


Beam results
Robustness and Timing
Performance

Vadim Rusu

Pulsar crate status

- As of Jan26
 - hardware and firmware are stable
 - continuous monitoring of the hardware (**PulsarMon** check automatically every run)
 - in beam for every run ever since ($\sim 20\text{pb}^{-1}$)
 - **we see no errors**
 - › PulsarMon gets a full capture of the system every L2A
 - › The decision node validates the internal consistency of the data every L1A
 - PulsarMon log files should have zero events (0Bytes file size)
 - only the summary message from PulsarMon: “No errors found”



```
-rw-r--r-- 1 vrusu cdf 43 Jan 27 19:57 ErrorLog_SVT_PULSAR_192992.log
-rw-r--r-- 1 vrusu cdf 43 Jan 27 20:02 ErrorLog_MUON_PULSAR_192992.log
-rw-r--r-- 1 vrusu cdf 43 Jan 27 20:02 ErrorLog_LEVEL2_PULSAR_MERGER_SLINK_192992.log
-rw-r--r-- 1 vrusu cdf 43 Jan 27 20:02 ErrorLog_LEVEL2_PULSAR_MERGER_CES_192992.log
-rw-r--r-- 1 vrusu cdf 43 Jan 27 20:02 ErrorLog_CLUSTER_PULSAR_192992.log
-rw-r--r-- 1 vrusu cdf 39 Jan 27 20:02 ErrorLog_CES_2_192992.log
-rw-r--r-- 1 vrusu cdf 39 Jan 27 20:02 ErrorLog_CES_1_192992.log
-rw-r--r-- 1 vrusu cdf 39 Jan 27 20:02 ErrorLog_CES_0_192992.log
```

very sophisticated tool:
“ls -lrt”

Pulsar System Status

- **Parasitic running**
 - › The crate and the control node in partition
 - › The control node receives instructions from RC and passes them to the decision node
 - › The CPU makes decisions which are recorded together with the TL2D on the L2TS board as part of TP2D bank
- **Symbiotic running**
 - › TS listens for Pulsar trigger decisions (Pulsar actively participates in the TS handshake)
 - › In order to have zero interference on data quality, the decision bit is forced to “Reject”
- Since Feb 02 Pulsar in symbiotic running
- More than 1B L1A passed through the system so far in symbiotic mode
- All sub-systems are routinely running
 - › PulsarMon continuously checks a fraction of data
 - › Offline validation is done by expert

Trigger Decision Comparison (between Alpha and Pulsar)

PulsarMon provides online feedback

Trigger name	Occ.
L2_CEM12_ISO_&_SUMET20_&_TWO_JET3_ET	3
L2_CEM12_ISO_&_TRK2_D120_v-3	3
L2_CEM12_ISO_DPS_v-5	6
L2_CEM4_PT4_CES3_PS5_v-1	1
L2_CEM8_PT8_CES3_DPS_v-2	1
L2_EM10_ISO_PS1600_v-2	54
L2_EM12_ISO_&_CMX1.5_PT2_CSX_v-1	2
L2_EM21_ISO_PASS4_v-1	24
L2_TEST_PEM12_ISO_PASS4_L1_EM8_&_MET	19
L2_TRK2_D120_&_CEM4_PT4_CES3_2DPHI90	1
L2_TWO_CEM4_PT4_CES3_v-1	1
L2_TWO_EM10_ISO_v-2	2

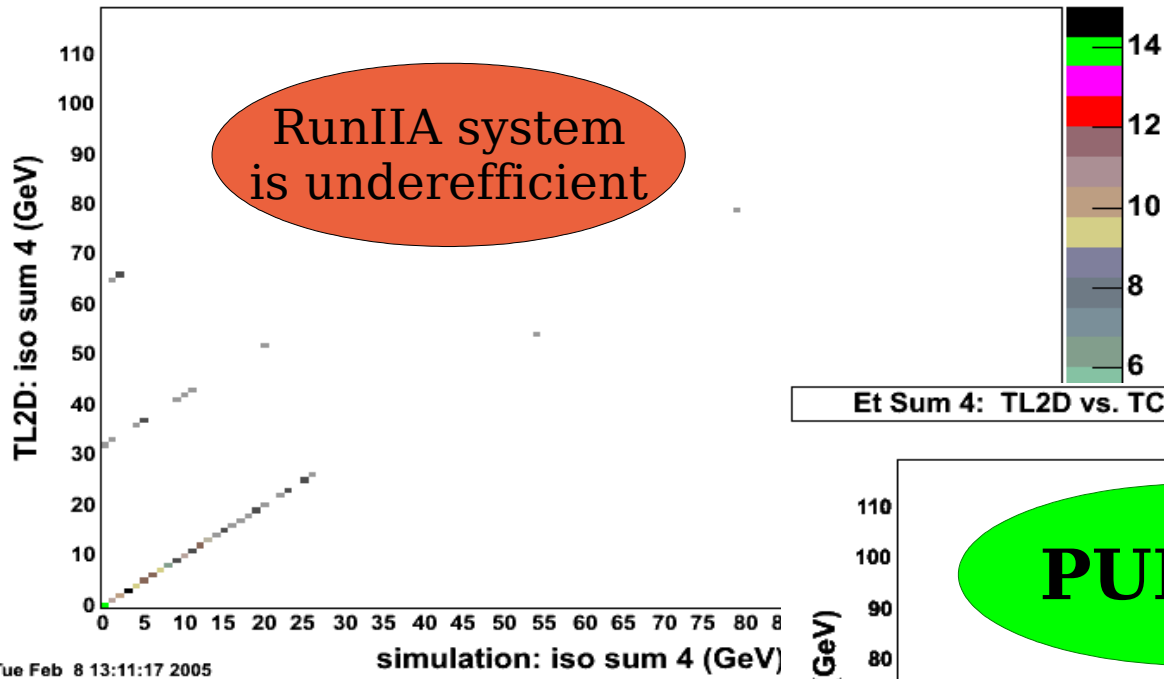
CES and ISO
triggers only.

