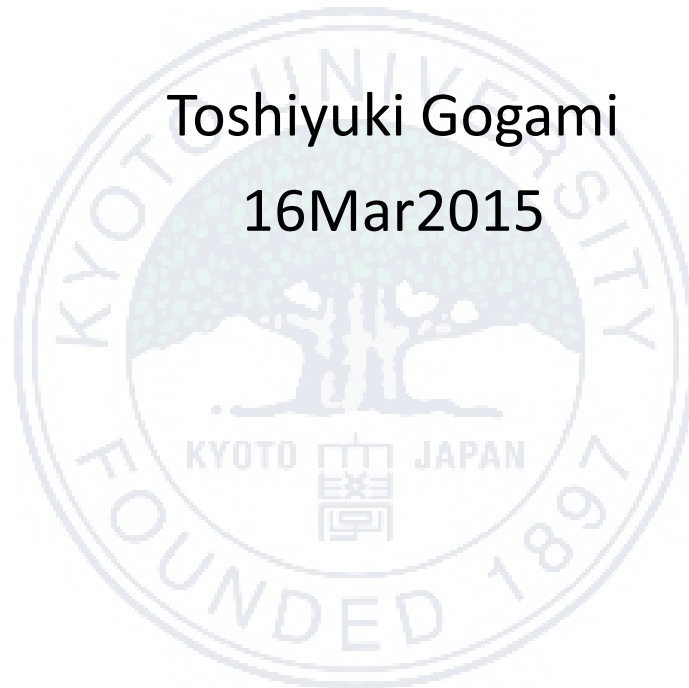


Analysis memo

(S-2S water Cherenkov detector)

Toshiyuki Gogami

16Mar2015



Contents

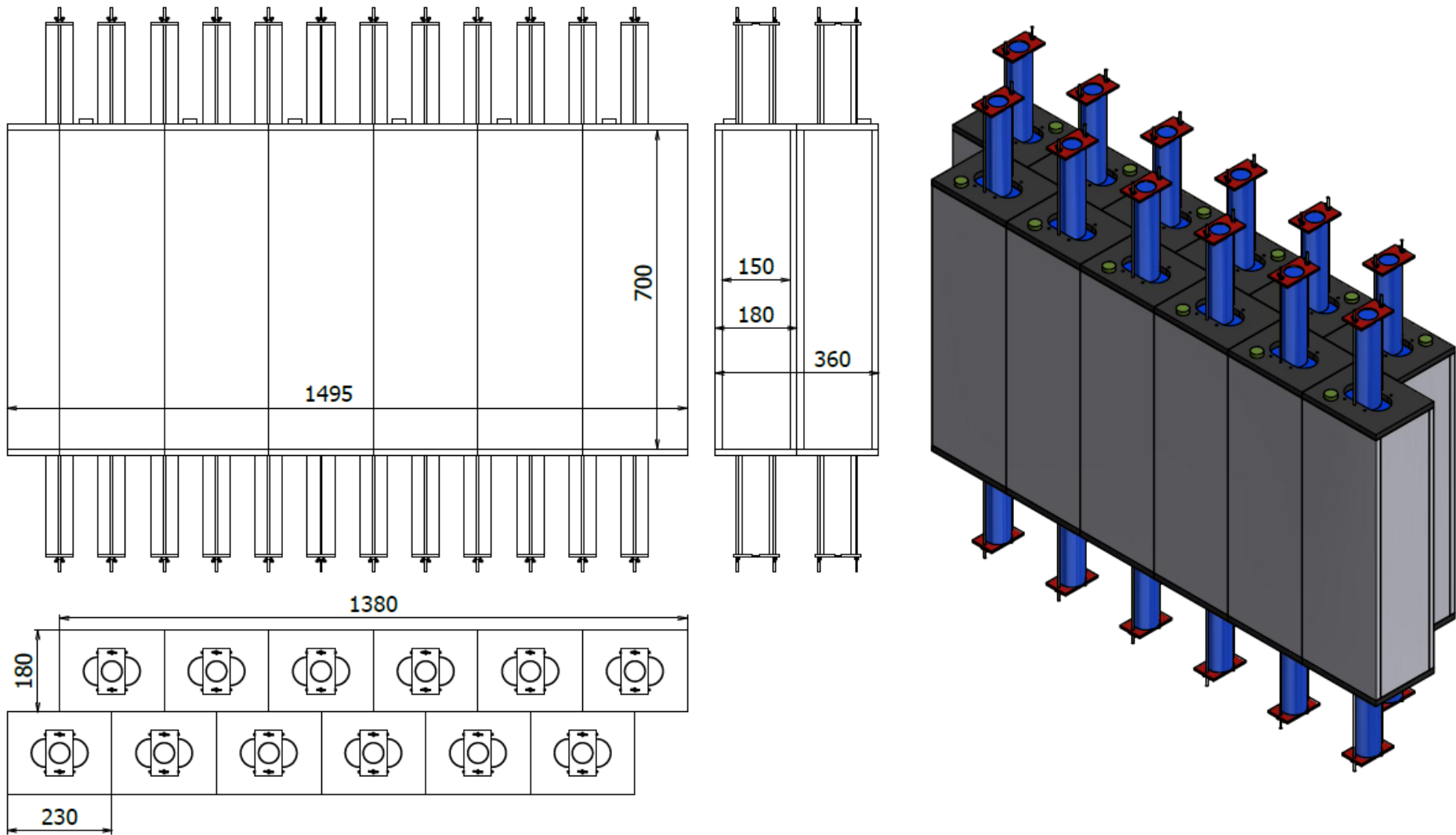
Geant4 simulation for WC detector **UPDATED**

