

SIDIS Single Electron Trigger Rates

12/19/2017

Introduction

HallD hadron backgrounds: π^- , π^0 , π^+ , all hadrons no e

- SIDIS configuration:
 - SIDIS single electron trigger curve was generated from Wiser background simulation by Jin.
 - SIDIS single electron trigger curves are generated from merged EM and HallD hadron backgrounds (beam on target backgrounds) with GEMC simulation files.
 - SIDIS hadron trigger needs to be studied?
- PVDIS configuration:
 - Trigger curves were generated from Remoll HallD hadron background simulation by Rakitha.
 - Trigger curves were generated from GEMC HallD hadron backgrounds simulation.

Single e⁻ Trigger Rates for FAEC

Rate (kHz)	FAEC		FAEC+LGC		FAEC+LGC+SPD+up+down	
	Zhiwen	Ye	Zhiwen	Ye	Zhiwen	Ye
DIS e ⁻	68	70.5	63	64.7	58+1+2	59.9+1+1.7
π^0	1028.5	1021.5	43.7	42.9	32.8	32.2
π^-	541.3	637.8	3.6	3.9	3.2	3.7
p	198	241.8	0	0.015	0	0.015
All hadrons no e ⁻	2724	3009	62	63	48.6+2.1+0.05	49.5+2.4+0.04
FAEC total					111.7 kHz	114.1 kHz

Single e⁻ Trigger Rates for LAEC

Rate (kHz)	LAEC		LAEC+SPD+up+down	
	Zhiwen	Ye	Zhiwen	Ye
DIS e ⁻	4.5	4.4	4.1+3.6+2.6	4.0+3.5+2.6
π^0	14.6	14.7	0.6	0.7
π^-	5.5	6.5	5.0	6.0
p	3.5	2.6	3.3	2.3
All hadrons no e ⁻	37.4	36.9	17.5+8.1+0.2	17.1+7.6+0.2
LAEC total			36.1	35

Single e: 114+35=149kHz

Summary and Outlook

- The background rates are consistent with previous Zhiwen's results for the SIDIS configuration by using the same trigger curve method.
- The above backgrounds rates will be compared with directly ECAL response method.
- The hadron trigger needs to be studied next?

Any comments and suggestions ?

Back up

single (gas(hallD), win up(wiser), win down(wiser))

Jin's EC Wiser trigger **hit matching**

e_FA(kHz)	EC	EC+LGC	EC+LGC+SPD
Electron	68 (57)	63(56)	58(52)+1+2
Pip	694(643)	4.2(3.3)	3.8(3.1)+2.5/2+1.6/2
Pim	537(492)	4.0(3.2)	3.6(3.0) +2.3/2+2.1/2
Pi0	1024(120)	43(31)	32(30) +1.1/2+5.8/2
P	202(185)	0(0)	0(0) +0/2+0/2
all hadrons, no electron	2692	62	47 +?+?
Total:			105+4+7=116

electron trigger self coin
prescaled by 10

61/10=6kHz

Only primary particle
in parenthesis,
In case of pi0, only e+
or e-

Pi0 before LGC 26(26)
Pi0 before GEM 13(12)

e_LA(kHz)	EC	EC+SPD
electron	4.5(4.3)	4.1(4)+3.6+2.6
Pip	8.6(8.5)	7.9(8.1)+8.4/2+5.6/2
Pim	6.4(6.0)	5.9(5.7) +6.1/2+3.7/2
Pi0	15.3(0.2)	0.6(0.2) +0.4/2+0.3/2
P	2.9(3.2)	2.8(3.0) +7.6/2+4.8/2
all hadrons, no electron	38	18 +?+?
Total:		22 +14+10=46

h_FA(kHz)	EC	EC+SPD
electron	140(94)	100(87) +4+4
Pip	5855(4898)	5151(4447) +3405/2+4570/2
Pim	4925(3787)	3971(3435) +3300/2+4590/2
Pi0	4607(811)	548(468) +33/2+171/2
P	3510(3103)	3164(2831) +2243/2+2563/2
all hadrons, no electron	17392	12805 +?+?
Total:		12913 +4500+6000=23413