- CES (see Chris's talk) due to problems on the RunIIa RECES boards
- ISO – next slide

This is an example from PulsarMon error log.
Only triggers that disagree are printed here

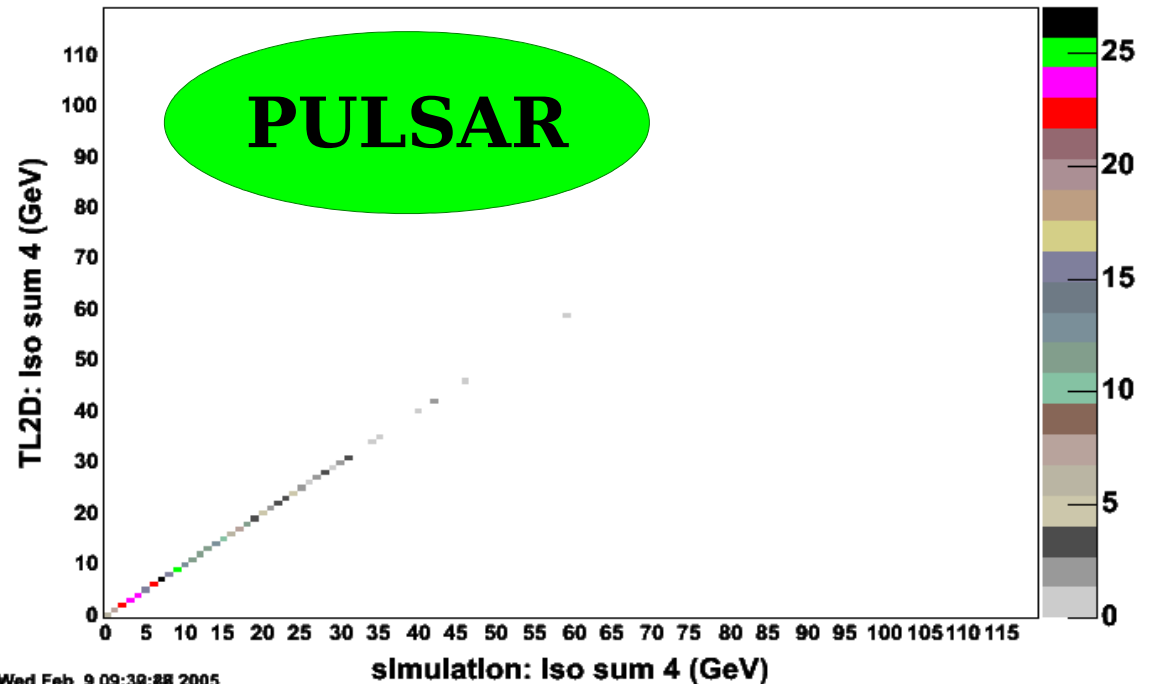
ISOLIST Trigger Bits Disagreement

Et Sum 4: TL2D vs. TC2D



comparison between data and simulation for EtSum4

Et Sum 4: TL2D vs. TC2D



- This is one example of the Pulsar system success.

Overall System Status

like a



- Robust hardware, firmware, software in place
- Definitive functional improvements (ISO, CES)
- Monitoring tools keep track of system performance and reliability
- We started integrating weeks and tens of pb with the Pulsar system fully running
- We already had a successful beam test with Pulsar driving CDF at low luminosity (results to follow)

First Pulsar Driving Beam Test

- Low luminosity ($\sim 20E30$)
- No silicon involved
- Allowed for detailed comparison between the Pulsar system and the Alpha system
- Checked the stability of the system – no problems

Pulsar Scaler Mon

(comparison between the Pulsar and the Alpha FredLive rates)