S-2S Geant4 simulation

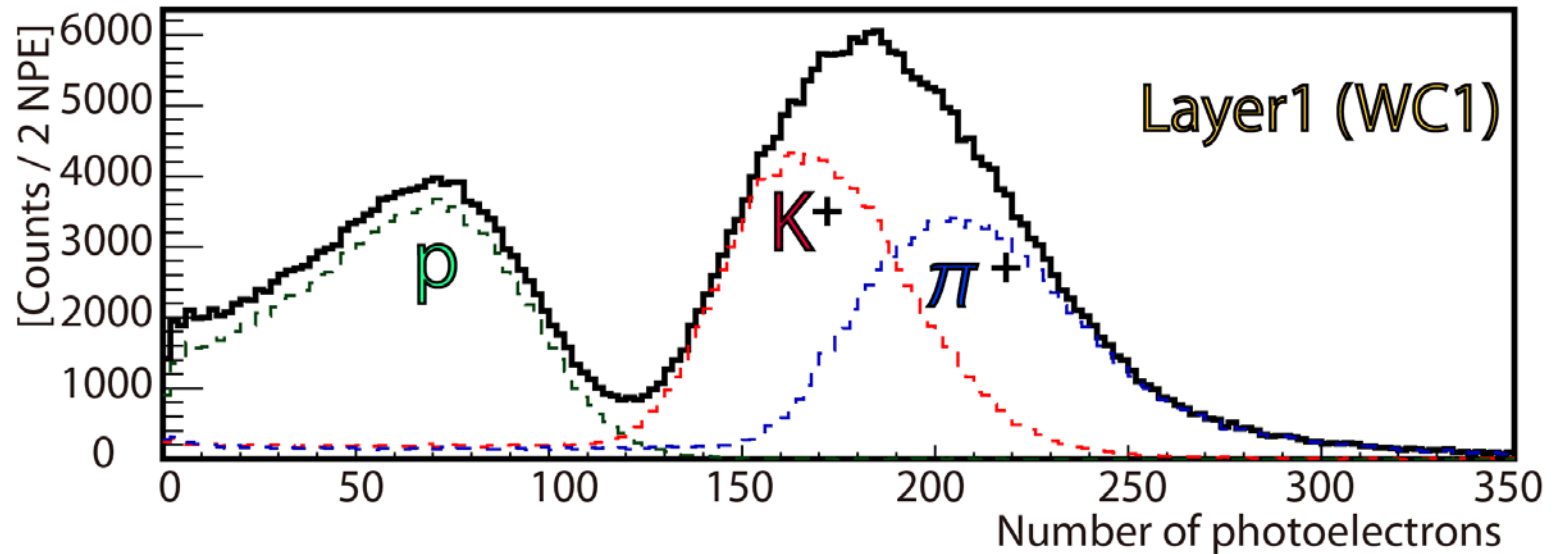
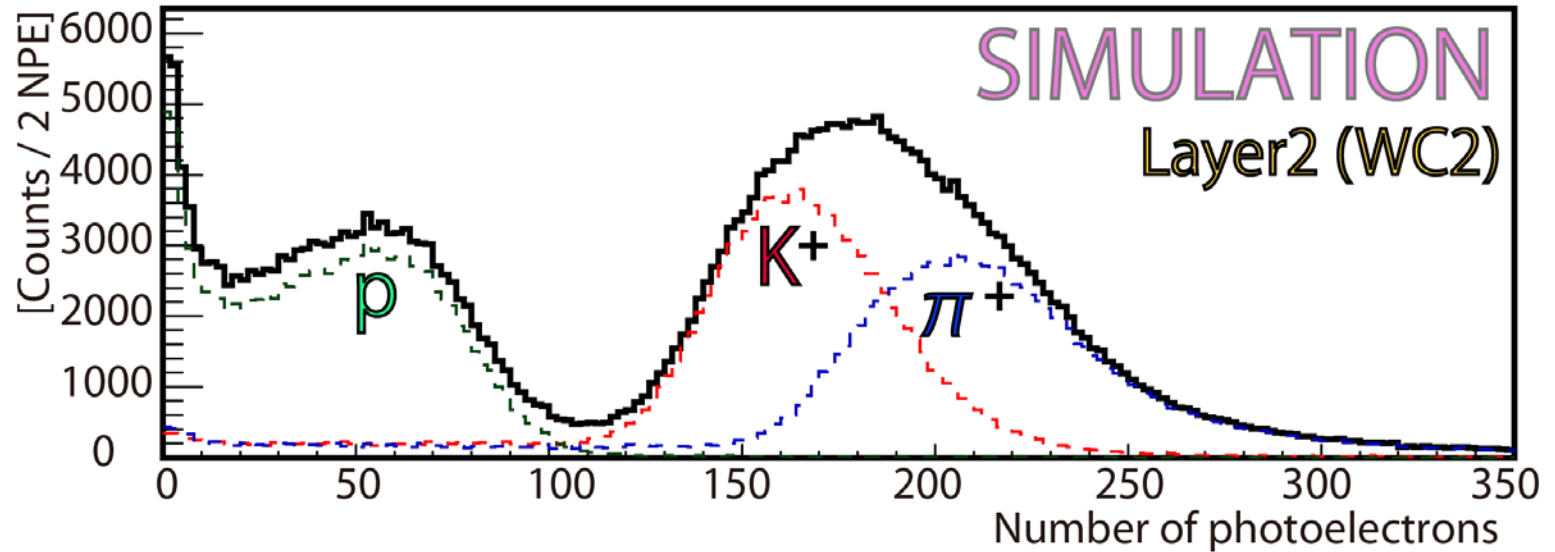
Conditions