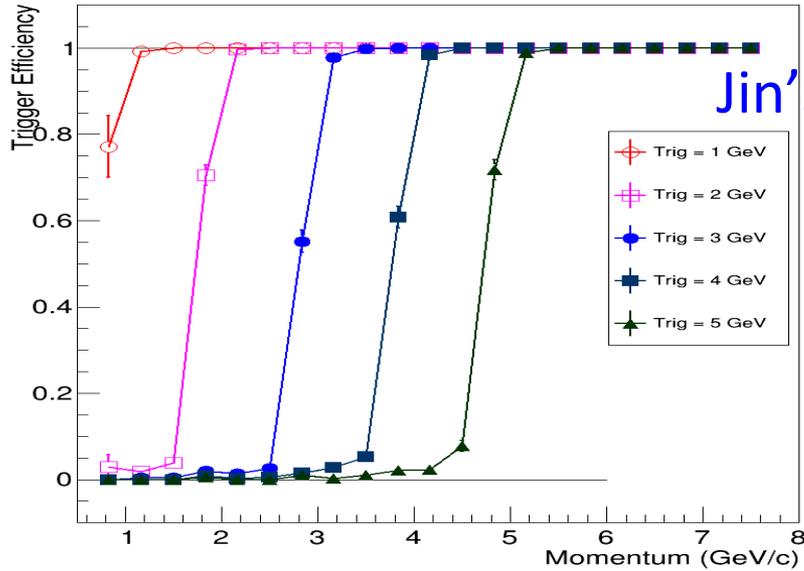
only primary particle in parenthesis

Wiser rate scaled down by 2

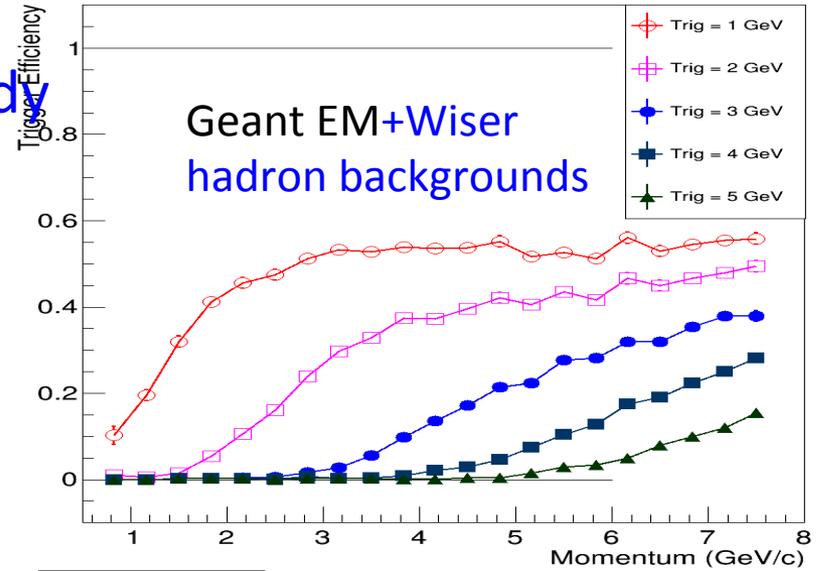
Random coin $(116+46-10.3-7.06-6.96) * 23413 * 1e3 * 30e-9 = 97\text{KHz}$