PULSAR

ALPHA

Freeze Display!												
Help												
MassPrescale												
ClearMassPrescale												
Trigger Rate Monitor 17:34:59		Dynamic Prescaling Disabled		Last Message: 17:34:59 HALTED								
Partition: 0		Run Number: 193385 [32]		Runtime: 925.3s		Select Run: <input type="text"/>						
Trigger Type: PHYSICS_3_00 [2,566,523]		Event Number: 42430		Livetime: 736.3s								
General	PreFred	Fred	Fred Prescaled	Fred Live	TS	L2 (0-63)	L2 (64-127)	L3 (0-63)	L3 (64-127)	L3 (128-191)	L3 (192-255)	DynamicPrescale
n	Trigger	Count	<Rate>	nb	Rate (dog scale)	n	Trigger	Count	<Rate>	nb	Rate (dog scale)	
0	LI_TWO_GAP_&EM4 [1]	10,268	12.8	799.9	<div style="width: 100%;"></div>	32	LI_TWO_CMU15_PT15 [4]	12,901	16.1	1,005.0	<div style="width: 100%;"></div>	
1	LI_GAP_EAST_&JET10_PS100 [1]	138	0.2	10.7	<div style="width: 100%;"></div>	33	LI_TWO_TRK10_DPH20_DPS [1]	7,267	9.1	566.1	<div style="width: 100%;"></div>	
2	LI_TWO_GAP_&CMU15_PT15 [1]	5,094	6.4	396.8	<div style="width: 100%;"></div>	34	LI_TRK4_P50 [2]	0	0.0	0.0	<div style="width: 100%;"></div>	
3	LI_RP_&JET10_P550 [1]	298	0.4	23.2	<div style="width: 100%;"></div>	35	LI_TRK10_PS250 [1]	1,294	1.6	100.8	<div style="width: 100%;"></div>	
4	LI_JET10 [1]	343,523	428.6	26,759.5	<div style="width: 100%;"></div>	36	LI_TWO_CEM4_PT4 [2]	12,422	15.5	967.6	<div style="width: 100%;"></div>	
5	LI_GAP_WEST_&JET10_PS100 [1]	158	0.2	12.3	<div style="width: 100%;"></div>	37	LI_TWO_TRK2_PS200 [4]	73,051	91.2	5,690.5	<div style="width: 100%;"></div>	
6	LI_JET10_&SUMET90 [1]	9,596	12.0	747.5	<div style="width: 100%;"></div>	38	LI_CEM8_PT8 [4]	18,185	22.7	1,416.6	<div style="width: 100%;"></div>	
7	LI_CEM4_PT4_&CMU15_PT15 [1]	10,124	12.6	788.6	<div style="width: 100%;"></div>	39		0	0.0	0.0	<div style="width: 100%;"></div>	
8	LI_CEM4_PT4_&CMX15_PT2_CSX [1]	1,360	1.7	105.9	<div style="width: 100%;"></div>	40	LI_BMU10_ISU_PT11 [1]	904	1.1	70.4	<div style="width: 100%;"></div>	
9	LI_CEM4_PT4_&TRK2_DPH100 [2]	165,348	206.3	12,880.2	<div style="width: 100%;"></div>	41	LI_TWO_TRK25_OPPD_DPH135_S_	742,121	926.0	57,809.3	<div style="width: 100%;"></div>	
10	LI_EM8_&CMU15_PT15 [2]	7,071	8.8	550.8	<div style="width: 100%;"></div>	42	LI_CMUP6_PT4 [2]	24,965	31.2	1,944.7	<div style="width: 100%;"></div>	
11	LI_CEM4_PT4_PS250 [1]	1,189	1.5	92.6	<div style="width: 100%;"></div>	43	LI_CMX6_PT8_CSX [2]	1,380	1.7	107.5	<div style="width: 100%;"></div>	
12	LI_CMU15_PT15_&CMX15_PT2_C_	4,651	5.8	362.3	<div style="width: 100%;"></div>	44	LI_TOF20_PT0 [1]	18	0.0	1.4	<div style="width: 100%;"></div>	
13	LI_TWO_TRK2_DPH90_&CMU15_	329,396	411.0	25,659.1	<div style="width: 100%;"></div>	45	LI_COT_SPKNE [1]	0	0.0	0.0	<div style="width: 100%;"></div>	
14	LI_EM8_&CMX15_PT2_CSX [3]	927	1.2	72.2	<div style="width: 100%;"></div>	46	LI_MET25 [1]	4,206	5.2	327.6	<div style="width: 100%;"></div>	
15	LI_EM8 [2]	200,439	250.1	15,613.7	<div style="width: 100%;"></div>	47	LI_TEN_TRK2 [1]	5,219	6.5	406.5	<div style="width: 100%;"></div>	
16	LI_GAP_EAST_&JETS [1]	162,576	202.9	12,664.2	<div style="width: 100%;"></div>	48		0	0.0	0.0	<div style="width: 100%;"></div>	
17	LI_GAP_EAST_&JETS_&RP [2]	5,763	7.2	448.9	<div style="width: 100%;"></div>	49	LI_RP_&JETS_PS250 [1]	809	1.0	63.0	<div style="width: 100%;"></div>	
18	LI_GAP_WEST_&JETS [1]	187,748	234.3	14,625.1	<div style="width: 100%;"></div>	50		0	0.0	0.0	<div style="width: 100%;"></div>	
19	LI_JETS_PS50 [1]	91,212	113.8	7,105.2	<div style="width: 100%;"></div>	51	LI_TWO_CEM2_PT2_OPPD_150PHL	139,698	174.3	10,882.1	<div style="width: 100%;"></div>	
20		0	0.0	0.0	<div style="width: 100%;"></div>	52		0	0.0	0.0	<div style="width: 100%;"></div>	
21	LI_RP_PS150K [1]	289	0.4	22.5	<div style="width: 100%;"></div>	53	LI_MB_CLC_PS10K [2]	41,375	51.6	3,223.0	<div style="width: 100%;"></div>	
22	LI_TWO_GAP_&JETS [1]	22,217	27.7	1,730.6	<div style="width: 100%;"></div>	54		0	0.0	0.0	<div style="width: 100%;"></div>	
23	LI_MB_XING_PS1M [2]	1,255	1.6	97.8	<div style="width: 100%;"></div>	55	LI_TOF_14_MIP_&CLC_PS10K [1]	23,150	28.9	1,803.3	<div style="width: 100%;"></div>	
24	LI_EM8_&MET15 [1]	12,017	15.0	936.1	<div style="width: 100%;"></div>	56	LI_TWO_TRK2_OPPD_DPH135_SU_	2,405,942	3,002.1	187,416.6	<div style="width: 100%;"></div>	
25	LI_TWO_TRK2_DPH90_&CMX15_	47,375	59.1	3,690.4	<div style="width: 100%;"></div>	57	LI_TWO_TRK2_DPH90_UPS [1]	0	0.0	0.0	<div style="width: 100%;"></div>	
26	LI_TRK55_TRK25_&CJET5 [2]	374,756	467.6	29,192.5	<div style="width: 100%;"></div>	58	LI_BMU10_ISUR_TSUO_&CLC [1]	13,208	16.5	1,028.9	<div style="width: 100%;"></div>	
27	LI_TWO_TRK2_&TWO_CJET5 [3]	158,822	198.2	12,371.8	<div style="width: 100%;"></div>	59	LI_TWO_TRK6_DPH30_&TWO_CL_	16,742	20.9	1,304.2	<div style="width: 100%;"></div>	
28		0	0.0	0.0	<div style="width: 100%;"></div>	60		0	0.0	0.0	<div style="width: 100%;"></div>	
29	LI_MET15_&TWO_TRK2 [2]	44,242	55.2	3,446.3	<div style="width: 100%;"></div>	61		0	0.0	0.0	<div style="width: 100%;"></div>	
30		0	0.0	0.0	<div style="width: 100%;"></div>	62		0	0.0	0.0	<div style="width: 100%;"></div>	
31		0	0.0	0.0	<div style="width: 100%;"></div>	63		0	0.0	0.0	<div style="width: 100%;"></div>	