- Particle generation at a target point (but no target)
 - Momentum: 1.1 – 1.9 GeV/c (Uniform)
 - Angle: 0 – 0.25 rad (Spherical uniform)
 - Particles: p or K^+ or π^+
- Reactions
 - Electromagnetic: ON
 - Hadronic: ON
- Decay: ON
- Requirements for plots
 - Hit TOF detector with new zigzag configuration.
- NPE value
 - was set to reproduce a cosmic ray test.
- Materials
 - All detectors were installed.
(Chambers, TOF, AC, WC)

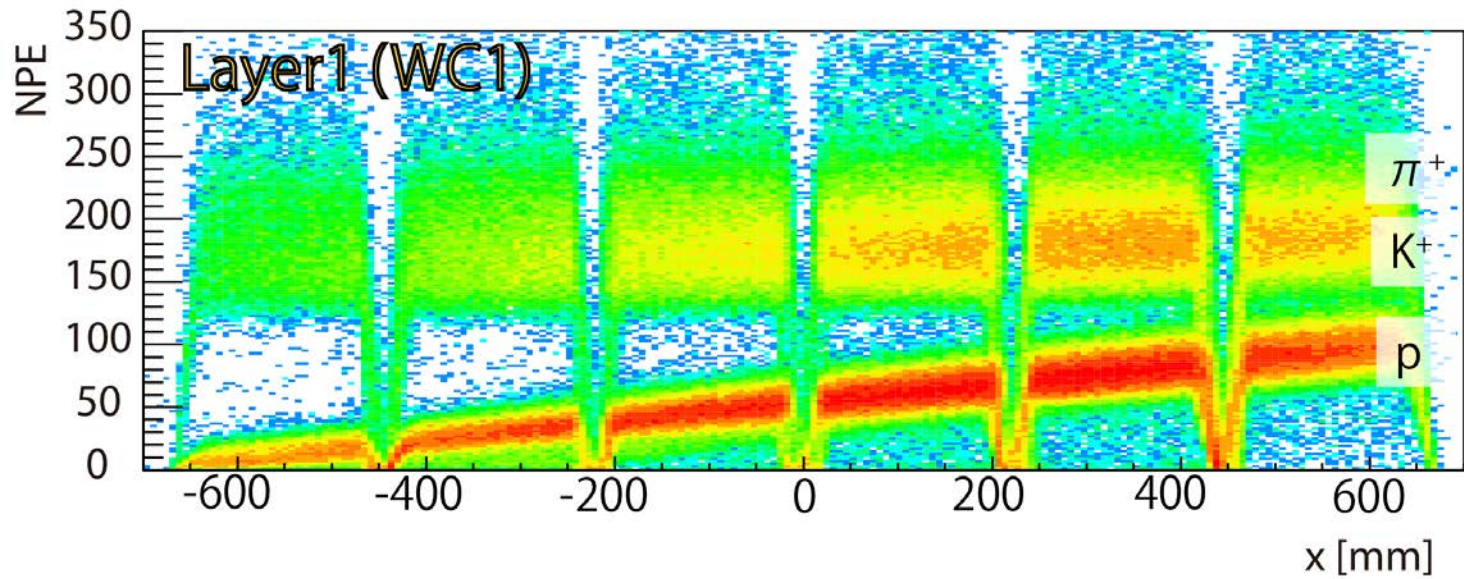
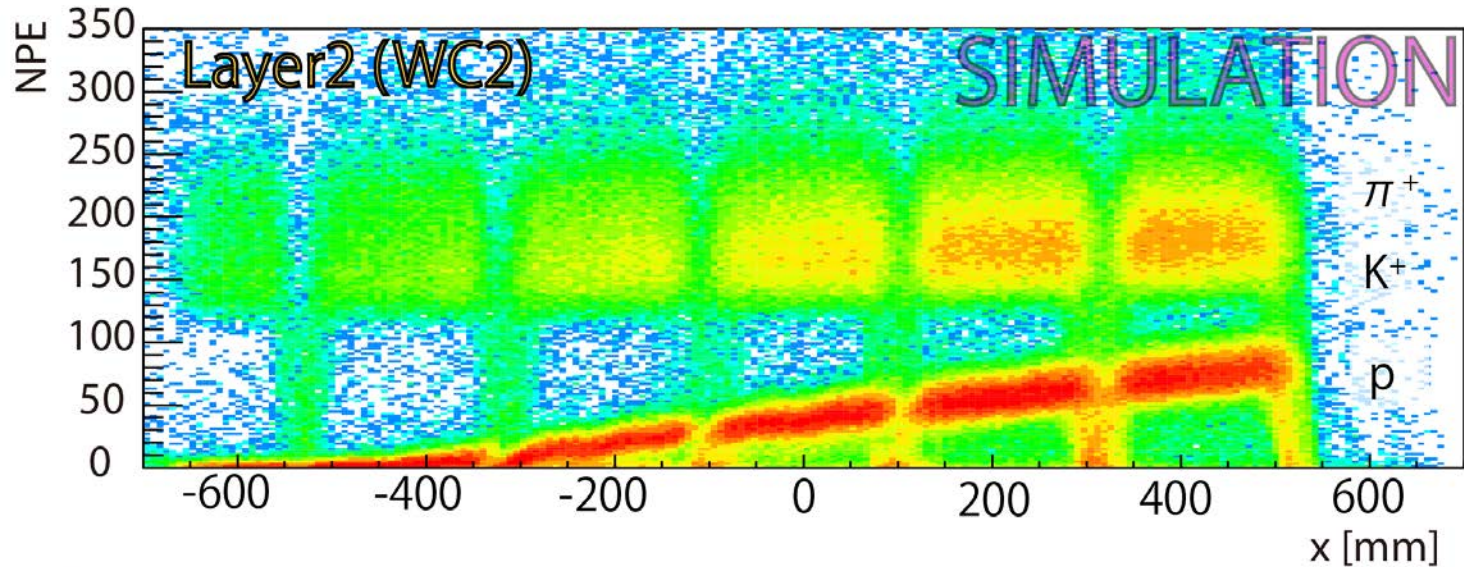
Geometrical setup of WC



