

Hall Background and Simulations for SANE

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SANE Collaboration
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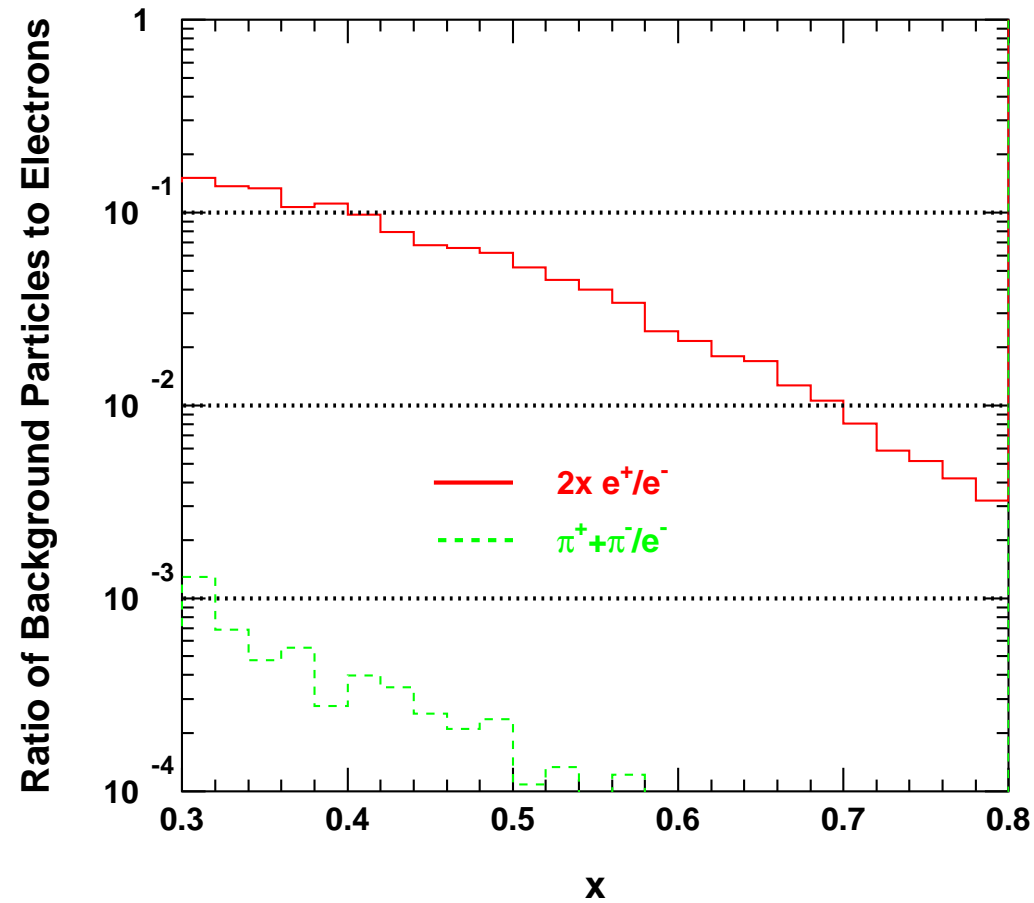
Background Particles

$e^- + e^+$: Identical response by BETA
Requires **HMS measurement**
during data taking

$\pi^+ + \pi^-$: Reduction by $10^3:1$ by Cerenkov

$\pi^0(2\gamma) + p + n$: $10^4:1$ reduction for p
 $10^5:1$ reduction for n
 $\pi^0 \rightarrow 2\gamma$, useful for the calibration
of the calorimeter

Ratio of Background Particles



- $E_{\text{beam}} = 6$ GeV, anti-parallel
- Pion ratio reduced by the gas Cerenkov rejection factor
- Proton/neutron ratio not visible on this scale

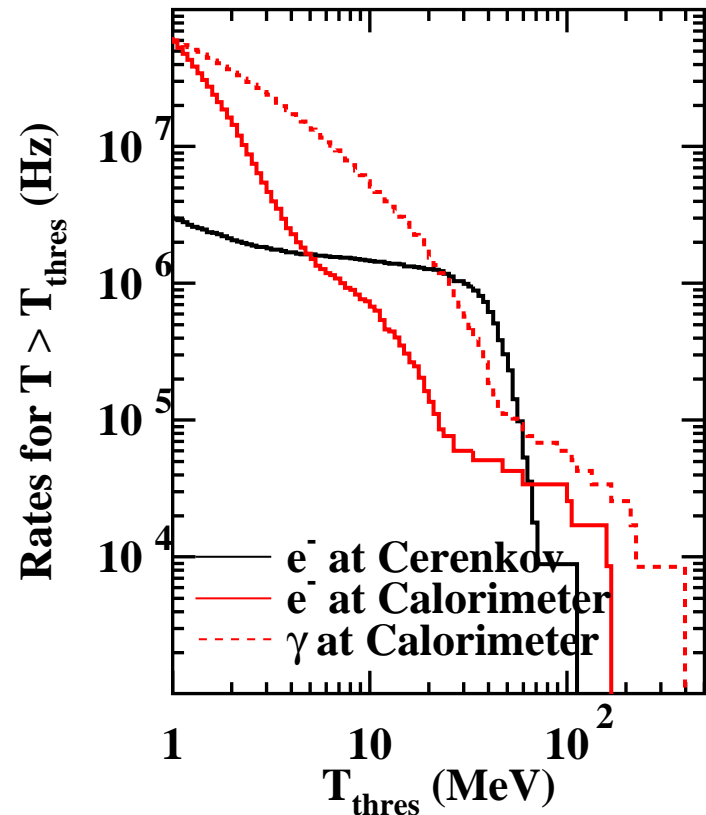
Positrons

- Rates: deduced from the measurement of e^+/e^- ratio by HMS
- For positron asymmetries
 - Positron asymmetry data from EG1b run of CLAS
 - Photon asymmetry with BETA
(assuming e^+ coming from γ)
 - $\pi^0 \rightarrow 2\gamma$ asymmetry with BETA
 - Two “electron (e^+/e^-)” asymmetry with BETA

Study of Beam Background

Preliminary study using Pavel Degtiarenko's simulation package

- No problem with parallel field
- A large fraction of electrons into BETA at transverse field
 - At most 200kHz/PMT for gas Cerenkov
 - Pileup, trigger rates, detector rates all manageable
 - Numbers are conservative, probably at least factor 2 reduction in Cerenkov rates



Beam Background (cont.)

What to do for **transverse** field beam background?

- Increase online CAL threshold to 900 MeV to bring trigger rate $< 1\text{kHz}$ without any impact on physics
- Slightly increased pileup: 0.8% above 10 MeV, but 0.01% above 50 MeV
- Increased accidentals between gas Cerenkov and CAL, $< 5\%$, but uncertainty in correction will be $< 0.5\%$ of true rate

Summary

- Background from the target: under control
 - π , n , p : reduction by Cerenkov
 - e^+ : On-line monitoring with HMS
- Beam line background: manageable