Freeze Display!												
Help												
MassPrescale												
ClearMassPrescale												
Trigger Rate Monitor 17:35:43		Dynamic Prescaling Enabled		Last Message: 17:35:43 HALTED								
Partition: 0		Run Number: 193385 [32]		Runtime: 925.3s		Select Run: <input type="text"/>						
Trigger Type: PHYSICS_3_00 [2,566,523]		Event Number: 42430		Livetime: 736.3s								
General	PreFred	Fred	Fred Prescaled	Fred Live	TS	L2 (0-63)	L2 (64-127)	L3 (0-63)	L3 (64-127)	L3 (128-191)	L3 (192-255)	DynamicPrescale
n	Trigger	Count	<Rate>	nb	Rate (dog scale)	n	Trigger	Count	<Rate>	nb	Rate (dog scale)	
0	LI_TWO_GAP_&EM4 [1]	10,270	12.9	807.0	<div style="width: 100%;"></div>	32	LI_TWO_CMU15_PT15 [4]	12,904	16.2	1,014.0	<div style="width: 100%;"></div>	
1	LI_GAP_EAST_&JET10_PS100 [1]	138	0.2	10.8	<div style="width: 100%;"></div>	33	LI_TWO_TRK10_DPH20_DPS [1]	7,267	9.1	571.0	<div style="width: 100%;"></div>	
2	LI_TWO_GAP_&CMU15_PT15 [1]	5,095	6.4	400.4	<div style="width: 100%;"></div>	34	LI_TRK4_P50 [2]	0	0.0	0.0	<div style="width: 100%;"></div>	
3	LI_RP_&JET10_P550 [1]	298	0.4	23.4	<div style="width: 100%;"></div>	35	LI_TRK10_PS250 [1]	1,295	1.6	101.8	<div style="width: 100%;"></div>	
4	LI_JET10 [1]	343,631	431.9	27,002.9	<div style="width: 100%;"></div>	36	LI_TWO_CEM4_PT4 [2]	12,424	15.6	976.3	<div style="width: 100%;"></div>	
5	LI_GAP_WEST_&JET10_PS100 [1]	158	0.2	12.4	<div style="width: 100%;"></div>	37	LI_TWO_TRK2_PS200 [4]	73,077	91.8	5,742.5	<div style="width: 100%;"></div>	
6	LI_JET10_&SUMET90 [1]	9,597	12.1	754.1	<div style="width: 100%;"></div>	38	LI_CEM8_PT8 [4]	18,189	22.9	1,429.3	<div style="width: 100%;"></div>	
7	LI_CEM4_PT4_&CMU15_PT15 [1]	10,127	12.7	795.8	<div style="width: 100%;"></div>	39		0	0.0	0.0	<div style="width: 100%;"></div>	
8	LI_CEM4_PT4_&CMX15_PT2_CSX [1]	1,361	1.7	106.9	<div style="width: 100%;"></div>	40	LI_BMU10_ISU_PT11 [1]	904	1.1	71.0	<div style="width: 100%;"></div>	
9	LI_CEM4_PT4_&TRK2_DPH100 [2]	165,395	207.9	12,996.9	<div style="width: 100%;"></div>	41	LI_TWO_TRK25_OPPD_DPH135_S_	742,371	933.0	58,336.4	<div style="width: 100%;"></div>	
10	LI_EM8_&CMU15_PT15 [2]	7,073	8.9	555.8	<div style="width: 100%;"></div>	42	LI_CMUP6_PT4 [2]	24,975	31.4	1,962.6	<div style="width: 100%;"></div>	
11	LI_CEM4_PT4_PS250 [1]	1,189	1.5	93.4	<div style="width: 100%;"></div>	43	LI_CMX6_PT8_CSX [2]	1,380	1.7	108.4	<div style="width: 100%;"></div>	
12	LI_CMU15_PT15_&CMX15_PT2_C_	4,652	5.8	365.6	<div style="width: 100%;"></div>	44	LI_TOF20_PT0 [1]	18	0.0	1.4	<div style="width: 100%;"></div>	
13	LI_TWO_TRK2_DPH90_&CMU15_	329,487	414.1	25,891.5	<div style="width: 100%;"></div>	45	LI_COT_SPKNE [1]	0	0.0	0.0	<div style="width: 100%;"></div>	
14	LI_EM8_&CMX15_PT2_CSX [3]	927	1.2	72.8	<div style="width: 100%;"></div>	46	LI_MET25 [1]	4,208	5.3	330.7	<div style="width: 100%;"></div>	
15	LI_EM8 [2]	200,512	252.0	15,756.5	<div style="width: 100%;"></div>	47	LI_TEN_TRK2 [1]	5,220	6.6	410.2	<div style="width: 100%;"></div>	
16	LI_GAP_EAST_&JETS [1]	162,614	204.4	12,778.4	<div style="width: 100%;"></div>	48		0	0.0	0.0	<div style="width: 100%;"></div>	
17	LI_GAP_EAST_&JETS_&RP [2]	5,766	7.2	453.1	<div style="width: 100%;"></div>	49	LI_RP_&JETS_PS250 [1]	809	1.0	63.6	<div style="width: 100%;"></div>	
18	LI_GAP_WEST_&JETS [1]	187,810	236.0	14,758.3	<div style="width: 100%;"></div>	50		0	0.0	0.0	<div style="width: 100%;"></div>	
19	LI_JETS_PS50 [1]	91,242	114.7	7,169.9	<div style="width: 100%;"></div>	51	LI_TWO_CEM2_PT2_OPPD_150PHL	139,702	175.6	10,977.9	<div style="width: 100%;"></div>	
20		0	0.0	0.0	<div style="width: 100%;"></div>	52		0	0.0	0.0	<div style="width: 100%;"></div>	
21	LI_RP_PS150K [1]	290	0.4	22.8	<div style="width: 100%;"></div>	53	LI_MB_CLC_PS10K [2]	41,390	52.0	3,252.3	<div style="width: 100%;"></div>	
22	LI_TWO_GAP_&JETS [1]	22,220	27.9	1,746.1	<div style="width: 100%;"></div>	54		0	0.0	0.0	<div style="width: 100%;"></div>	
23	LI_MB_XING_PS1M [2]	1,256	1.6	98.7	<div style="width: 100%;"></div>	55	LI_TOF_14_MIP_&CLC_PS10K [1]	23,158	29.1	1,819.8	<div style="width: 100%;"></div>	
24	LI_EM8_&MET15 [1]	12,020	15.1	944.5	<div style="width: 100%;"></div>	56	LI_TWO_TRK2_OPPD_DPH135_SU_	2,405,993	3,024.0	189,065.7	<div style="width: 100%;"></div>	
25	LI_TWO_TRK2_DPH90_&CMX15_	47,393	59.6	3,724.2	<div style="width: 100%;"></div>	57	LI_TWO_TRK2_DPH90_UPS [1]	0	0.0	0.0	<div style="width: 100%;"></div>	
26	LI_TRK55_TRK25_&CJET5 [2]	374,878	471.2	29,458.4	<div style="width: 100%;"></div>	58	LI_BMU10_ISUR_TSUO_&CLC [1]	13,209	16.6	1,038.0	<div style="width: 100%;"></div>	
27	LI_TWO_TRK2_&TWO_CJET5 [3]	158,875	199.7	12,484.6	<div style="width: 100%;"></div>	59	LI_TWO_TRK6_DPH30_&TWO_CL_	16,747	21.0	1,316.0	<div style="width: 100%;"></div>	
28		0	0.0	0.0	<div style="width: 100%;"></div>	60		0	0.0	0.0	<div style="width: 100%;"></div>	
29	LI_MET15_&TWO_TRK2 [2]	44,259	55.6	3,477.9	<div style="width: 100%;"></div>	61		0	0.0	0.0	<div style="width: 100%;"></div>	
30		0	0.0	0.0	<div style="width: 100%;"></div>	62		0	0.0	0.0	<div style="width: 100%;"></div>	
31		0	0.0	0.0	<div style="width: 100%;"></div>	63		0	0.0	0.0	<div style="width: 100%;"></div>	

Pulsar Scaler Mon

(detailed comparison of the first 32 L2bits)

PULSAR

ALPHA

Freeze Display! Help MassPrescale ClearMassPrescale

Trigger Rate Monitor 17:37:45

Dynamic Prescaling Disabled

Last Message: 17:37:45 HALTED

Freeze Display! Help MassPrescale ClearMassPrescale

Trigger Rate Monitor 17:37:26

Dynamic Prescaling Enabled

Last Message: 17:37:26 HALTED

Partition: 0 Run Number: 193385 [35] Runtime: 985.6s Select Run: [v]
 Trigger Type: PHYSICS_3_00 [2,566,523] Event Number: 46208 Livetime: 796.4s