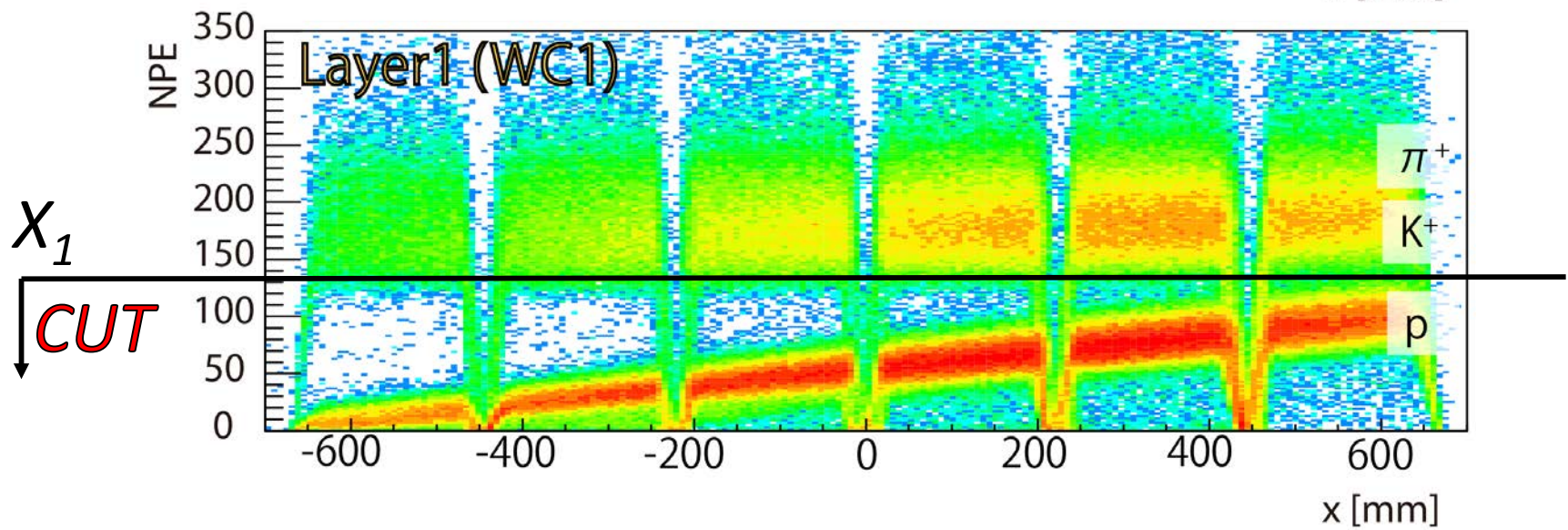
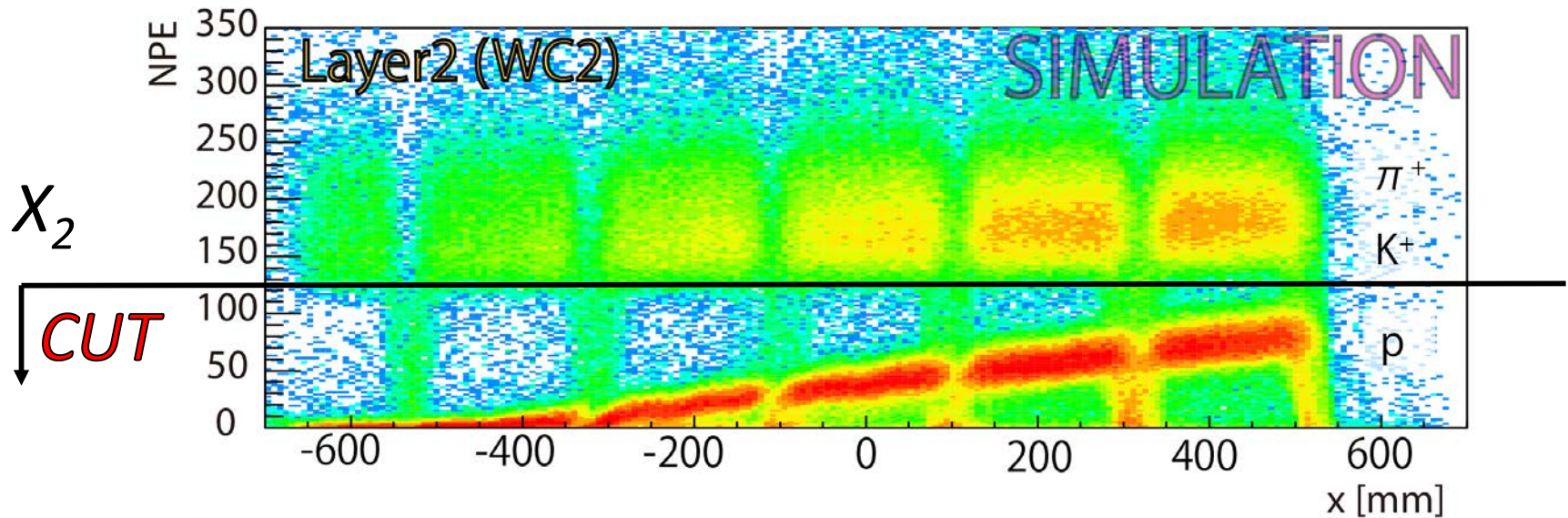
NPE distributions



