

Test Experiments at 12 GeV–PS

FY1998–FY2003

- **Test experiment (what is...)**
- **Experimental Hall**
 - ◆ **Internal Target (IT), π^2 line & T1 line**
- **Statistics**
 - ◆ **Shifts**
 - ◆ **Category**
 - ◆ **Requests (momentum, particle-type)**
- **Special cases**
- **Output**
- **in conclusion ...**

M. Ieiri (EPPC)
PS-Review 2004
June 8

Test experiments – custom (definition) –

- ☑ Shifts request ≤ 20 shifts (1 shift = 8 hours)
- ☑ No budget request
 - ◆ Experimental expenditure
 - ◆ Travel expense

→ be examined as a T.E. without oral defense at PAC
- ★ Shifts > 20 , special requests for beam line etc...

→ need presentation at PAC

R&D for ...

PS Experiment, International collaboration,
Non accelerator physics, B-factory, LC,
detector

Layout of Experimental Areas in September 2001



ν_μ

Neutrino beam line

Experiments in fiscal year 2001

Exp. No.	Beam Line	Title of Experiment
E325	EP1B	Study of Chiral Property of Dense Nuclear Matter Through Measurements of Meson Mass Modification in Medium
E362	ν -BL	Long Baseline Neutrino Oscillation Experiment
E391a	K0	Study of the $K_L \rightarrow \pi^0 \nu \bar{\nu}$ Decay
E452	K2	Spin-dependent Interaction in $\Sigma^+ p$ Scattering
E462	K6	Exclusive Measurement of Nonmesonic Weak Decay of $^5_\Delta \text{He}$
E470	K5	Measurement of direct photon emission in $K^+ \rightarrow \pi^+ \pi^0 \gamma$