Partition: 0 Run Number: 193385 [35] Runtime: 985.6s Select Run: [v]
 Trigger Type: PHYSICS_3_00 [2,566,523] Event Number: 46208 Livetime: 796.4s

General	PreFred	Fred	Fred Prescaled	Fred Live	TS	L2 (0-63)	L2 (64-127)	L3 (0-63)	L3 (64-127)	L3 (128-191)	L3 (192-255)	DynamicPrescale
n	Trigger	Raw	Prescaled	<Rate> Hz	nb	n	Trigger	Raw	Prescaled	<Rate> Hz	nb	
0	L2_AUTO_LL_CMN6_PT8_CSX [1]	1,449	1,449	1.5	105.8	32	L2_CJET15_PS24 [2]	4,783	199	0.2	14.5	
1	L2_AUTO_LL_COT_SPKNE [1]	0	0	0.0	0.0	33	L2_CMU15_PT15_&_CMX15_PT2_D...	837	837	0.8	61.1	
2	L2_AUTO_LL_GAP_EAST_&_JET10 [1]	145	145	0.1	10.6	34	L2_CMU6_PT4_&_CMX15_PT4_CSX [..	108	108	0.1	7.9	
3	L2_AUTO_LL_GAP_WEST_&_JET10 [1]	165	165	0.2	12.0	35	L2_CMU15_PT3_&_CMU15_PT15 [..	1,547	1,547	1.6	113.0	
4	L2_AUTO_LL_MB_XING [2]	1,315	1,315	1.3	96.0	36	L2_CMU15_PT3_&_CMX15_PT2_CS...	175	175	0.2	12.8	
5	L2_AUTO_LL_RP [3]	302	302	0.3	22.0	37	L2_CMU6_PT4_&_TRK2_D120_DPH...	0	0	0.0	0.0	
6	L2_AUTO_LL_TOF20_PT0 [1]	19	19	0.0	1.4	38	L2_CMU6_PT4_SVT_&_TRK2_D120...	0	0	0.0	0.0	
7	L2_AUTO_LL_TRK4_P50 [1]	0	0	0.0	0.0	39	L2_CMU6_PT8 [1]	2,264	2,264	2.3	165.3	
8	L2_AUTO_LL_TWO_GAP_&_CMU15_PT...	5,352	5,352	5.4	390.8	40	L2_CMN6_PT10 [1]	942	942	1.0	68.8	
9	L2_BJET15_D120 [3]	0	0	0.0	0.0	41	L2_DPS_LL_CMU6_PT4 [2]	26,262	525	0.5	38.3	
10	L2_B_CHARM_HIGHTP [4]	0	0	0.0	0.0	42	L2_EM10_ISO_PS1600 [2]	44,778	27	0.0	2.0	
11	L2_B_CHARM_LL_DPS [3]	0	0	0.0	0.0	43	L2_EM12_ISO_&_CMU15_PT3 [1]	74	74	0.1	5.4	
12	L2_B_CHARM_LOWPT_LL_CMU15_PT...	0	0	0.0	0.0	44	L2_EM12_ISO_&_CMX15_PT2_CSX [1]	89	89	0.1	6.5	
13	L2_B_CHARM_LOWPT_LL_CMX15_PT2...	0	0	0.0	0.0	45	L2_EM21_ISO_PASS54 [1]	3,057	3,057	3.1	223.2	
14	L2_B_CHARM_LOWPT_LL_DPS [3]	0	0	0.0	0.0	46	L2_EM40 [2]	767	767	0.8	56.0	
15	L2_B_CHARM_PHI [1]	0	0	0.0	0.0	47	L2_EM70 [4]	364	364	0.4	26.6	
16	L2_B_PIP_HIGHTP [4]	0	0	0.0	0.0	48	L2_ERROR [2]	0	0	0.0	0.0	
17	L2_B_PIP_LL_DPS [3]	0	0	0.0	0.0	49	L2_FOUR_JET15_SUMET125 [1]	173	173	0.2	12.6	
18	L2_CEM12_ISO_&_SUMET20_&_TWO_...	1,139	1,139	1.2	83.2	50	L2_INCLUSIVE_NOTRACK_1HZ [1]	1,827,790	761	0.8	55.6	
19	L2_CEM12_ISO_&_TRK2_D120 [3]	0	0	0.0	0.0	51	L2_INCLUSIVE_TRACK_1HZ [1]	2,892,031	761	0.8	55.6	
20	L2_CEM12_ISO_DPS [5]	5,042	100	0.1	7.3	52	L2_JET15_PS25 [1]	11,780	471	0.5	34.4	
21	L2_CEM16_PT8 [3]	2,235	2,235	2.3	163.2	53	L2_JET40 [3]	290	290	0.3	21.2	
22	L2_CEM20_LL_MET15 [1]	1,691	1,691	1.7	123.5	54	L2_JET60_PS8 [3]	2,325	290	0.3	21.2	
23	L2_CEM4_PT4_CES3_&_CMU6_PT4 [1]	946	946	1.0	69.1	55	L2_JET90 [3]	562	562	0.6	41.0	
24	L2_CEM4_PT4_CES3_&_CMX15_PT4_...	182	182	0.2	13.3	56	L2_JPS_TWO_CEM2 [3]	1,084	1,084	1.1	79.1	
25	L2_CEM4_PT4_CES3_&_PEM8 [1]	1,025	1,025	1.0	74.8	57	L2_MET35 [1]	1,071	1,071	1.1	78.2	
26	L2_CEM4_PT4_CES3_P55 [1]	362	72	0.1	5.3	58	L2_PEM20_LL_ENR_&_MET15 [2]	1,040	1,040	1.1	75.9	
27	L2_CEM8_PT8_CES3_&_TRK5_DPH10...	1,659	1,659	1.7	121.1	59	L2_PEM20_PS25 [1]	3,090	123	0.1	9.0	
28	L2_CEM8_PT8_CES3_&_TRK8 [1]	1,191	1,191	1.2	87.0	60	L2_PEM8_&_CMU6_PT4 [1]	526	526	0.5	38.4	
29	L2_CEM8_PT8_CES3_DPS [2]	6,925	138	0.1	10.1	61	L2_PEM8_&_CMX15_PT4_CSX [1]	78	78	0.1	5.7	
30	L2_CJET15_LL_BMU10_ISR_TSU0 [2]	123	123	0.1	9.0	62	L2_PS0_LL_TEN_TRK2 [1]	5,461	0	0.0	0.0	
31	L2_CJET15_LL_BMU10_ISR_PT11 [2]	100	100	0.1	7.3	63	L2_PS1000_LL_JETS [1]	95,711	95	0.1	6.9	

