

SoLID-SIDIS Rate Update

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FAEC Trigger (Untrigger) Rate (KHz)		
	Zhiwen's (GEMC1+geant4.9.5)	Zhihong (GEMC2+geant4.9.6)
eDIS	73.08 (93.4)	73.08 (96.37)
e+/- (pi0)	104 (1.63e4)	92.39 (1.22e4)
gamma (pi0)	2.24e3 (3.81e5)	1.84e3 (1.06e5)
pi+	1.37e3 (1.49e4)	1.17e3 (1.41e4)
pi-	1.25e3 (1.34e4)	1.08e3 (1.26e4)
p	273 (4.65e3)	764.43 (9.68e3)

FAEC Single Trigger:

- 1, eDIS at FAEC (T/u/d): 73.08 KHz
- 2, e at LGC (T/u/d): 27.15 KHz
- 3, e at FAEC (T/u/d): 91.23 - 27.15 (from LGC) = 64.08/40=1.60KHz, where 40 is for 3 sectors
- 4, Photon t FAEC (T/u/d): (1.84e3)/20/40 = 2.30 KH, where 20 is for photon-rejection from SPD+MRPC
- 5, Hadron random coincident: 3.01e3/2/40 = 37.63 KHz
- 6, Hadron Correlation coincident: 3.01e3/2/ 55 = 27.36 KHz

Rate = 73.08 + 0.4 * (27.15+1.60+2.30+37.63+27.36) = 111.50 KHz, where 0.4 is the norm. factor from Wiser code.

(Zhiwen's July value, Rate = 129.7 KHz)

LAEC: Single Trigger:

- 1, eDIS at LAEC (T/u/d): 10.21 KHz
- 2, e at LAEC (T/u/d): 0.17 KHz
- 3, photon at LAEC (T/u/d): 40.19 / 10 = 4.0 KHz, where 10 is the photon-rejection factor from LASPD
- 4, Hadron: 30.63 KHz

Rate = 10.21 + 0.4 * (0.17 + 4.0 + 30.63) = 24.13 KHz

(Zhiwen's July value, Rate = 25.5 KHz)

Coincidence Trigger:

- 1, Random Coincidence Rate:
 - (a) Electron-Like Trigger: 108.92 (FAEC) + 24.13 (LAEC) = 133.05 KHz
 - (b) Charged Particle Trigger: 14e3KHz (obtained from Zhiwen's MIP trigger values)

$R = 133.05 * 14e3 * 30ns = 55.88$ KHz (compared with Zhiwen's 65.2 KHz)

- 2, SIDIS Physics Rate ~ 6 KHz from the newest update by Zhiwen in August

Rate = 55.88 + 6 = 61.88 KHz

(compared with Zhiwen's 69.2 KHz)

The Detailed rates from different sources in tables. Values were extracted by the Event-by-Event Method. Unless specified, these values were based on the simulation data using GEMC2+GEANT4.9.6.

			LASPD	LAEC	LGC	FAEC
eDIS	e (kHz) Cut(No-Cut)	target	3.97 (18.52)	3.99 (16.40)	70.98 (105.32)	70.98 (93.46)
		up	3.86 (13.78)	3.86 (12.25)	0.16 (0.85)	0.16 (0.24)
		down	2.34 (13.79)	2.36 (12.32)	1.94 (4.75)	1.94 (2.67)
		total	10.17 (46.09)	10.21 (40.97)	73.08 (110.92)	73.08 (96.37)

EM_Norm_Fact = $1.5/1.6 \times 1e14/1e8 = 0.929e6$ Hz = 929KHz, so we need more statistic to see the actual rate

			LASPD	LAEC	LGC	FAEC
EM	g (kHz) Cut(No-Cut)	target	0 (2.91e7)	0 (2.85e7)	929.31 (2.27e7)	929.31 (1.77e7)
		e (kHz) Cut (No-Cut)	target	0 (1.90e5)	0 (3.24e5)	1.88e3 (2.98e5)

GEMC2+Geant4.9.6

			LASPD	LAEC	LGC	FAEC
pi0	g (kHz) Cut(No-Cut)	target	13.78 (7.66e4)	13.80 (7.60e4)	1.69e3 (6.19e4)	1.68e3 (5.41e4)
		up	17.18 (4.24e4)	17.18 (4.15e4)	0.81 (2.66e4)	0.81 (2.24e4)
		down	9.16 (5.61e4)	9.21 (5.62e4)	47.20 (3.40e4)	47.66 (2.57e4)
		total	40.12 (17.51e4)	40.19 (17.37e4)	1.74e4 (12.25e4)	1.68e3 (10.22e4)
	e (kHz) Cut (No-Cut)	target	0.02 (3.04e3)	0.03 (4.26e3)	19.90 (5.19e3)	88.20 (7.43e3)
		up	0.11 (1.92e3)	0.11 (2.68e3)	0 (2.12e3)	0.14 (2.53e3)
		down	0.03 (1.89e3)	0.03 (2.71e3)	2.54 (2.97e3)	4.05 (2.27e3)
		total	0.16 (6.86e3)	0.17 (9.65e3)	22.44 (10.28e3)	92.39 (12.23e3)

