

SIDIS Electron Trigger Rates

12/14/2017

Introduction

HalID hadron backgrounds: π^- , π^0 , π^+

- 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 HalID hadron backgrounds (beam on target backgrounds) with GEMC simulation files.
 - SIDIS hadron trigger curves will be generated.
- PVDIS configuration:
 - Trigger curves were generated from Remoll HalID hadron background simulation by Rakitha.
 - Trigger curves will be generated from GEMC HalID hadron backgrounds simulation?

Rate (kHz)	FAEC		FAEC+LGC		FAEC+LGC+SPD	
	Zhiwen	Ye	Zhiwen	Ye	Zhiwen	Ye
DIS e ⁻	68	70.5	63	64.7	58	59.9
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	49.5

Rate (kHz)	LAEC		LAEC+SPD	
	Zhiwen	Ye	Zhiwen	Ye
DIS e ⁻	4.5	4.4	4.1	4.0
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	17.1

Summary and Outlook

- The background rates are consistent with previous the SIDIS Zhiwen's results 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

SIDIS electron trigger

FAEC electron trigger

Radius(cm)	E Threshold (GeV)	Jin's cut (GeV)
90 - 105	5.0	shE-preshE>4.4
105 - 115	4.0	shE-preshE>3.5
115 - 130	3.0	shE-preshE>2.6
130 - 150	2.0	shE-preshE>1.6
150 - 200	1.0	shE>0.9

Radius(cm)	6+1 Cluster Threshold (MeV)	6p1 E _{dep} in ECAL
90 - 105	990.09	
105 - 115	762.60	
115 - 130	557.97	
130 - 150	355.25	
150 - 200	170.87	

LAEC electron trigger

Radius(cm)	P Threshold (GeV)
90 - 105	3.0
105 - 115	3.0
115 - 130	3.0

Radius(cm)	6+1 Cluster Threshold (MeV)
90 - 105	571.50
105 - 115	571.90
115 - 130	531.60

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

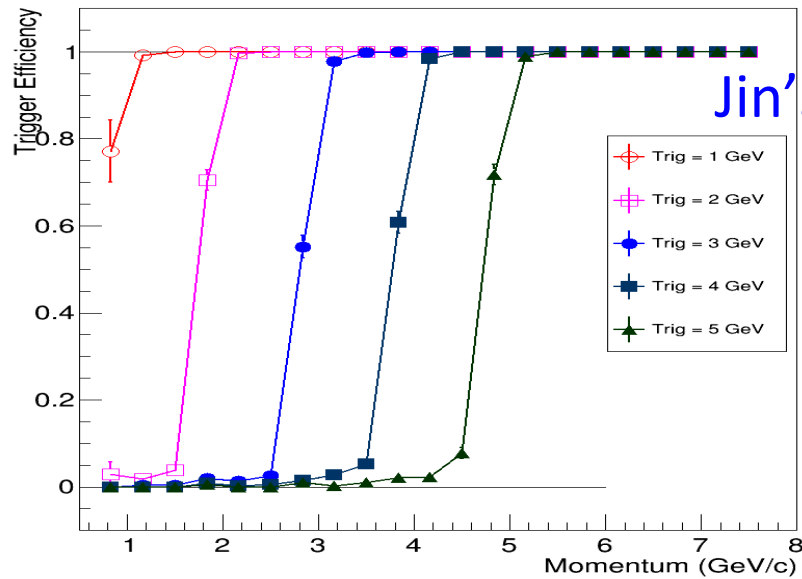
h_FA(kHz)	EC	EC+SPD
electron	140(94)	100(87) +4+4
Pip	5855(4898)	5151(4447) +3405/2+4570/2
Pim	4925(3787)	3971(3435) +3300/2+4590/2
Pi0	4607(811)	548(468) +33/2+171/2
P	3510(3103)	3164(2831) +2243/2+2563/2
all hadrons, no electron	17392	12805 +?+?
Total:		12913 +4500+6000=23413

