J-PARC Hadron Hall : EXPERIMENTAL REPORT on RUN#

		Date(submitted)	March 19
Group	E36	Beam line	K1.1BR
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Summary and Results

This beamtime is aimed at systematic beam halo measurement by arranging two CsI(Tl) modeles at the actual E36 position. Although the existence of the beam halo was recognized in the last K1.1BR tuning in December 2012, in this beamtime details of the halo characteristics were carefully studied by using the beam hodoscope equipped just in front of the beamline shield.

A Fetch Cherenkov (FC) counter for the K/pi identification was put at the exit of K1.1BR. Two set of beam defining counter were set at the focusing point behind FC and used as trigger counters. We placed two CsI(Tl) modules at the distance of 15 cm from the beam axis to directly measure halo particles. Large plastic scintillators are put in front of the CsI(Tl) module to remove neutral particles.

Before studying the beam halo, the K^+ beam tuning was, at first, performed to make the actual E36 experimental conditions. We were successful in obtaining the 780 MeV/c K^+ beam with 350 k/spill and K^+/π^+ ratio ~ 1. The ESS voltage was ±250 kV. This is expected to be realistic E36 experimental conditions, although MR is operated about half power of the E36 design. Since MIP peaks were clearly found in the CsI(Tl) ADC spectra and the CsI(Tl) rate is not largely changed by making coincidence with the plastic counter, it was concluded that main component of the beam halo is due to charged particles (but we cannot identify π or μ or both).

The beam halo was investigated by putting a BeO degrader and a dummy K^+ stopping target. The CsI(Tl) single rates were once measured by changing K1.1BR horizontal slits (IFX, HFOC). However, prominent halo reduction was not obtained and recognized that it is difficult to remove the halo just using IFX and HFOC. Then, the beam halo trajectories were determined from the hit position in the beam hodoscope and the trigger counters by connecting them with a straight line. The beam profile of the intrinsic K^+ beam and the beam halo at the hodoscope position was found to be so different. From these data, a beam collimator to remove the beam halo will be newly designed, and introduced in the next beamtime.

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

1) Scheduled time: 24 hours (from March 8, 1:00 to March 10, 9:00)
2) Executed machine time: 24 hours with several downtimes
3) Beam condition: 780 MeV/c positive beam, the DC separator was very stable. MR: 14.9 kW operation.
4) Down time: Area entering to modify the experimental configuration. The BeO degrader and the dummy target were put and removed a few times.

Comments/Requests

Sometimes we observed a sudden change of the K/π ratio which could be attributed to either the instability of the secondary beamline magnet or the primary beam line vertical position on the T1 target.