x vs. NPE



X vs. NPE

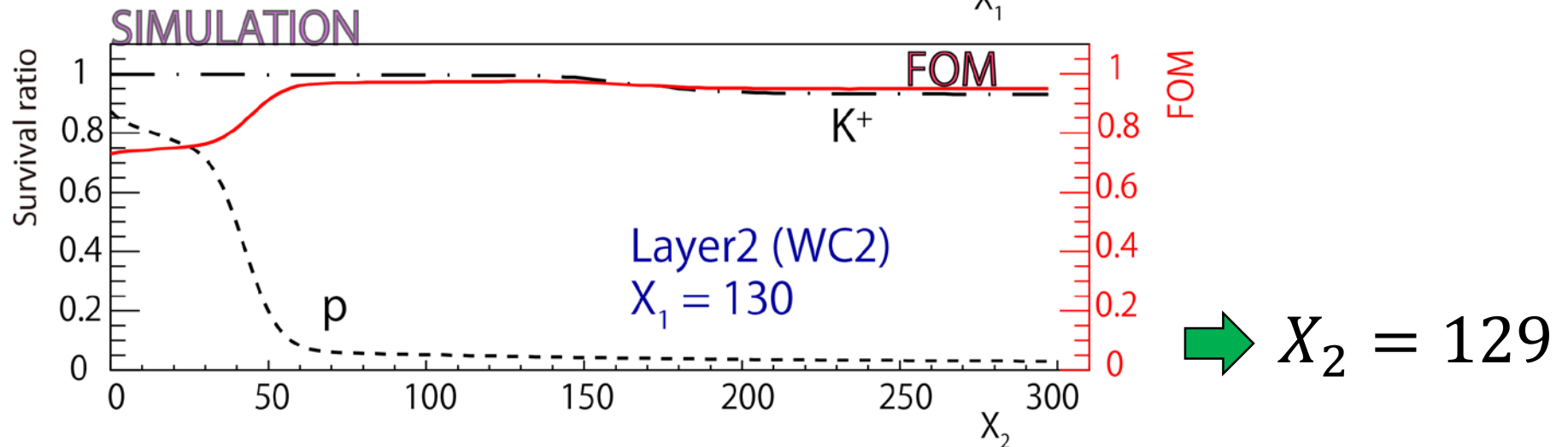
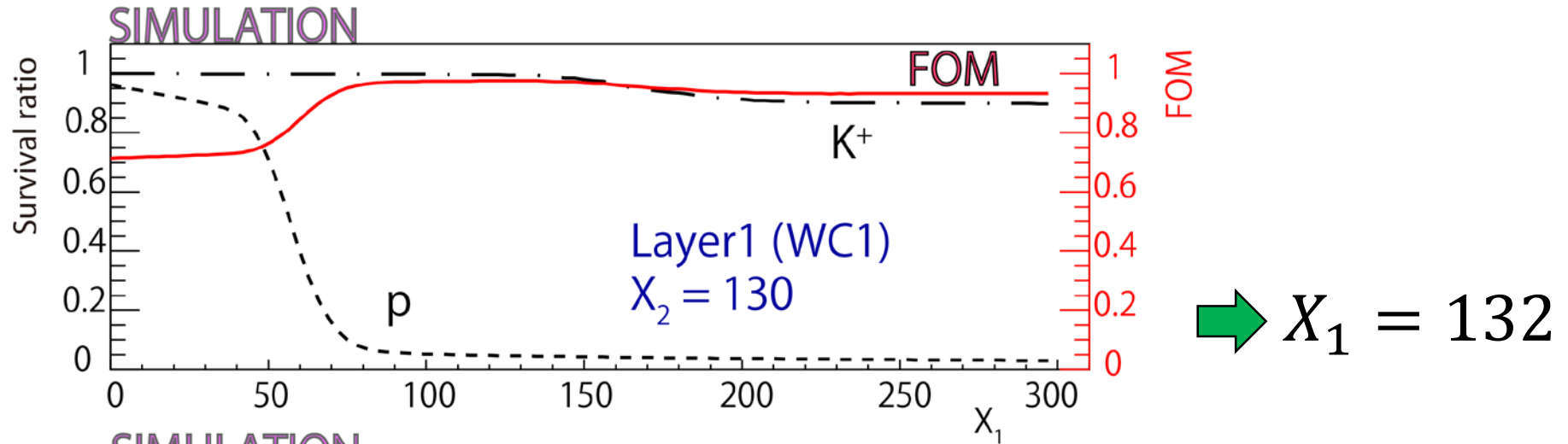