only primary particle in parenthesis
Wiser rate scaled down by 2

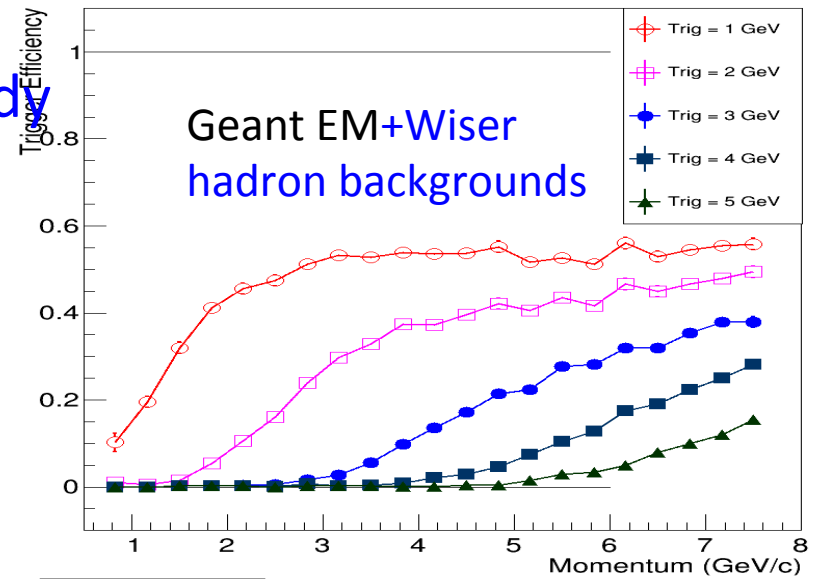
Random coin $(116+46-10.3-7.06-6.96)*23413*1e3*30e-9=97\text{KHz}$

SIDIS FAEC Electron and Pion Efficiency Curves

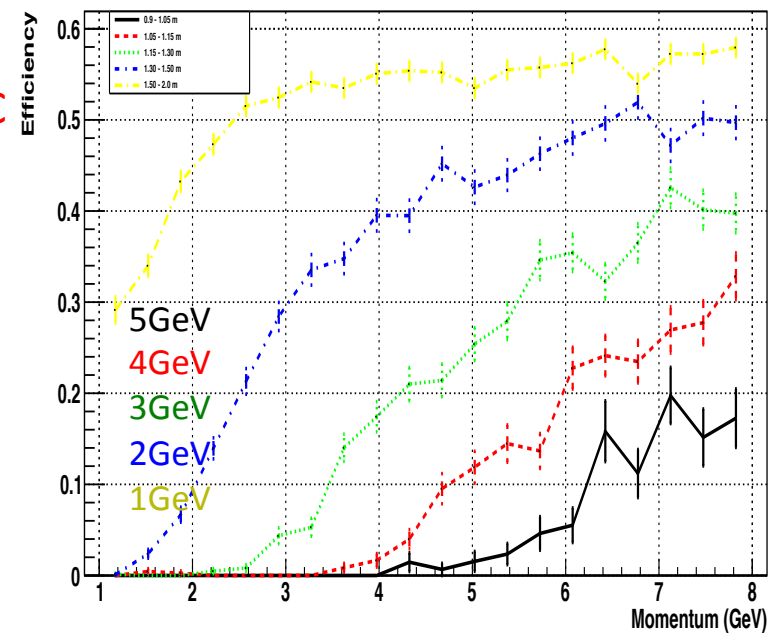
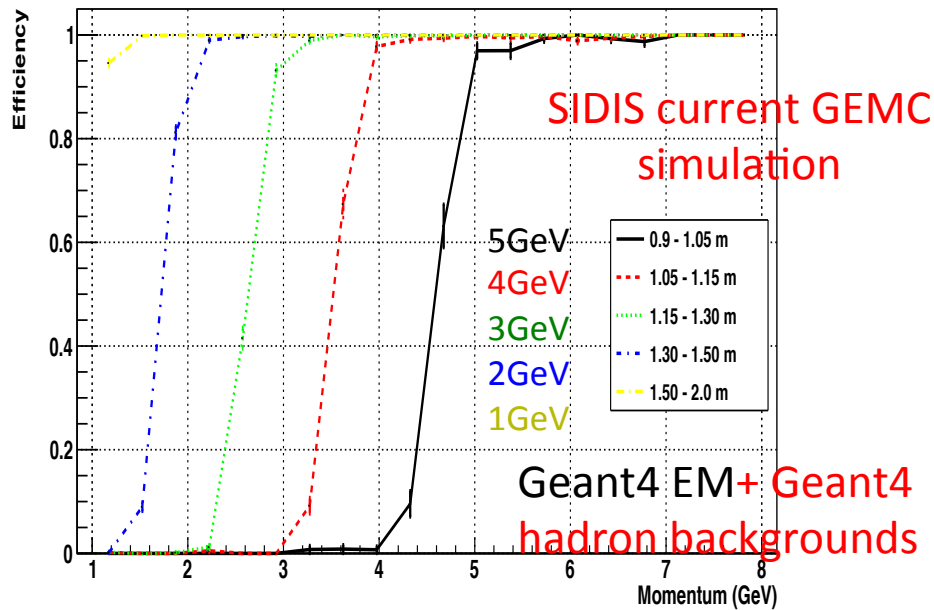
Electron