North Counter Hall

K6

K5

EP1-B

East Counter Hall

$\pi\mu$

K2

EP2

IT

$\pi 2$

K0

12-GeV PS

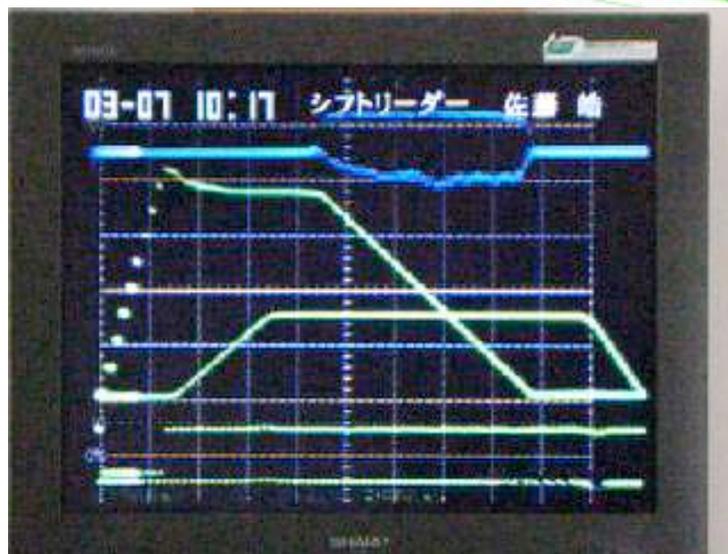
0 100 m



Layout of Experimental Areas in September 2001



ν_μ Neutrino beam line

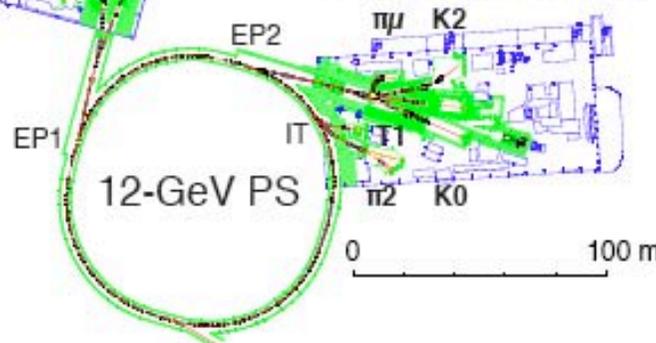


Experiments in fiscal year 2001

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North Counter Hall

East Counter Hall



Layout of Experimental Areas in September 2001



ν_μ

Neutrino beam line

- ▷ IT lines from the beginning ('75~)
- ▷ in the late 80's, from E to T

$\pi 2$: 10° , 0.5-4 GeV/c, unseparated, $\sim 10^4 \pi$ /spill

T1 : 23° , 0.5-2 GeV/c, unseparated, $< 10^3 \pi$ /spill

Experiments in fiscal year 2001

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North Counter Hall

K6

K5

EP1-B

East Counter Hall

EP2

$\pi\mu$

K2

EP1

IT

T1

$\pi 2$

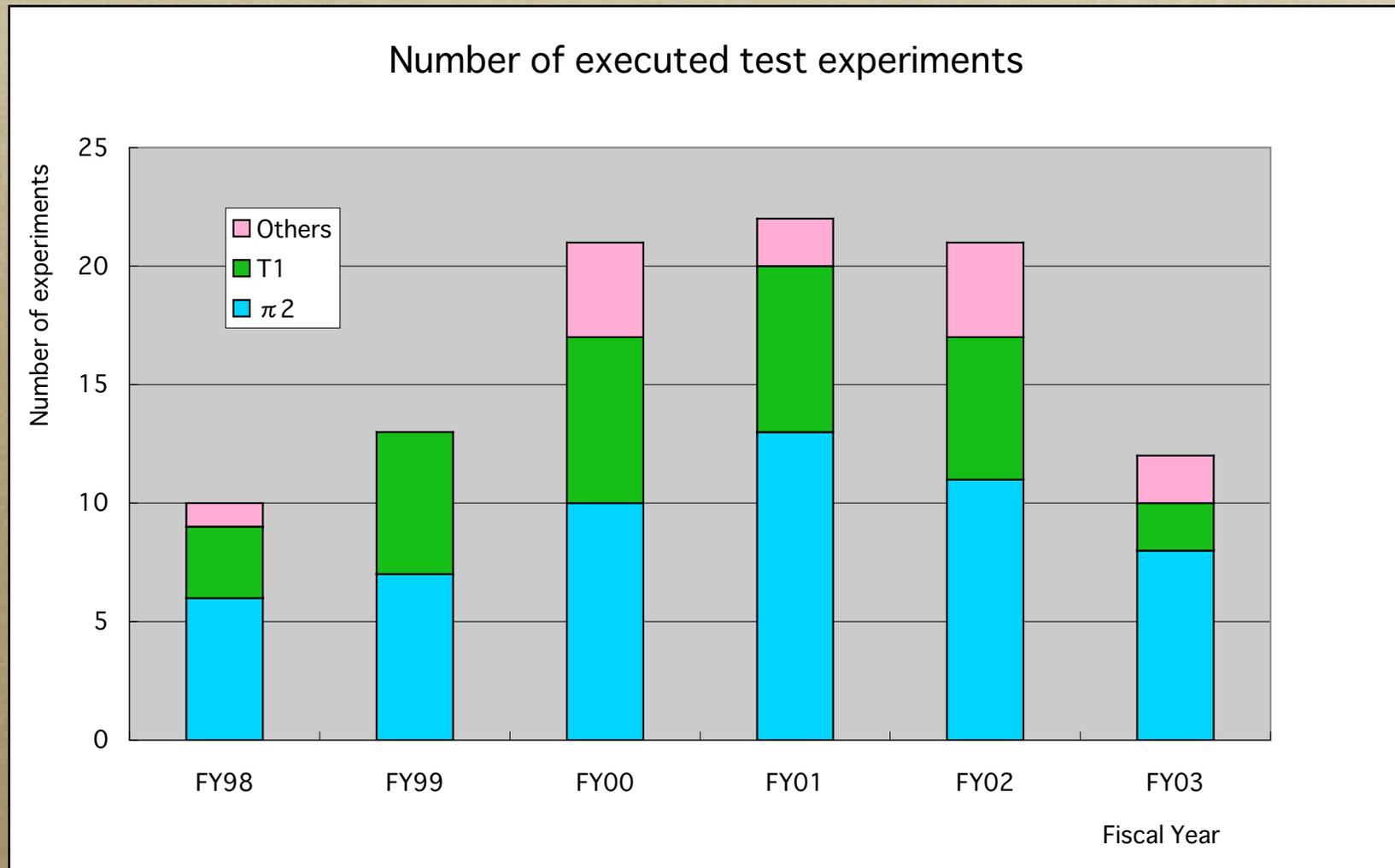
K0

12-GeV PS

0 100 m

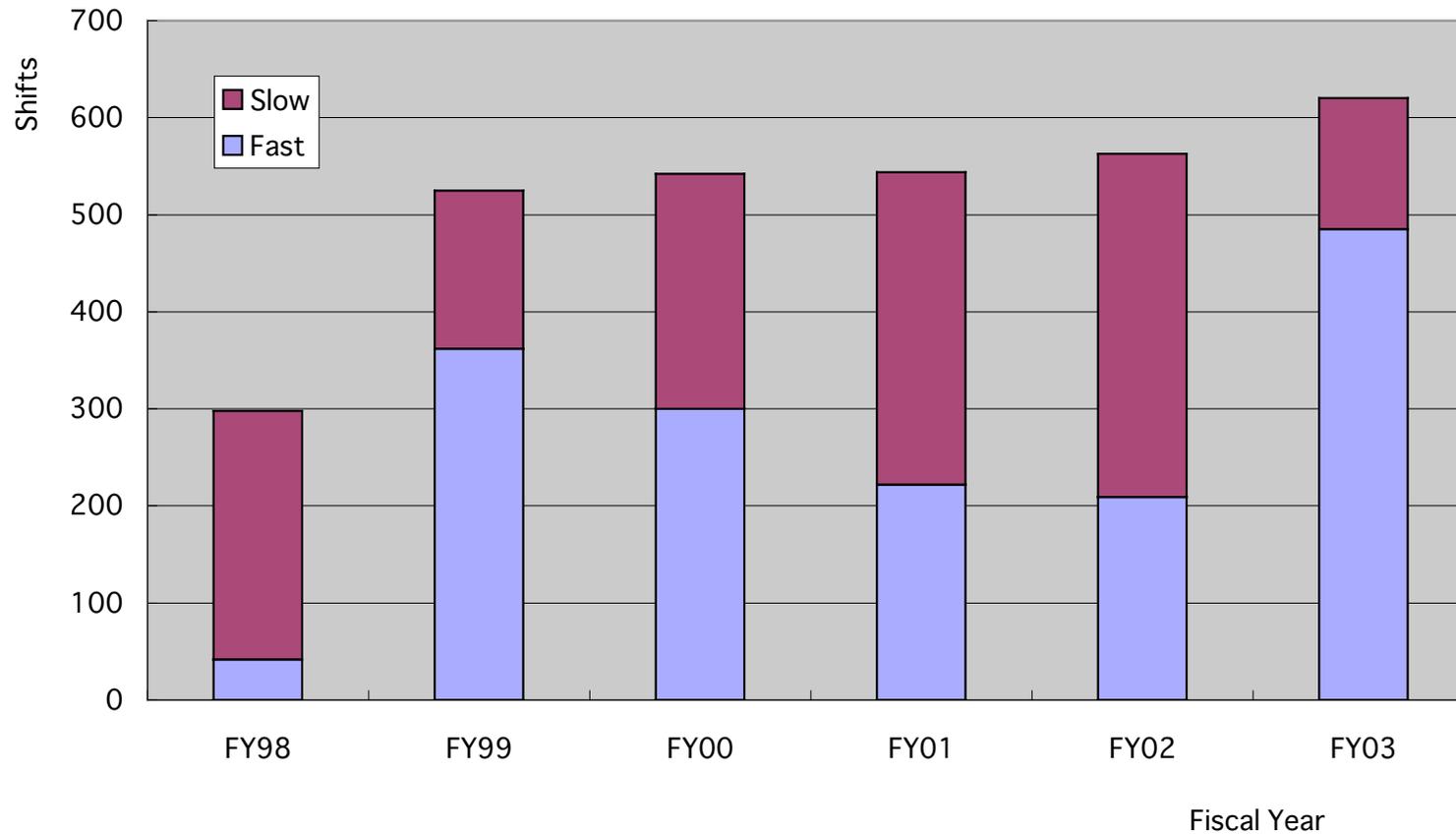


Statistics-1 [Executed test experiments]