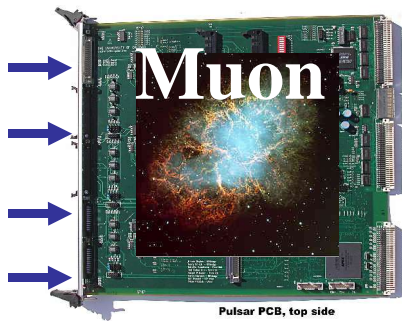
General	PreFred	Fred	Fred Prescaled	Fred Live	TS	L2 (0-63)	L2 (64-127)	L3 (0-63)	L3 (64-127)	L3 (128-191)	L3 (192-255)	DynamicPrescale
n	Trigger	Raw	Prescaled	<Rate> Hz	nb	n	Trigger	Raw	Prescaled	<Rate> Hz	nb	
0	L2_AUTO_LL_CMN6_PT8_CSX [1]	1,449	1,449	1.5	105.8	32	L2_CJET15_PS24 [2]	4,784	199	0.2	14.5	
1	L2_AUTO_LL_COT_SPKNE [1]	0	0	0.0	0.0	33	L2_CMU15_PT15_&_CMX15_PT2_D...	836	836	0.8	61.0	
2	L2_AUTO_LL_GAP_EAST_&_JET10 [1]	145	145	0.1	10.6	34	L2_CMU6_PT4_&_CMX15_PT4_CSX [..	108	108	0.1	7.9	
3	L2_AUTO_LL_GAP_WEST_&_JET10 [1]	165	165	0.2	12.0	35	L2_CMU15_PT3_&_CMU15_PT15 [..	1,547	1,547	1.6	113.0	
4	L2_AUTO_LL_MB_XING [2]	1,316	1,316	1.3	96.1	36	L2_CMU15_PT3_&_CMX15_PT2_CS...	175	175	0.2	12.8	
5	L2_AUTO_LL_RP [3]	303	303	0.3	22.1	37	L2_CMU6_PT4_&_TRK2_D120_DPH...	0	0	0.0	0.0	
6	L2_AUTO_LL_TOF20_PT0 [1]	19	19	0.0	1.4	38	L2_CMU6_PT4_SVT_&_TRK2_D120...	0	0	0.0	0.0	
7	L2_AUTO_LL_TRK4_P50 [1]	0	0	0.0	0.0	39	L2_CMU6_PT8 [1]	2,265	2,265	2.3	165.4	
8	L2_AUTO_LL_TWO_GAP_&_CMU15_PT...	5,353	5,353	5.4	390.8	40	L2_CMN6_PT10 [1]	942	942	1.0	68.8	
9	L2_BJET15_D120 [3]	0	0	0.0	0.0	41	L2_DPS_LL_CMU6_PT4 [2]	26,272	776	0.8	56.7	
10	L2_B_CHARM_HIGHTP [4]	0	0	0.0	0.0	42	L2_EM10_ISO_PS1600 [2]	41,259	25	0.0	1.8	
11	L2_B_CHARM_LL_DPS [3]	0	0	0.0	0.0	43	L2_EM12_ISO_&_CMU15_PT3 [1]	66	66	0.1	4.8	
12	L2_B_CHARM_LOWPT_LL_CMU15_PT...	0	0	0.0	0.0	44	L2_EM12_ISO_&_CMX15_PT2_CSX [1]	75	75	0.1	5.5	
13	L2_B_CHARM_LOWPT_LL_CMX15_PT2...	0	0	0.0	0.0	45	L2_EM21_ISO_PASS54 [1]	2,793	2,793	2.8	203.9	
14	L2_B_CHARM_LOWPT_LL_DPS [3]	0	0	0.0	0.0	46	L2_EM40 [2]	768	768	0.8	56.1	
15	L2_B_CHARM_PHI [1]	0	0	0.0	0.0	47	L2_EM70 [4]	364	364	0.4	26.6	
16	L2_B_PIP_HIGHTP [4]	0	0	0.0	0.0	48	L2_ERROR [2]	0	0	0.0	0.0	
17	L2_B_PIP_LL_DPS [3]	0	0	0.0	0.0	49	L2_FOUR_JET15_SUMET125 [1]	173	173	0.2	12.6	
18	L2_CEM12_ISO_&_SUMET20_&_TWO_...	1,045	1,045	1.1	76.3	50	L2_INCLUSIVE_NOTRACK_1HZ [1]	1,828,317	774	0.8	56.5	
19	L2_CEM12_ISO_&_TRK2_D120 [3]	0	0	0.0	0.0	51	L2_INCLUSIVE_TRACK_1HZ [1]	2,892,348	774	0.8	56.5	
20	L2_CEM12_ISO_DPS [5]	4,726	135	0.1	9.9	52	L2_JET15_PS25 [1]	11,783	471	0.5	34.4	
21	L2_CEM16_PT8 [3]	2,235	2,235	2.3	163.2	53	L2_JET40 [3]	290	290	0.3	21.2	
22	L2_CEM20_LL_MET15 [1]	1,692	1,692	1.7	123.5	54	L2_JET60_PS8 [3]	2,325	290	0.3	21.2	
23	L2_CEM4_PT4_CES3_&_CMU6_PT4 [1]	946	946	1.0	69.1	55	L2_JET90 [3]	562	562	0.6	41.0	
24	L2_CEM4_PT4_CES3_&_CMX15_PT4_...	182	182	0.2	13.3	56	L2_JPS_TWO_CEM2 [3]	1,081	1,081	1.1	78.9	
25	L2_CEM4_PT4_CES3_&_PEM8 [1]	1,024	1,024	1.0	74.8	57	L2_MET35 [1]	1,072	1,072	1.1	78.3	
26	L2_CEM4_PT4_CES3_P55 [1]	361	72	0.1	5.3	58	L2_PEM20_LL_ENR_&_MET15 [2]	1,041	1,041	1.1	76.0	
27	L2_CEM8_PT8_CES3_&_TRK5_DPH10...	1,656	1,656	1.7	120.9	59	L2_PEM20_PS25 [1]	3,092	123	0.1	9.0	
28	L2_CEM8_PT8_CES3_&_TRK8 [1]	1,190	1,190	1.2	86.9	60	L2_PEM8_&_CMU6_PT4 [1]	526	526	0.5	38.4	
29	L2_CEM8_PT8_CES3_DPS [2]	6,918	203	0.2	14.8	61	L2_PEM8_&_CMX15_PT4_CSX [1]	78	78	0.1	5.7	
30	L2_CJET15_LL_BMU10_ISR_TSU0 [2]	123	123	0.1	9.0	62	L2_PS0_LL_TEN_TRK2 [1]	5,462	0	0.0	0.0	
31	L2_CJET15_LL_BMU10_ISR_PT11 [2]	100	100	0.1	7.3	63	L2_PS1000_LL_JETS [1]	95,741	95	0.1	6.9	

