J-PARC Hadron Hall : EXPERIMENTAL REPORT on RUN# 28

Group	E15/E17	Date (Submitted)	Feb.6, 2010
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Summary and Results

i) +0.75 GeV/c unseparated beam (Ni target)
- K trigger tune
- Scaler tune
- Rate study
- K^+ yield study

ii) -0.75 GeV/c unseparated beam (Ni target)
- K^- yield study

iii) +-0.75 GeV/c separated beam (+-200kV, Ni target)
- CM scan for K^+ tune of K1.8BR
- CM scan for K^- tune of K1.8BR
- K^+/K^- yield study

iv) +-0.75 GeV/c unseparated beam (Pt target)
- K^- yield study for Pt target
- Rate study

v) +-0.75 GeV/c separated beam (+-200kV, Pt target)
- K^+/K^- yield study for Pt target

SCHEDULED and EXECUTED MACHINE TIME, BEAM CONDITION, DOWN TIME, Priority etc.

Dec. 12 01:00 ~ Dec.12 09:30 +0.75 GeV/c ESS1 0->+-200kV ($2*10^{11}$ ppp 160W, Ni)
Dec. 13 13:40 ~ Dec.13 14:30 +0.75 GeV/c unseparated ($6.8*10^{11}$ ppp 550W, Pt)
Dec. 16 07:00 ~ Dec.16 09:40 +-0.75 GeV/c unseparated ($3*10^{11}$ ppp 240W, Ni)
Dec. 16 16:20 ~ Dec.16 16:30 +0.75 GeV/c unseparated ($6.8*10^{11}$ ppp 550W, Pt)
Dec. 17 04:00 ~ Dec.17 07:00 +-0.75 GeV/c ESS1 +-200kV->0 ($3*10^{11}$ ppp 240W, Pt)
Dec. 23 05:00 ~ Dec.23 09:50 +-0.75 GeV/c ESS1 +-200kV->0 ($3*10^{11}$ ppp 240W, Ni->Pt at 7:20)