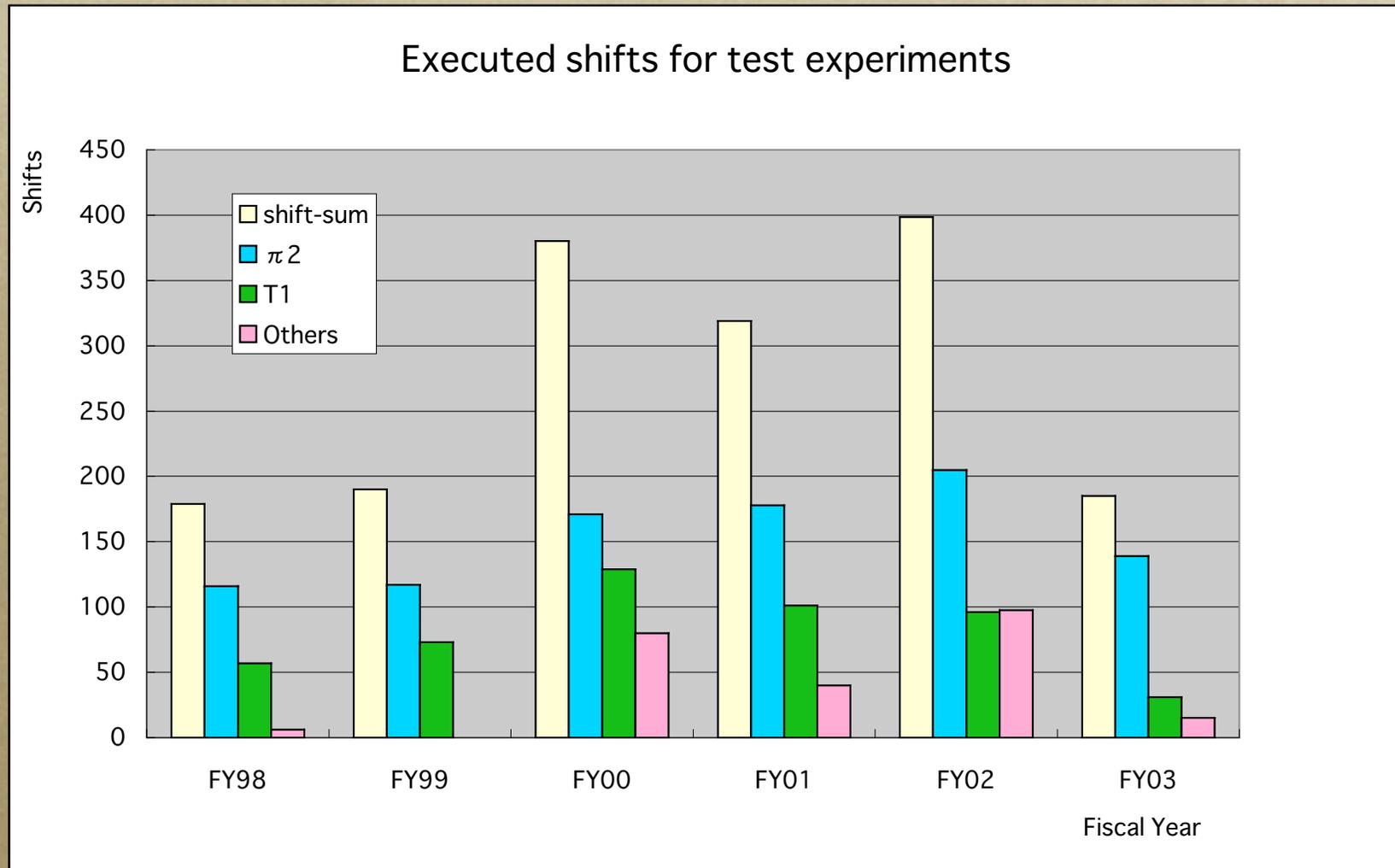


Statistics-1 [Executed test experiments]