Pion



Pion Efficiency



SIDIS pion Efficiency Curves for LAEC

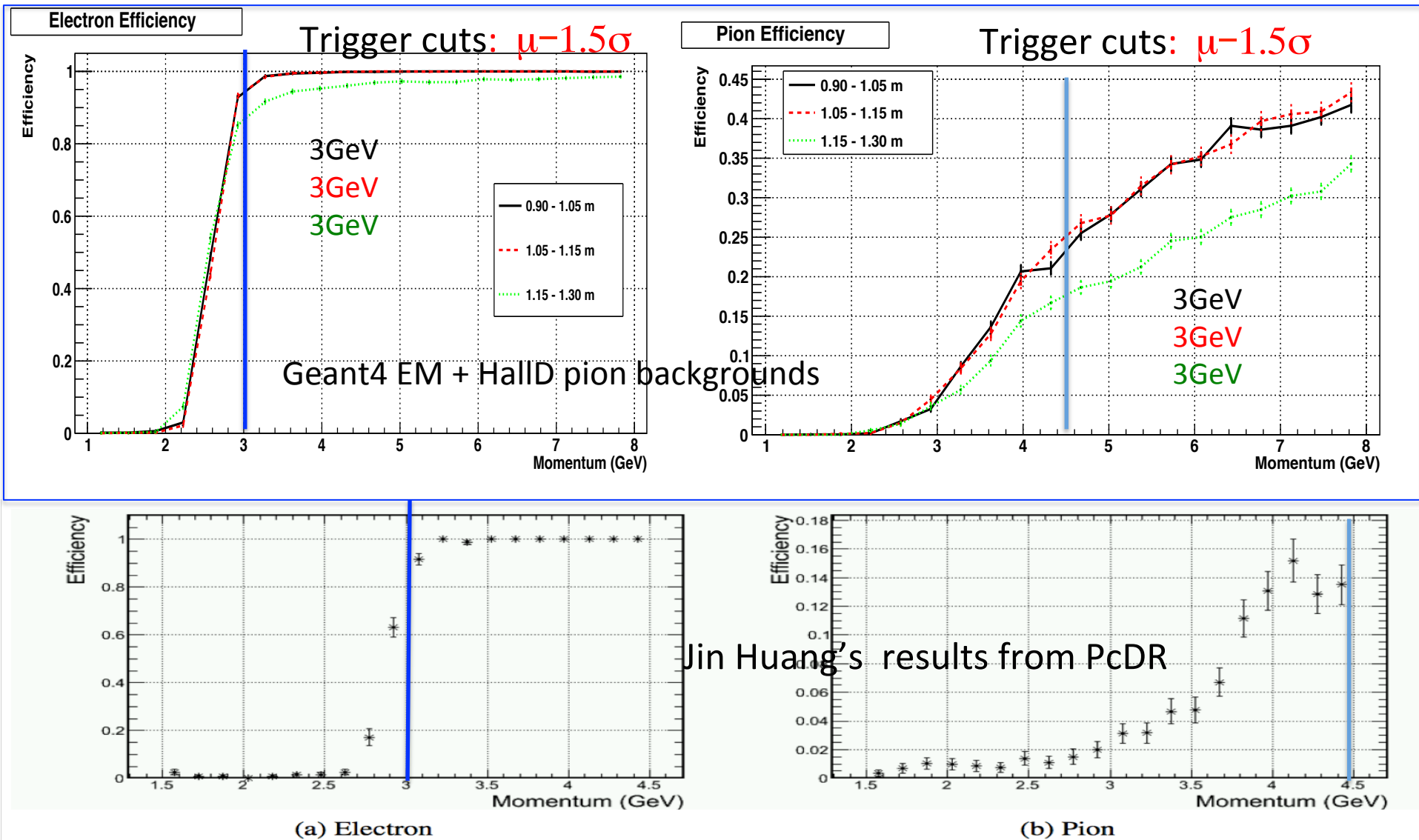


Figure 102: Trigger efficiency for electrons (a) and pions (b) for the SIDIS large angle calorimeter. The target trigger threshold is approximately $P_e = 3 \text{ GeV}/c$. Only the (high-background) inner-radius region is shown here.

Rate (kHz)	FAEC		FAEC+LGC		FAEC+LGC+SPD	
	Zhiwen	Ye	Zhiwen	Ye	Zhiwen	Ye
DIS e ⁻	68	78.5	63	71.1		
π^0	1024	1007	43	59		
π^-	537	558	4.0	4.1		
All hadrons no e-	2724	1971	62	90		

Rate (kHz)	LAEC	
	Zhiwen	Ye
DIS e ⁻	4.5	2.3(2.4)
π^0	15.3	6.4(8.5)
π^-	6.4	1.5(3.1)
All hadrons no e-	38	7.3(10.7)