Total 20.0 hrs

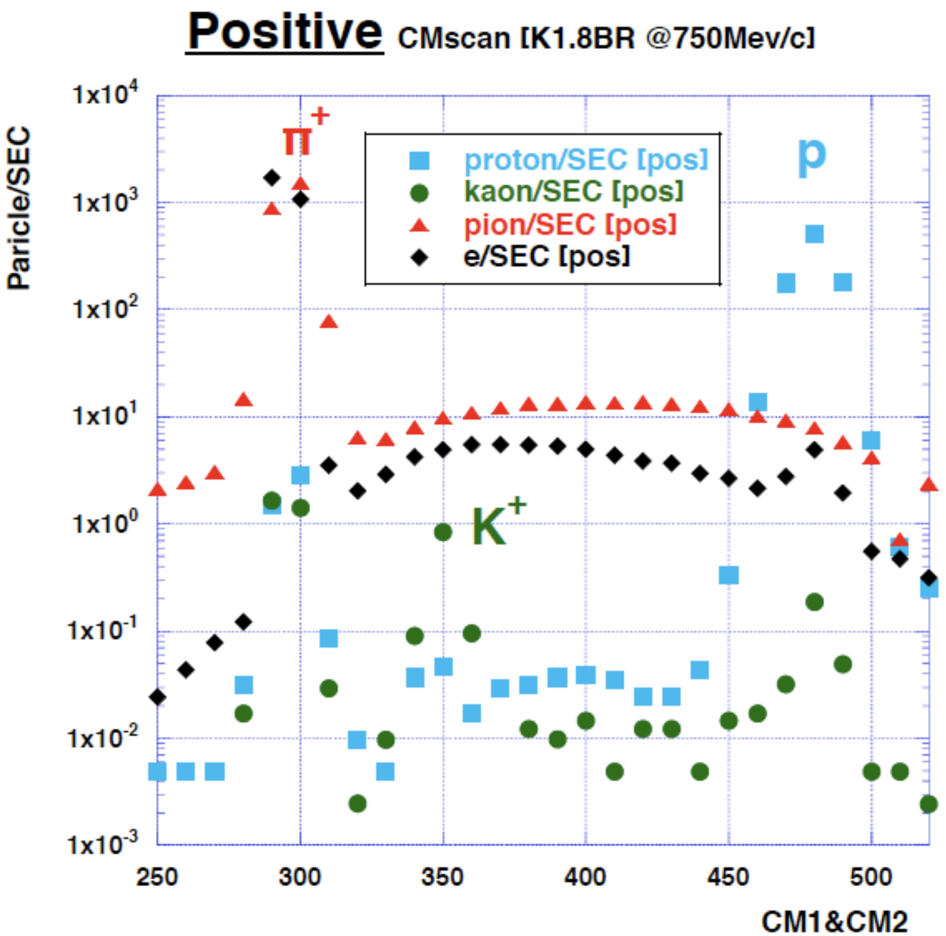
Comments/Requests

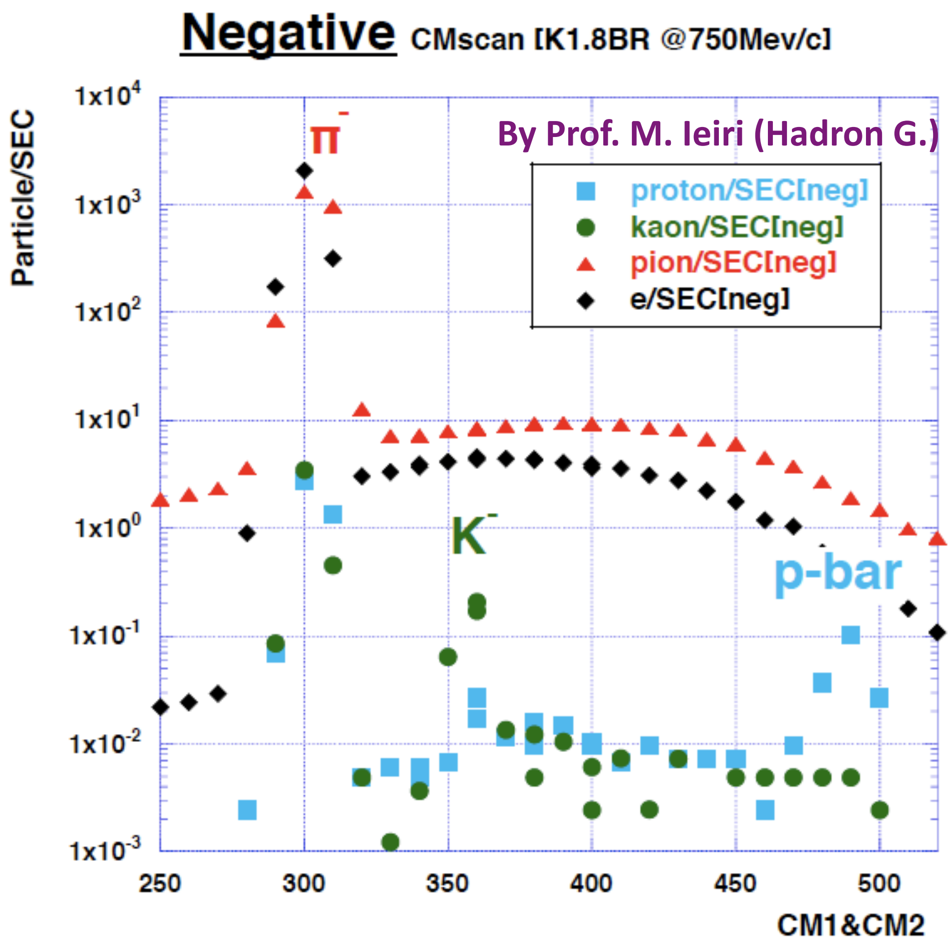
Beam measurement of Run#28(1)

On Dec. 12 morning, K-tuning of K1.8BR beamline was achieved in comprehensive cooperation with Hadron G.