SIDIS FAEC Electron and Pion Efficiency Curves

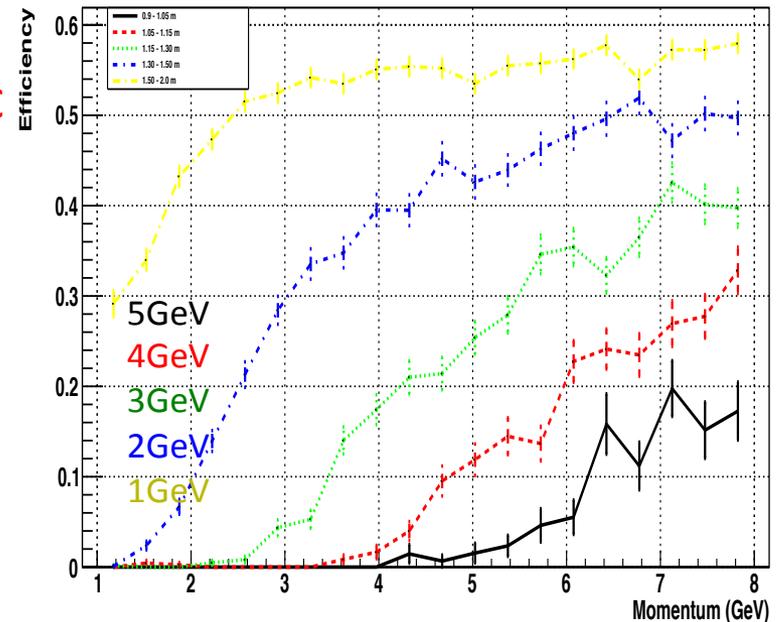
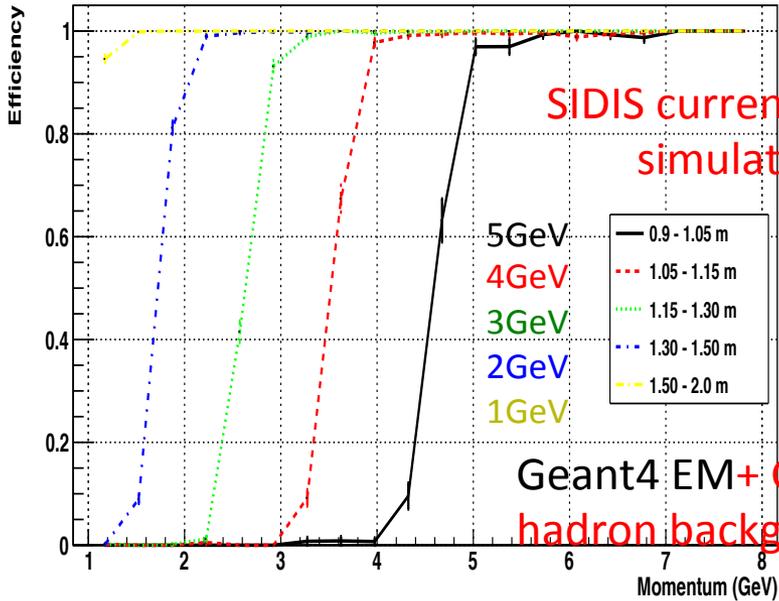
Electron