Cut condition optimization

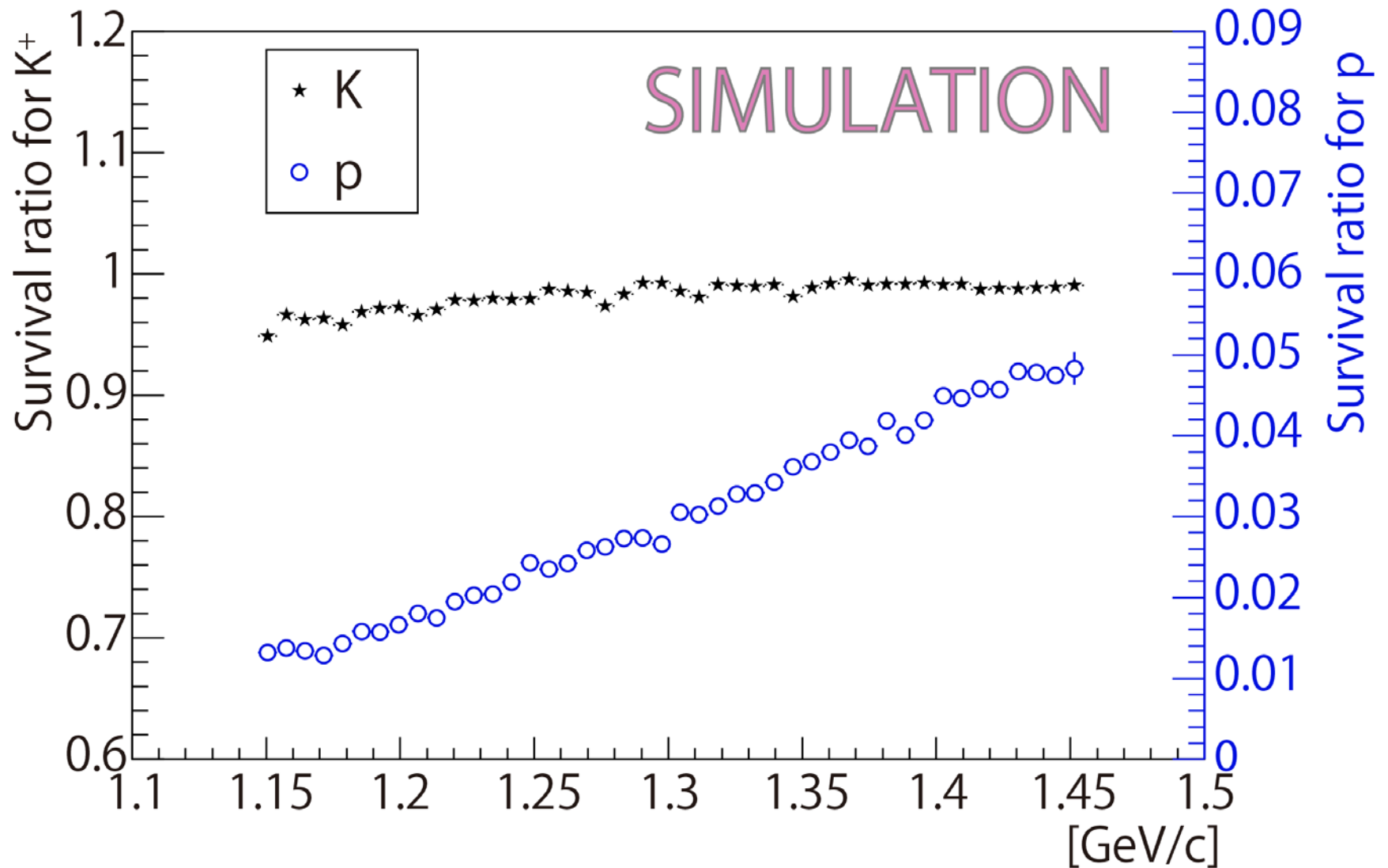
$X_{1,2}$: Cut thresholds for WC1 and WC2