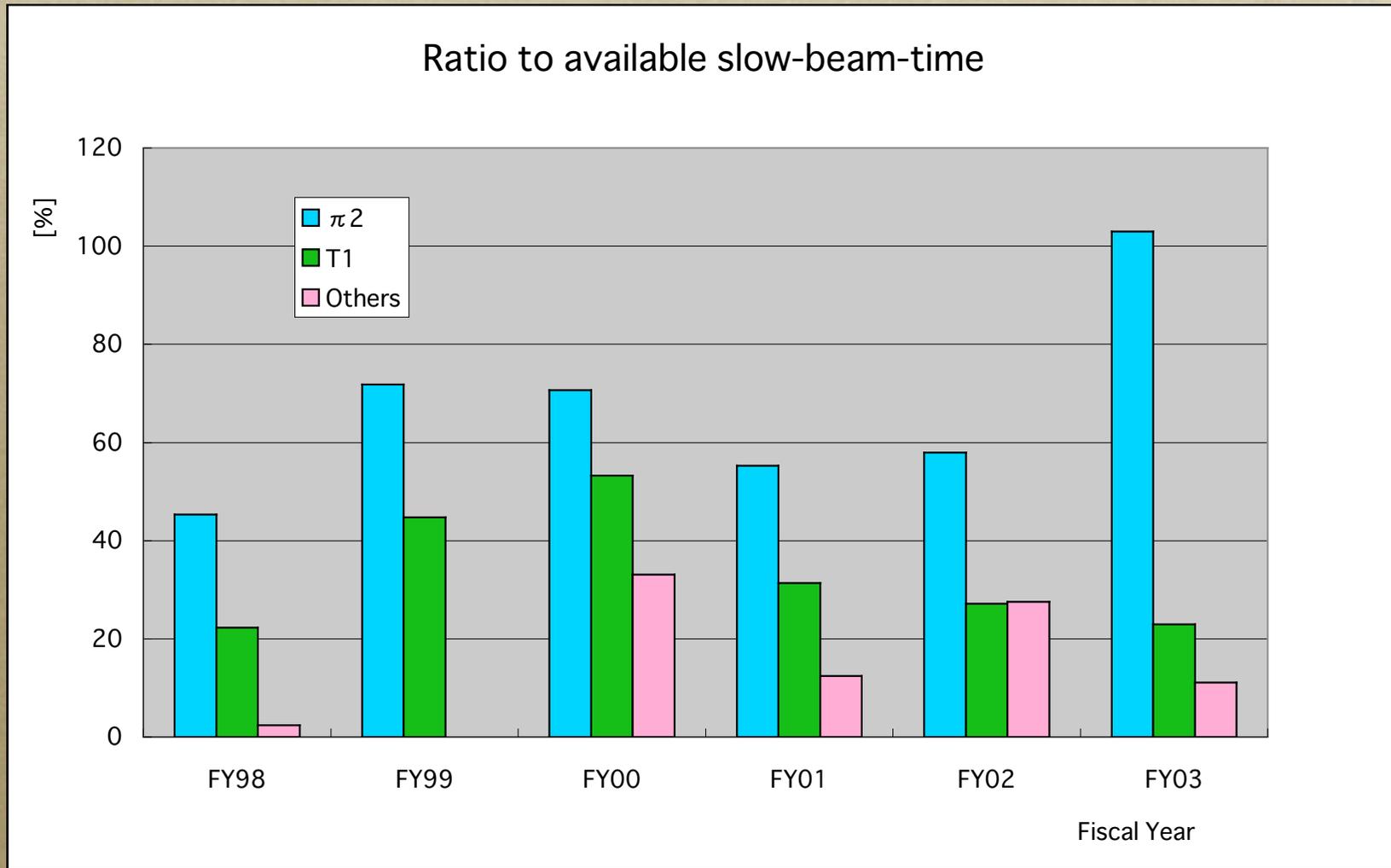
Accelerator Operation mode for Each Fiscal Year



Statistics-2 [Executed Shifts]



Statistics-3 [Executed Shifts ratio to available BT]



Statistics-3 [Executed Shifts ratio to available BT]

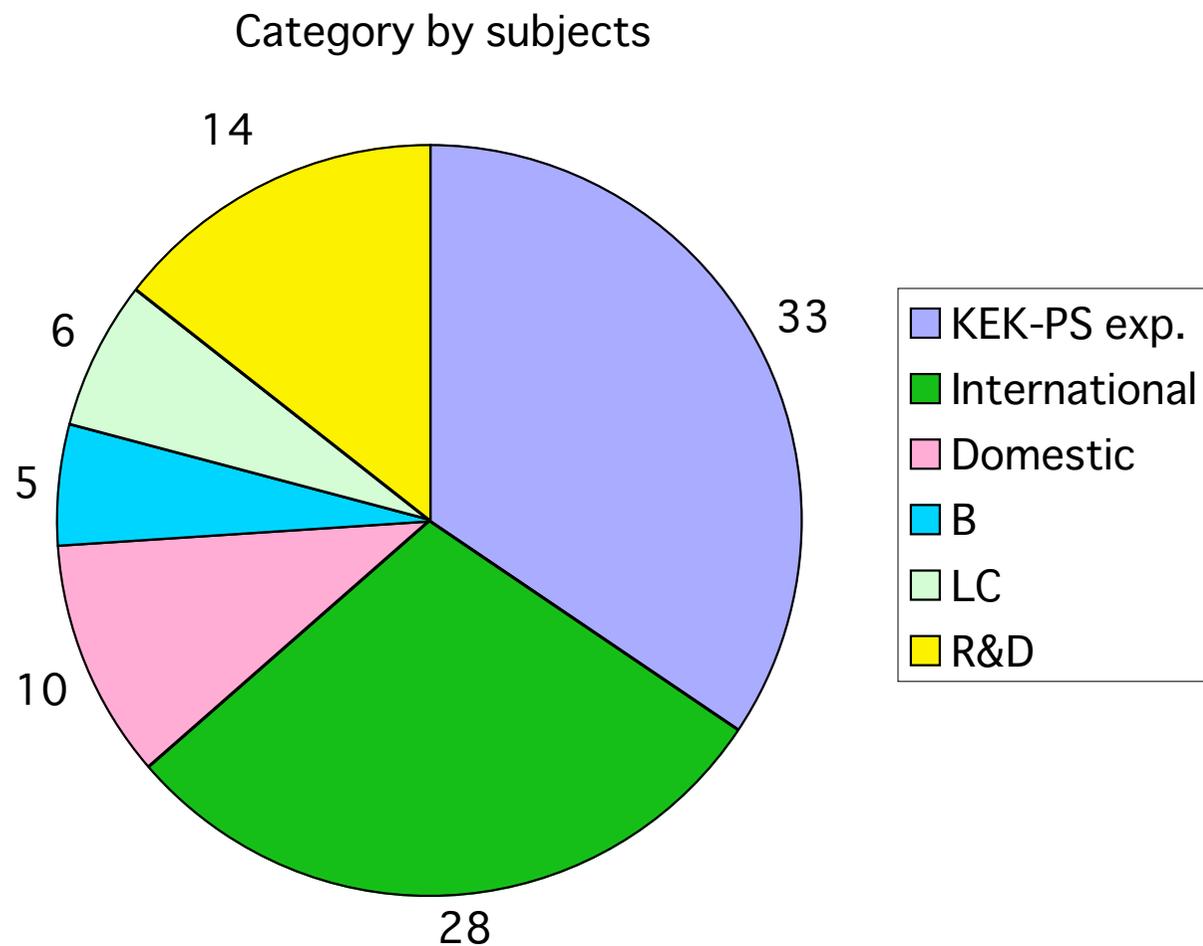
Executed Experiments at the KEK 12 GeV PS (1998-2004)