Primary proton intensity: 2×10[11] ppp
Production target: Ni
EQ/RQ: OFF

Momentum/porality:±0.75 GeV/c
K1.8ES1: ±200 kV
IF-H:±130mm IF-V: -0mm/+4mm
K1.8Mom Slit: ±60mm
K1.8Mass Slit1: ±2.35mm



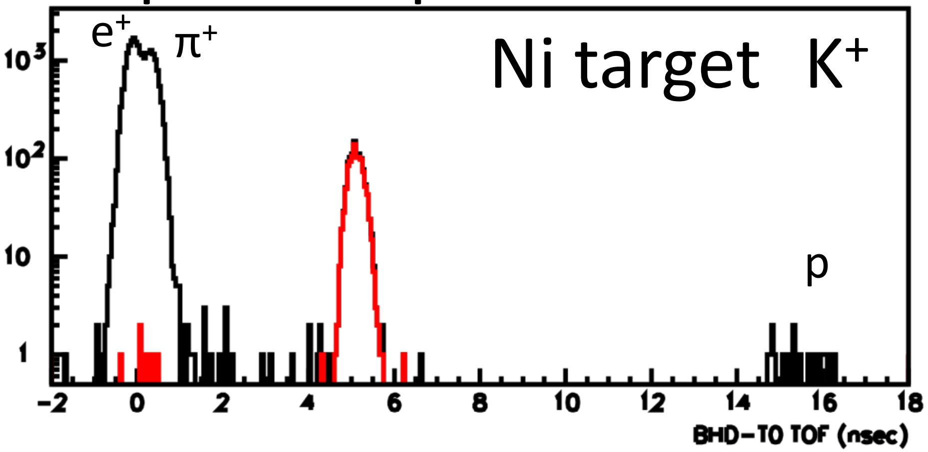


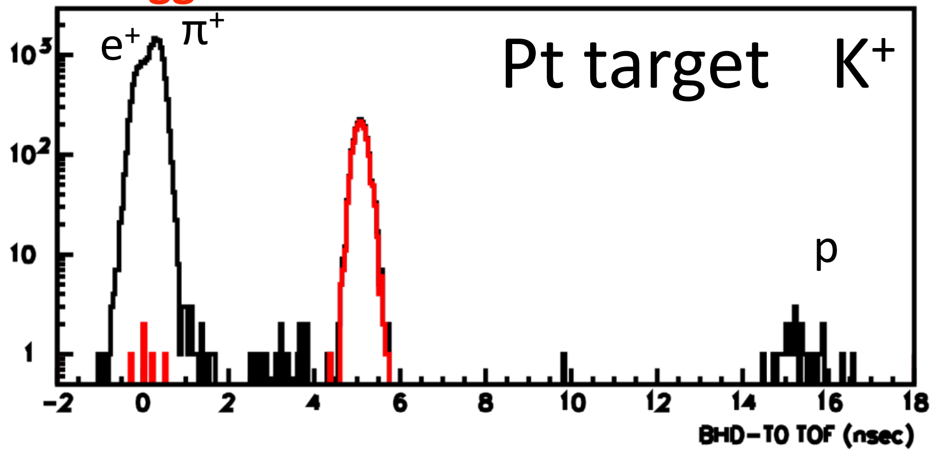
Beam measurement of Run#28(2)

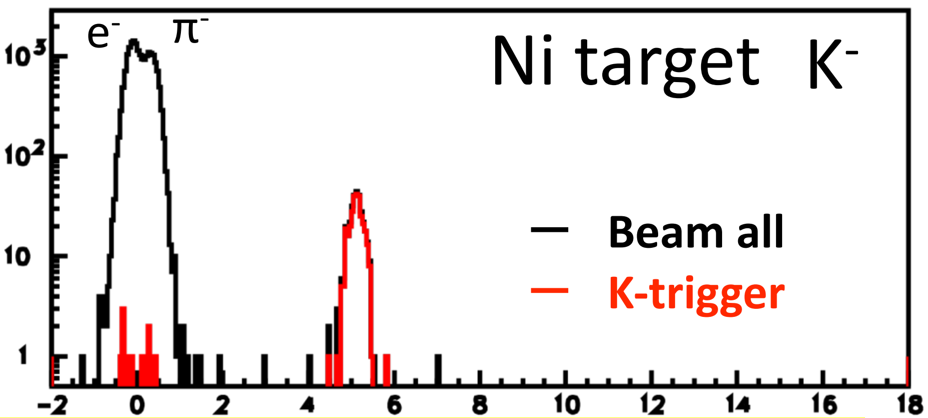
On Dec. 23 morning, $K^{\pm}$ intensity, etc. were measured under K-tune for the comparison of Ni and Pt targets