1. Fix X_2 (X_1).
2. Scan FOM ($\equiv \frac{S}{\sqrt{S+N}}$) varying X_1 (X_2).
 - $S = R_K$: Survival ratio of K^+
 - $N = R_p$: Survival ratio of p

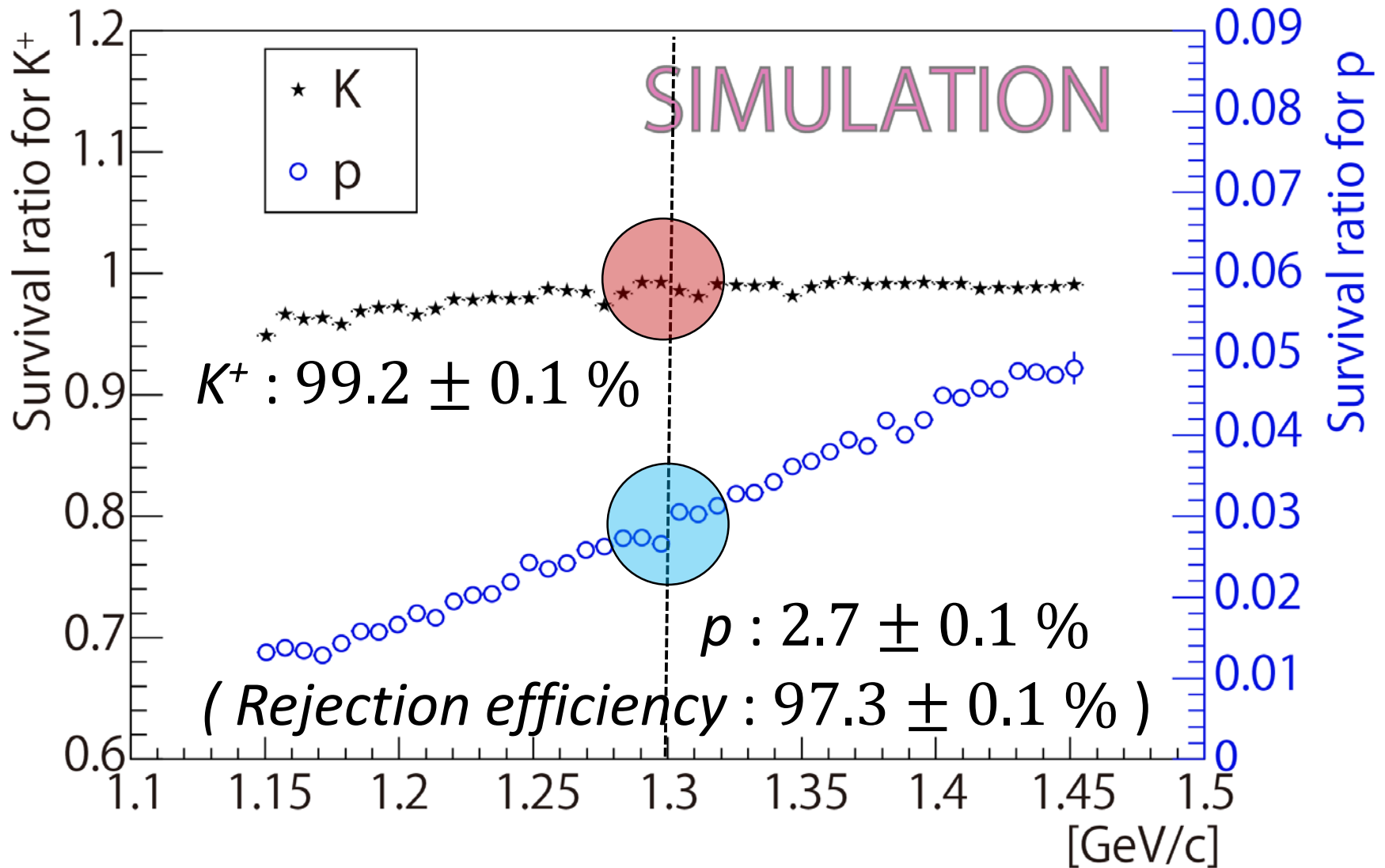
Optimized cut conditions



Survival ratios for K^+ and p



Survival ratios for K^+ and p



Summary

S-2S Geant4 simulation for WC detector

- p rejection efficiency : 97.3 ± 0.1 %
- K^+ survival ratio: 99.2 ± 0.1 %