Year	1998				1999				2000				2001				2002				2003				2004					
Fiscal Year	FY1998				FY1999				FY2000				FY2001				FY2002				FY2003									
Month	4	7	10	1	4	7	10	1	4	7	10	1	4	7	10	1	4	7	10	1	4	7	10	1	4	7	10	1	4	7
12GeV-PS Operation Cycle	[S][S][S][S]				[S][S][S][S]				[S][S][S][S]				[S][S][S][S]				[S][S][S][S]				[S][S][S][S]				[S][S]					
EP1	K5	E246				E246				E246				E470		E509		E471				E471								
	K6	E419				E438				E462				E462		E508		E521		E518		E521								
	EP1B	E325				E325				E325				E325																
	ν					E362				E362		E362						E362				E362								
EP2	K0									E391a				E391a				E391a				E391a								
	K2	E373				E373				E373		E452		E452				E522				E522								
	$\pi\mu$	E360																				E546								
IT	$\pi 2$	E417								E443																				

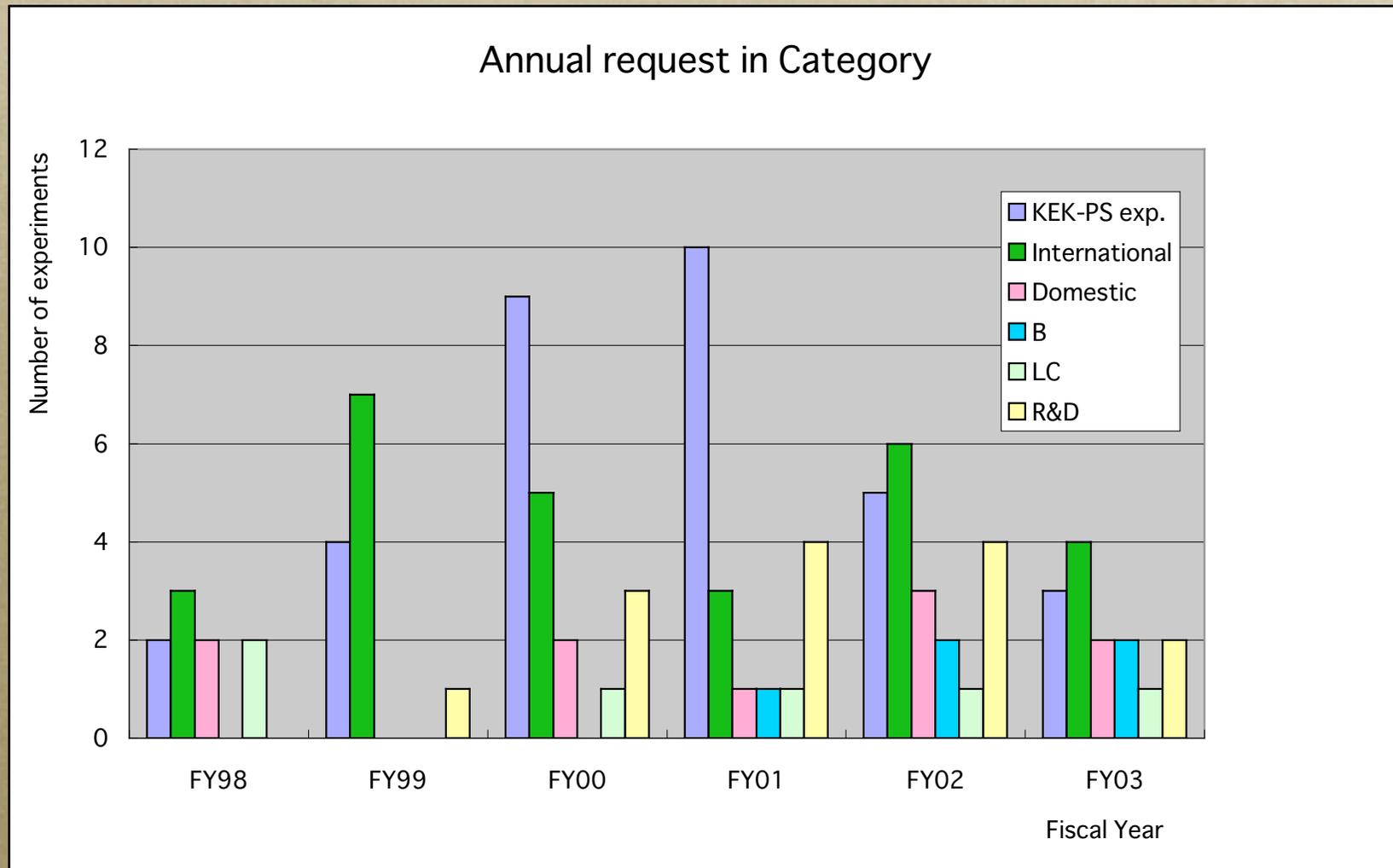
Slow extraction
 Fast extraction
 Executed Time

