels at the 70-GeV proton accelerator at IHEP. The best one is channel 2, where we can use
 - Electrons from 1.5 GeV up to 19 GeV.
 - Pions of up to 34 GeV, and Protons up to 50 GeV.
 - Momentum spread is large, but beam momentum can be measured with 0.1% accuracy with a magnet and 14 drift chambers.
- Last upgrade of our test beam facility was in building and commissioning of 4 planes of fiber hodoscopes with a cell less than one mm.
- Our plan is to use intensively this beam line for many needed tests for experiment PANDA at FAIR in Darmstadt where we are responsible for
 - 1) design and production of barrel calorimeter consisting of 11,360 lead tungstate crystals,
 - 2) design and production of fine-segmented forward shashlyk calorimeter for about 1500 electronic channels,
 - 3) design and production of 8 silicon discs of the forward microstrip vertex detector.

Summaries of Test Beam Facilities in Asia

Laboratory	Energy Range (GeV)	Particl es	# of Beam lines	Rate (Hz)	$\Delta p/p$	Availability and plans
KEK FTBL	0.4 - 3.4	e	1	20	1 %	~200 days/yr
J-PARC	0.5 - 1.5	π	1	~100	broad	Available in 2010 ?
IHEP Beijing	1.1 - 1.5 (primary) 0.4 - 1.2 (secondary)	e e, π, p	2 1	25 1.5	< 1% 1%	Shutdown 2008 - 2010
IHEP Protvino	1.5 - 19 up to 34 up to 50	e π p	8	160 ~ 1000	broad Can be measured w/ 0.1% accuracy	Two months periods per year (one and one)

Table 5 Summary of BES Test Facility Beam Parameters and Instrumentation

Momentum range	1.1–1.5 GeV [E1, E2] 0.4–1.2 GeV [E3]
Particle types	electrons/positrons [E1,E2] electrons, pions, protons [E3]
Bunch spacing	40 ns
Bunch length	1200 ps
Rates	160–1000 Hz
Instrumentation	TOF and threshold Cherenkov systems; MWPC with 50% dE/dx resolution

2.5 IHEP-Protvino

At least four high intensity and low intensity beam lines are available at IHEP-Protvino. Beam lines in the BV hall are produced from internal targets in proton synchrotron and have limited intensity. The extracted proton beam is also used to produce high-intensity primary and secondary test beams in the experimental gallery. Test beams are available in two period (April and November-December) for a total of about 2 months/year. Table 6 summarizes the beam line parameters and instrumentation for IHEP-Protvino beam test facility.

Table 6 Summary of IHEP Protvino Test Facility Beam Parameters and Instrumentation

IHEP Protvino beam parameters	
Momentum range	33–55 GeV [N2B] 20–40 GeV [N4V] < 4 GeV [Soft Hadron] 1–70 GeV [N22]
Particle types	Electrons, muons, hadrons
Bunch spacing	160 ns
Bunch length	40 ns
Rates	160–1000 Hz
Cycle time	10 s
Spill time	1.8 s
Intensity	10^{13} p/cycle
Instrumentation	TOF and threshold and differential Cherenkov systems; MWPCs, scintillator hodoscopes