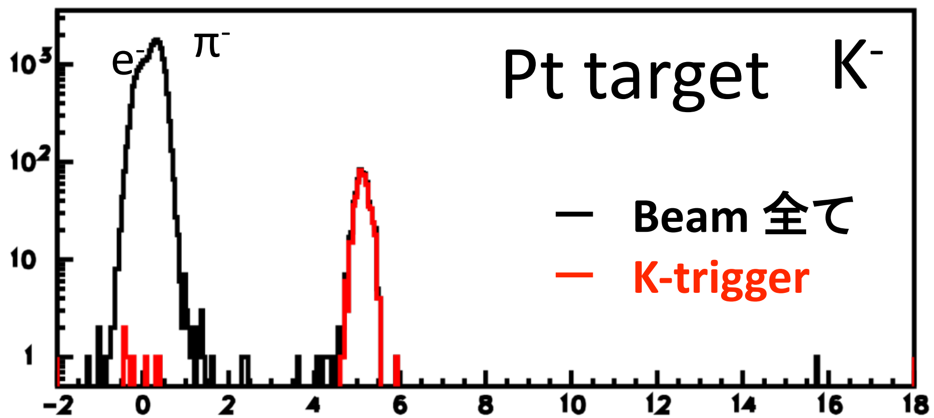
Primary beam intensity: 3×10^{11} ppp (0.24 kW), EQ/RQ: ON

TOF spectra – Comparisons of "Beam all" and "K triggered events"









Momentum/porality:±0.75 GeV/c
K1.8ES1: ±200 kV CM1=CM2=350(K^+)/355(K^-)
IF-H:±130mm (full open) IF-V: -0mm/+4mm->-2mm/+6mm
K1.8Mom Slit: ±180mm (full open)
K1.8Mass Slit1: ±2.35mm ->±4.7mm

K trigger includes real kaon by over 97%, and the kaon purity is over 99% -> scaler count of K trigger is reliable as real Kaon number.

Beam measurement of Run#28(3)

Quantitative comparison of Ni and Pt targets (data taken on 12/23 morning)

5 spill scaler counts (purity of K in K trigger is over 99%)
SEC stability is within 1−2% (no correction)

K^+

		Ni		Pt	Pt/Ni
IF-Y (0,4mm) : mass slit=±2.35mm		1178		2755	2.33
	K/π ratio (×10^{-2})	7.3		12.7	1.74
IF-Y (-2,6mm) : mass slit=±2.35mm		1497		3430	2.29
	K/π ratio (×10^{-2})	7.2		11.9	1.64
IF-Y (-2,6mm) : mass slit=±4.7mm		2218	→	4992	2.25
	K/π ratio((×10^{-2})	5.3		8.4	1.60

K^-

		Ni		Pt	Pt/Ni
IF-Y (0,4mm) : mass slit=±2.35mm		331		678	2.0
	K/π ratio (×10^{-2})	2.47		3.31	1.34
IF-Y (-2,6mm) : mass slit=±2.35mm		378		824	2.1
	K/π ratio (×10^{-2})	2.17		3.08	1.42
IF-Y (-2,6mm) : mass slit=±4.7mm		601	→	1116	1.9
	K/π ratio (×10^{-2})	1.67		2.10	1.26

Beam measurement of Run#28(4)

Discussion of the K^+/K^- yields and their comparison between Ni and Pt targets

(1) For both K yield・K/π ratio, Pt is much advantageous than Ni. 2.3 times(K^+)/1.9 times(K^-) larger yields are achieved per primary proton. This agree well with the TM number ratio, 2.4, from hadron beamline group.

(2) Kaon yields for full-openned Horizontal slits and two times wider vertical slit width for 240W/Pt target are : K^+ 1000/spill K^- 220/spill

(3) Except for the tuning of D3-D4-D5 magnets for the centering of beam axis, tuning procedures like Q magnet tune, etc., are not performed yet. Therefore, K/π ratio might be improved more.

(4) K^+ numbers measured under unseparated and K-tuned conditions agree completely for identical D-setting, and they are consistent with calculated number by Sanford-Wang's formula, etc. Therefore, <u>there is no possibility of any improvement of K yields per primary proton from the presented values.</u>