Fiscal Year

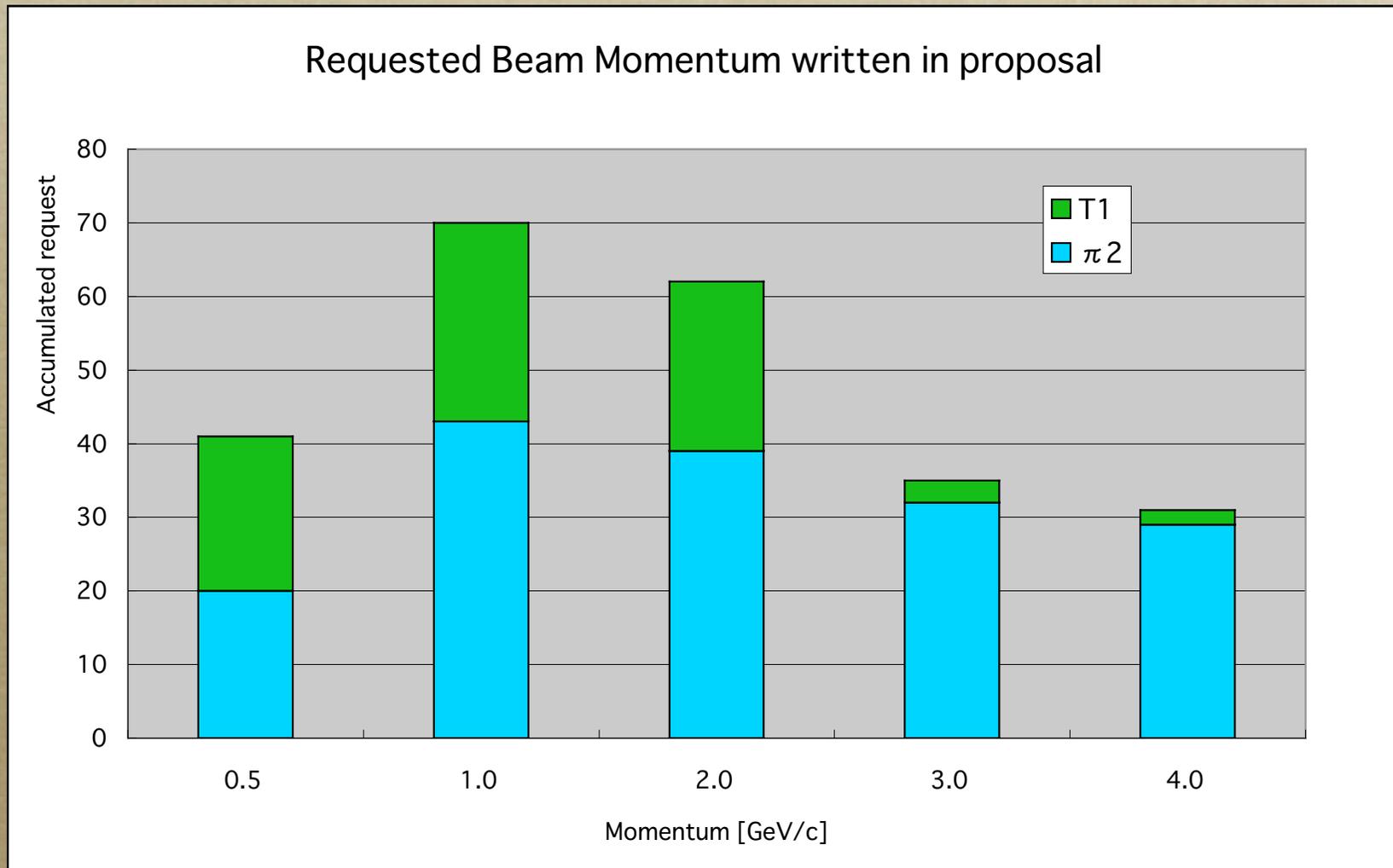
Statistics-4 [Category by subjects]



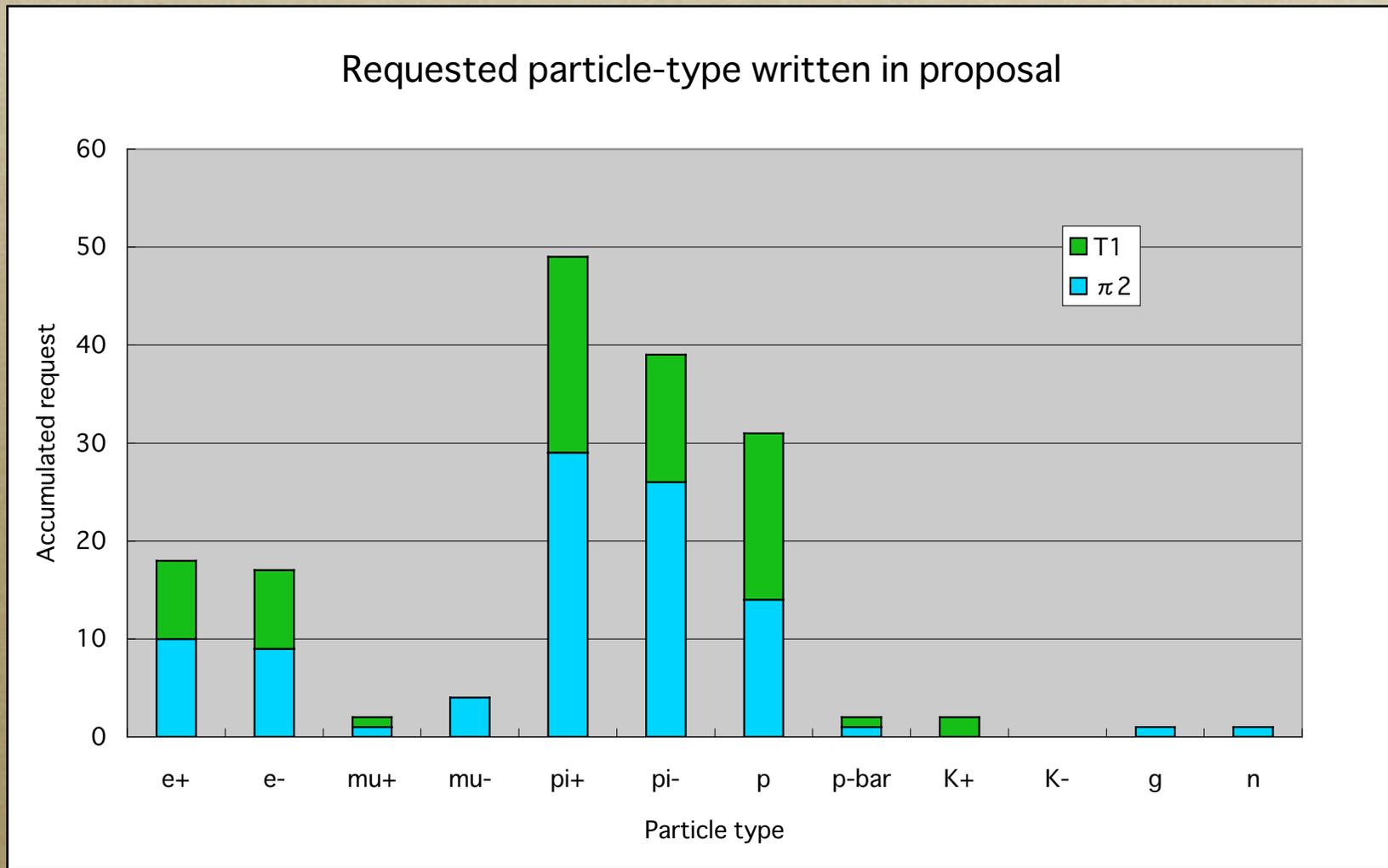
Statistics-5 [Annual request in Category]