Conclusions for the First Beam Test

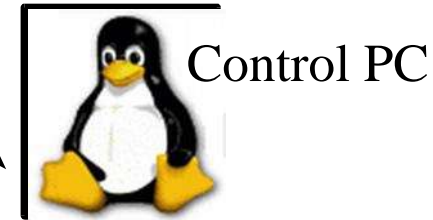
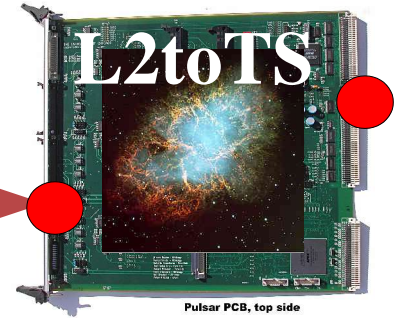
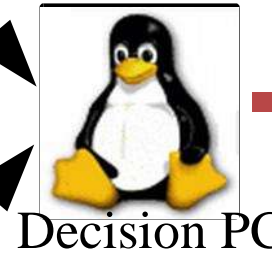
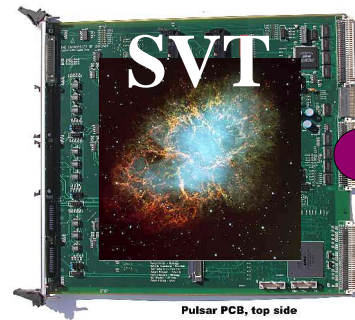
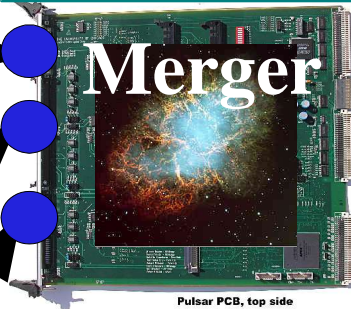
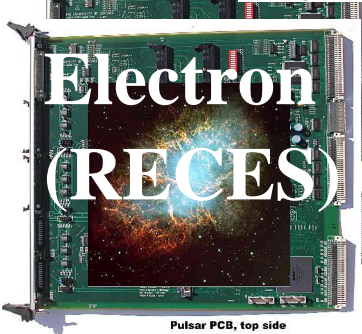
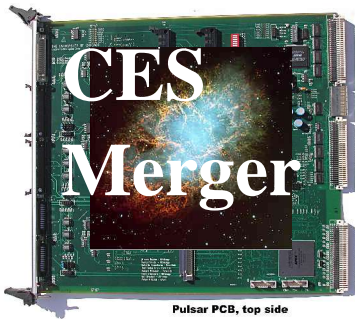
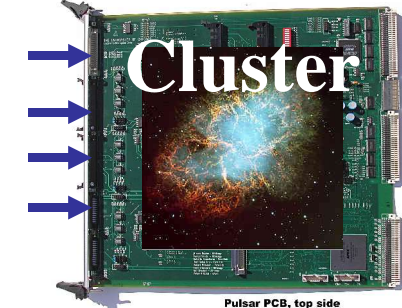
- Successfully completed the first beam test with Pulsar driving the CDF at L2
- ScalerMon – rates are all in agreement
- PulsarMon – decision bits are all in agreement
 - › small discrepancies are due to CES and ISO triggers
- We need to have more tests like this **ASAP** in order to better understand our system
- One of the highest priorities so far was to understand the timing of the new system (results and studies next)

System overview and latency measurements

Muon
XTRP
L1



Clist
Isolist
EtSum



Latency counters measure the time (from L1A) before the data arrives at:

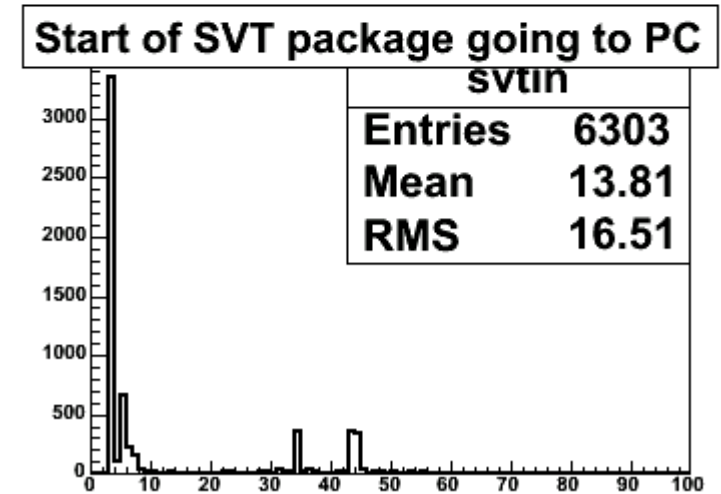
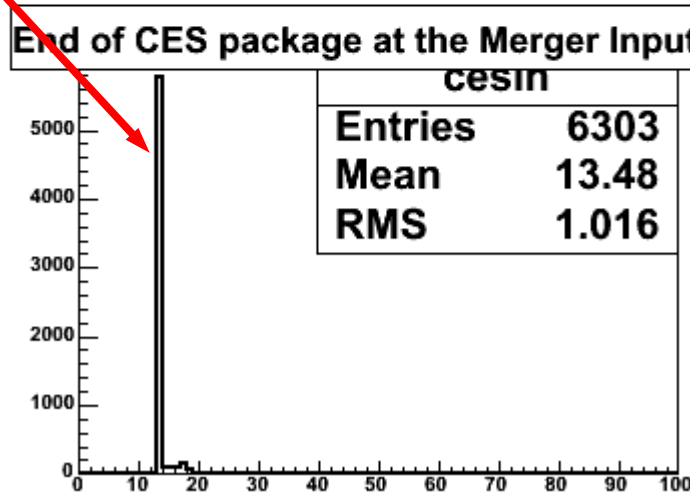
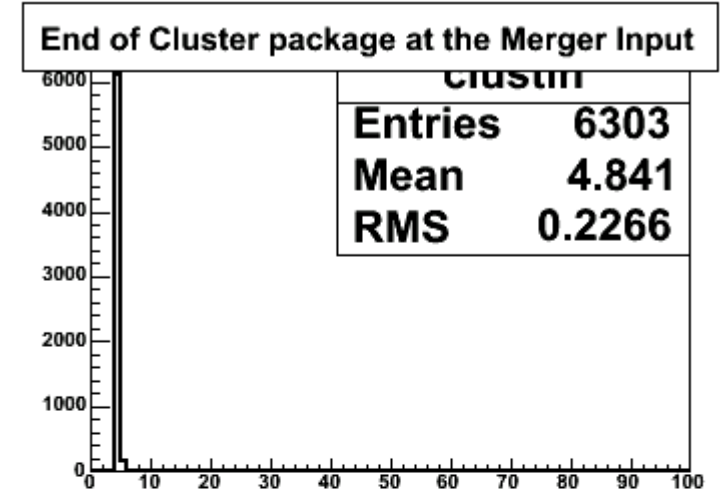
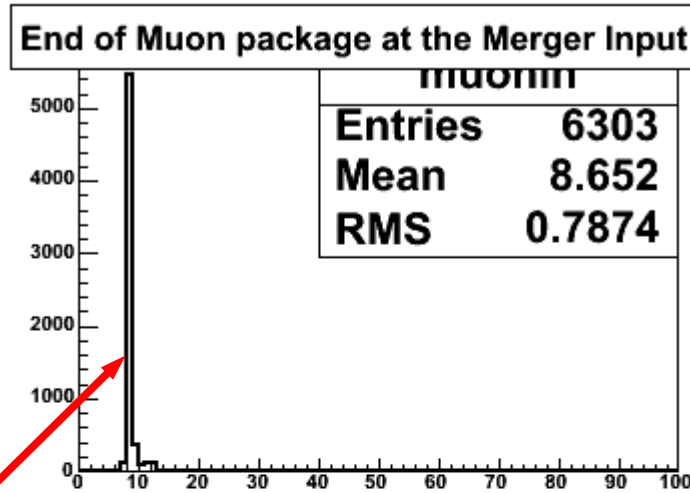
- Merger inputs
 - Data from Muon/Cluster/CESMerger boards
- SVT Pulsar Output
 - SVT data began to be sent to PC
- L2 Pulsar decision arrives to the L2TOTS board
 - TS handshaking time is defined as the time between this and L2A arriving on the backplane