GEMC2+Geant4.9.5

			LASPD	LAEC	LGC	FAEC
pi0	g (kHz) Cut(No-Cut)	target	14.81 (7.64e4)	14.86 (7.58e4)	1.74e3 (6.20e4)	1.73e3 (5.41e4)
		up	9.44 (5.72e4)	9.53 (5.72e4)	51.11 (3.47e4)	51.15 (2.64e4)
		down	9.25 (5.60e4)	9.34 (5.61e4)	50.09 (3.40e4)	50.13 (2.58e4)
		total	33.50 (18.96e4)	33.73 (18.91e4)	1.84e3 (13.07e4)	1.84e3 (10.63e4)
	e (kHz) Cut (No-Cut)	target	0.06 (3.00e3)	0.09 (4.26e3)	21.90 (5.16e3)	84.70 (7.34e3)
		up	0.01 (1.92e3)	0.01 (2.76e3)	2.66 (3.00e3)	3.30 (2.30e3)
		down	0.01 (1.88e3)	0.01 (2.70e3)	2.59 (2.94e3)	3.23 (2.25e3)
		total	0.07 (6.80e3)	0.11 (9.72e3)	27.15 (11.10e3)	91.23 (11.89e3)

			LASPD	LAEC	LGC	FAEC
pi+	g (kHz) Cut(No-Cut)	target	0.09 (2.18e4)	0.09 (2.16e4)	6.02 (2.03e4)	11.04 (1.76e4)
		up	0.24 (1.18e4)	0.24 (1.16e4)	3.63 (1.09e4)	6.21 (8.45e3)
		down	0 (1.52e4)	0 (1.51e4)	3.81 (1.44e4)	5.94 (1.03e4)
		total	0.33 (4.68e4)	0.33 (4.83e4)	13.46 (4.56e4)	23.19 (11.24e4)
	e (kHz) Cut (No-Cut)	target	0 (1.51e3)	0 (2.04e3)	0.47 (2.23e3)	0.47 (2.09e3)
		up	0 (0.78e3)	0 (1.04e3)	0.32 (0.97e3)	0.60 (0.71e3)
		down	0 (1.19e3)	0 (1.59e3)	0 (1.27e3)	0 (0.86e3)
		total	0 (3.48e3)	0 (4.67e3)	0.79 (4.47e3)	1.07 (3.66e3)
	Pi+ (kHz) Cut (No-Cut)	target	3.31 (1.69e4)	3.32 (1.57e4)	777.23 (1.69e4)	780.55 (9.43e3)
		up	3.74 (8.36e3)	3.75 (7.57e3)	132.76 (3.43e3)	137.77 (1.77e3)
		down	1.82 (1.36e4)	1.83 (1.28e4)	250.46 (5.92e3)	254.85 (2.93e3)
		total	8.87 (3.89e4)	8.90 (3.61e4)	1.16e4(2.62e4)	1.17e3 (1.41e4)

			LASPD	LAEC	LGC	FAEC
pi-	g (kHz) Cut(No-Cut)	target	0.03 (1.94e4)	0.03 (1.93e4)	3.56 (1.86e4)	7.80 (1.61e4)
		up	0.13 (1.36e4)	0.13 (1.35e4)	2.77 (1.25e4)	3.55 (9.56e3)
		down	0 (1.73e4)	0 (1.71e4)	1.75 (1.64e4)	2.90 (1.19e4)
		total	0.16 (5.03e4)	0.16 (4.99e4)	8.08 (4.75e4)	14.25 (12.26e4)
	e (kHz) Cut (No-Cut)	target	0 (1.24e3)	0 (1.69e3)	0 (1.88e3)	0.01 (1.78e3)
		up	0 (0.80e3)	0 (1.07e3)	0.46 (1.00e3)	0.73 (0.73e3)
		down	0 (1.22e3)	0 (1.60e3)	0 (1.31)	0.15 (0.89e3)
		total	0 (3.26e3)	0 (4.36e3)	0.46 (3.19e3)	0.89 (3.40e3)
	Pi- (kHz) Cut (No-Cut)	target	3.44 (1.34e4)	3.44 (1.25e4)	687.04 (1.37e4)	691.00 (7.89e3)
		up	3.87 (8.52e3)	3.88 (7.70e3)	133.74 (3.45e3)	138.62 (1.78e3)
		down	2.01 (1.38e4)	2.02 (1.30e4)	250.30 (5.87e3)	254.55 (2.93e3)
		total	9.32 (3.57e4)	9.34 (3.32e4)	1.07e3(10.69e3)	1.08e3 (12.60e3)

			LASPD	LAEC	LGC	FAEC
P	g (kHz) Cut(No-Cut)	target	0.01 (3.94e3)	0.01 (3.91e3)	1.68 (5.18e3)	3.09 (5.81e3)
		up	0 (3.04e3)	0.01 (3.00e3)	0.56 (3.61e3)	1.46 (3.31e3)
		down	0 (2.99e3)	0 (2.95e3)	1.25 (4.22e3)	1.79 (3.70e3)
		total	0 (9.97e3)	0.02 (9.86e3)	3.49 (13.01e3)	6.24 (12.82e3)
	e (kHz) Cut (No-Cut)	target	0 (0.23e3)	0 (0.34e3)	0 (0.52e3)	0 (0.69e3)
		up	0 (0.17e3)	0 (0.25e3)	0 (0.26e3)	0 (0.27e3)
		down	0 (0.15e3)	0 (0.23e3)	0 (0.28e3)	0.05 (0.29e3)
		total	0 (10.37e3)	0 (0.82e3)	0 (1.06e3)	0.05 (1.25e3)
	p (kHz) Cut (No-Cut)	target	4.80 (3.53e3)	4.82 (3.32e3)	496.45 (6.83e3)	503.12 (6.11e3)
		up	5.17 (2.63e3)	5.18 (2.46e3)	96.01 (1.81e3)	103.03 (1.60e3)
		down	2.37 (2.56e3)	2.39 (2.41e3)	150.99 (2.00e3)	158.28 (1.97e3)
		total	12.34 (8.72e3)	12.39 (8.09e3)	743.45 (10.64e3)	764.43 (9.68e3)