Statistics-6 [Requested Momentum]



Statistics-7 [Requested Particle-type]



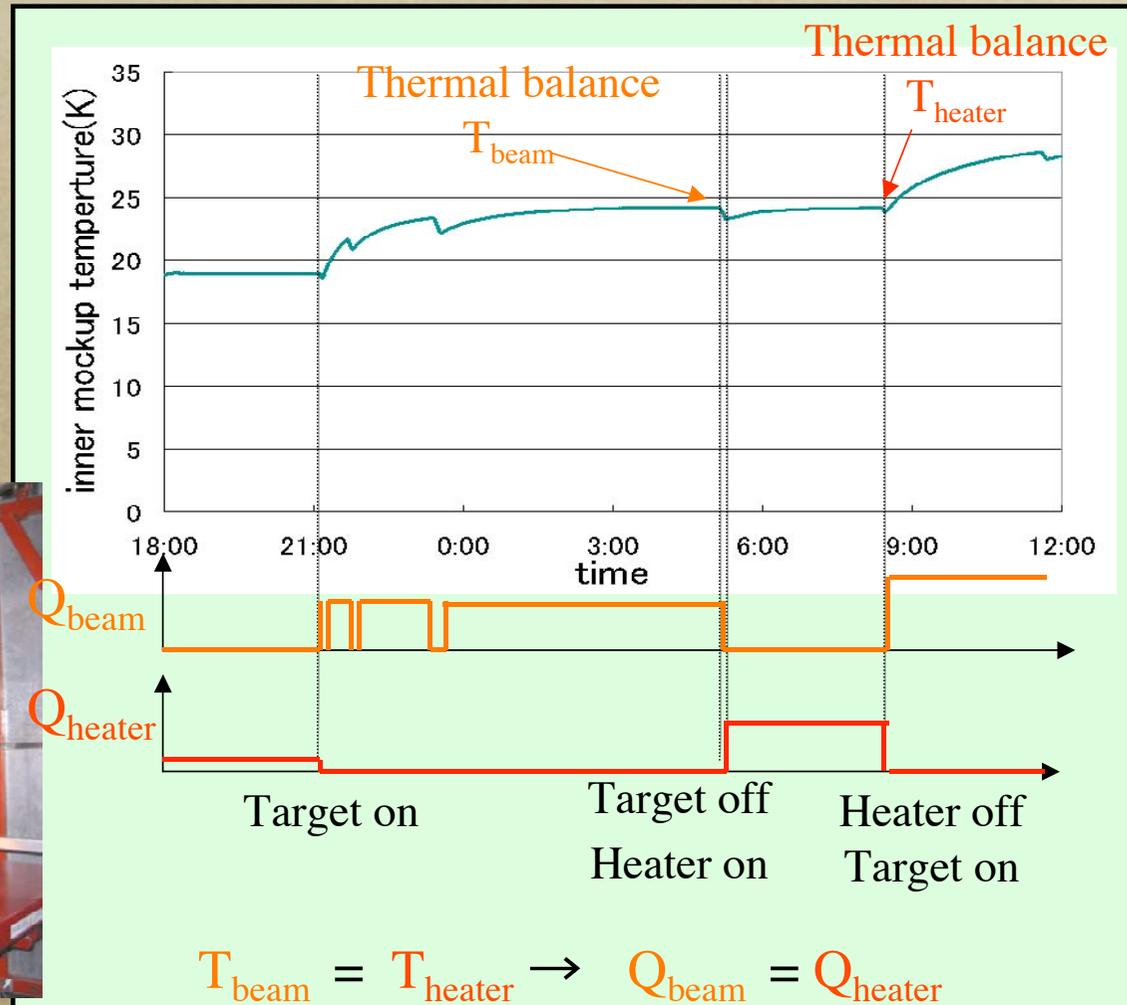
Statistics-8 [Personal Activity]

	FY98	FY99	FY00	FY01	FY02	FY03
person*day	829	609	1337	1211	1782	920
person/day	9.7	11.2	16.6	11.3	15.1	20.4

Special-1 [T524: SC-Solenoid mag. under High Radiation]

Requests ...

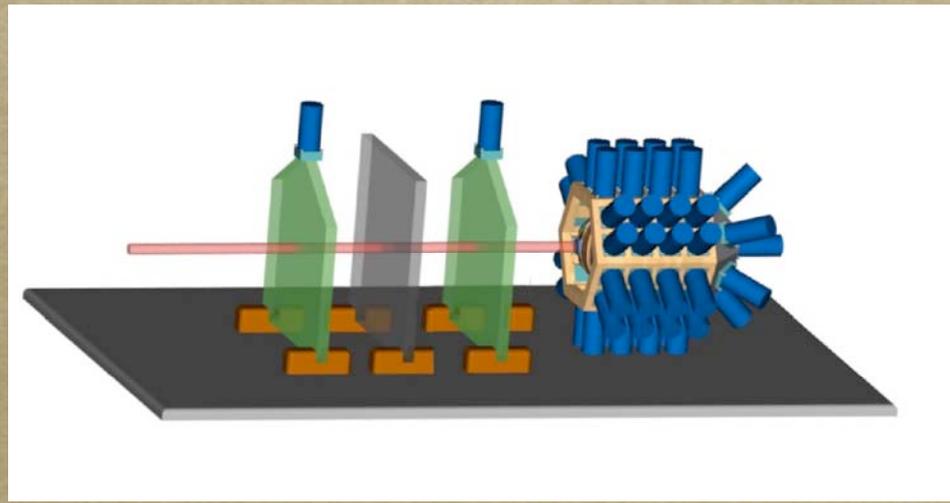
- 12 GeV primary
- 10^{11} protons/s
- EP2-A