Pion



Pion Efficiency



SIDIS pion Efficiency Curves for LAEC

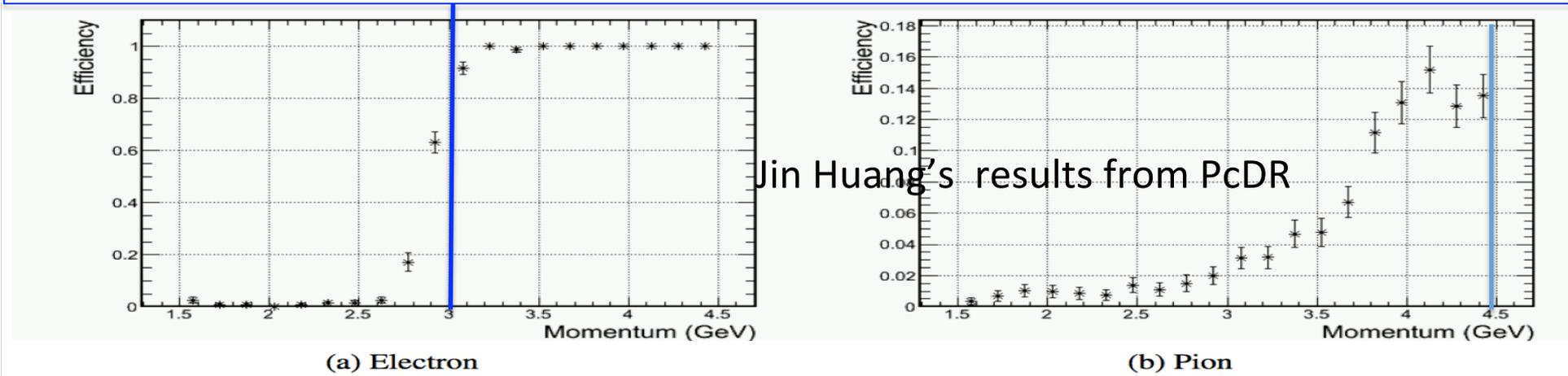
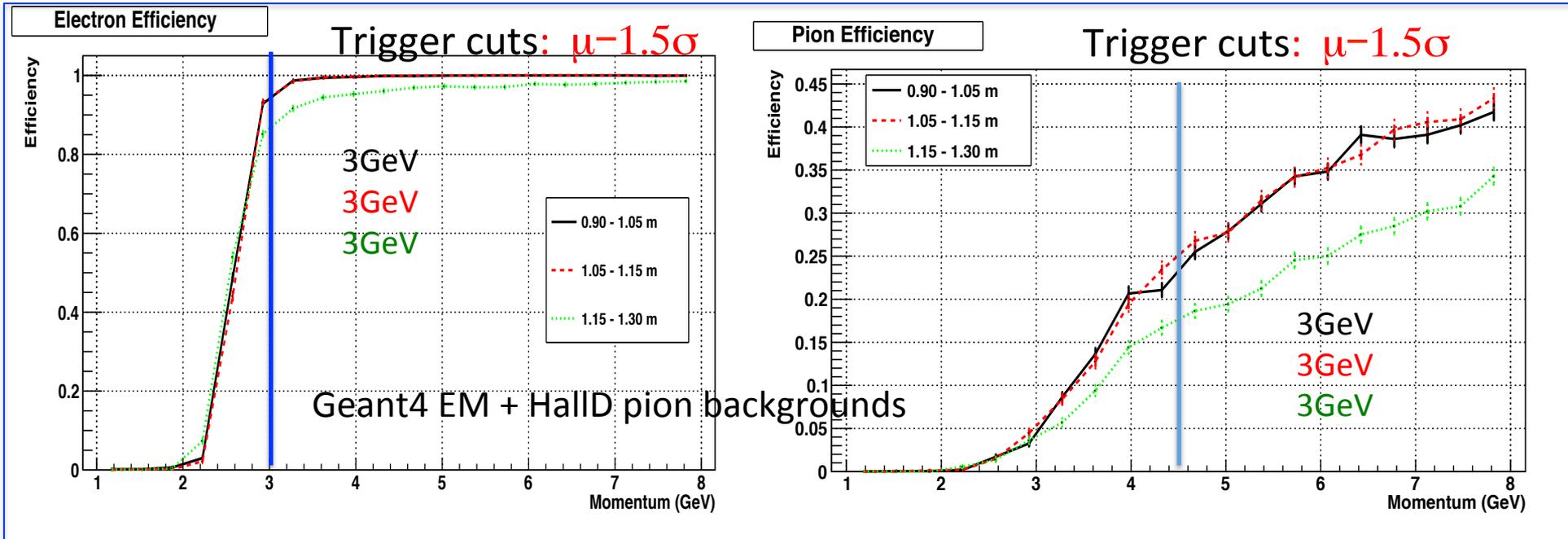


Figure 102: Trigger efficiency for electrons (a) and pions (b) for the SIDIS large angle calorimeter. The target trigger threshold is approximately $P_e = 3 \text{ GeV}/c$. Only the (high-background) inner-radius region is shown here.