Special-2 [T535: Antideuteron detector on balloon or satellite]

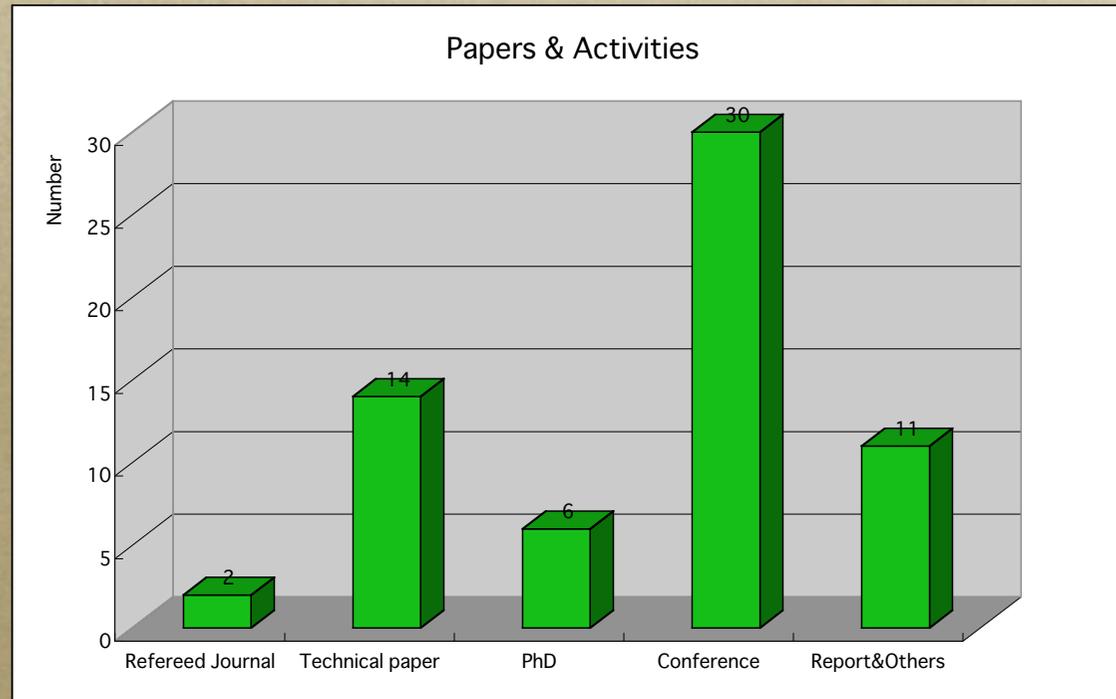
- Columbia University, LLNL -

- ★ **p-bar @1.2-1.4 GeV/c**
 - vagrant - CERN, BNL ----> KEK : π^2
- ★ **pure overseas group (no contact person at KEK)**
 - ☑ explain PS lines & operation
 - ☑ how to propose
 - ☑ full support (modules, cables, ...)
 - ☑ beam operation
 - ☑ tax for detectors
 - ☑ VISA



Output

- Ask 74 subjects, and 38 subjects (20 groups) replies -- 50%



- E391a, E471, MEG proposal, BESS, J-PARC mu, LC, ATLAS, super-B, ...

Letter of Intent for Test-beam Facilities at J-PARC

Table 1: Requirements to the beam properties.

	must/indispensable	should/required	desired	preferred/optional
momentum	0.5~2 GeV/c easily tunable	up to 10 GeV/c		
momentum bite	less than 1%		analyzing magnet	
intensity [particles/s]	electrons: 1~10 inclusive: 1~100 easily tunable		up to ~100 up to ~1000	
particle species ¹⁾	unseparated $e/\mu/Kpp$		DC separator ²⁾	e -enriched tertiary chopper
time structure	flat-top			

Table 2: Requirements to the area utilities.

	must/indispensable	should/required	desired	preferred/optional
number of lines	1		2 (isolated)	
beam height	$\geq 1.8\text{m}$			
hoist:				
lifting height	$\geq 3\text{m}$	$\geq 5.5\text{m}$		
lifting weight	\geq several hundred kg	$\geq 30\text{ton}$		
area sizes		$\sim 10\text{m}$ -long $\sim 6\text{m}$ -wide	$\sim 12\text{m}$ -long $\sim 8\text{m}$ -wide	non-magnetic floor
electricity and infra- structure	stabilized 100V 100A ¹⁾	UPS 100V 30A ¹⁾ 3-phase 200V 30A clean ground		homeothermal water
counting room	exist	2-groups capacity		
	network	CATV monitor		
	telephone over Japan			
equipments	moving stage ²⁾ (\geq a few hundred kg)		moving stage ($\geq 30\text{ton}$)	
		large-aperture magnet (2T) ³⁾		strong magnet ($\geq 3\text{T}$)
		gas Cerenkov counter ⁴⁾	tracking chambers ⁴⁾	
			momentum- analyzing magnet ⁵⁾	

LoI02
February,
2003

in conclusion ...

- **‘Test Experiment’ program at KEK–PS plays an important role in detector R&D for particle and nuclear physics experiments.**
- **Special thanks to Internal target facility and Test beam lines ($\pi 2$ & T1) for a stable operation for more than a quarter of a century. They have been precious and unique.**
- **There is a strong need of ‘Test Beam’ facility and program at J–PARC.**