→ we have other points in the system equipped with latency counters

Input latency for L2torture

Pulsar timing run 193090

Tue Feb 8 17:01:30 2005



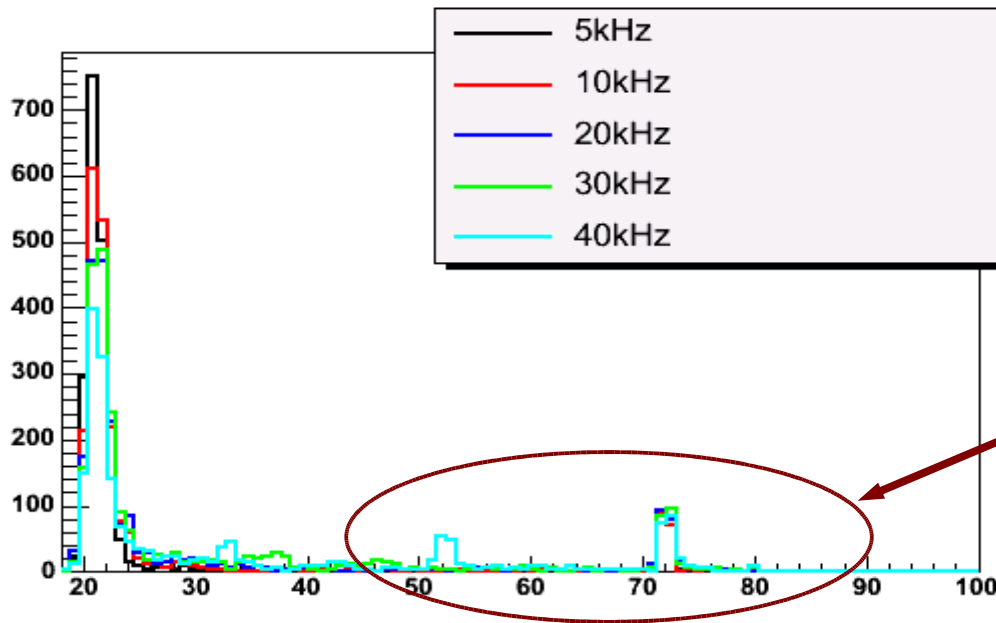
note the
5 μ s difference
between Muon
and RECES

- RECES timing dominates all Merger inputs
- Pulsar system has to wait for all non-SVT data before sending it to PC
- The system latency will be dictated by the RECES timing
- The RunIIA system pulls the RECES data on a need only basis
- L2Torture table does not need RECES

L2 latency dependency of L1 rate

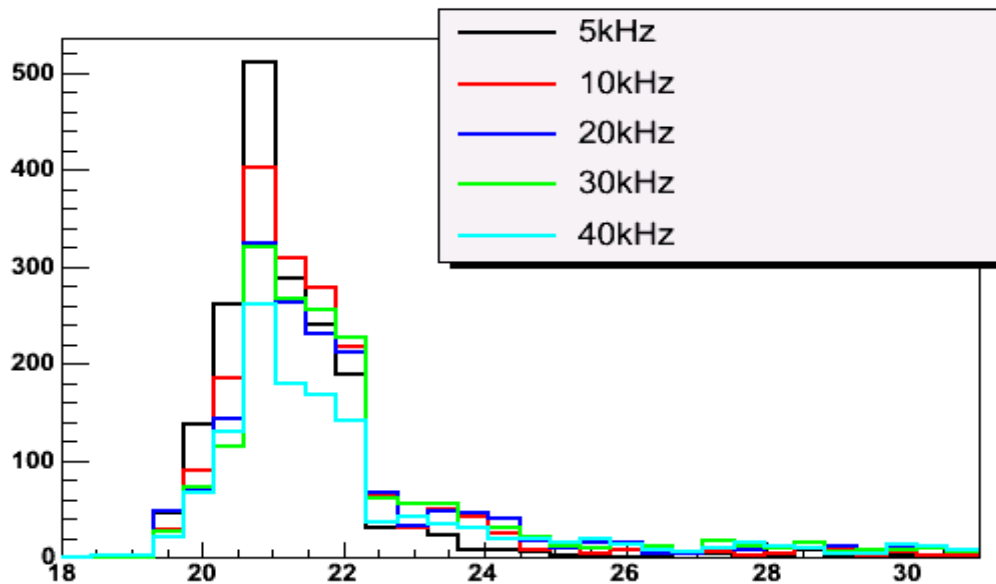
Alpha driving L2Torture run 193423

Tue Feb 8 16:50:25 2005



SVT fake tracks

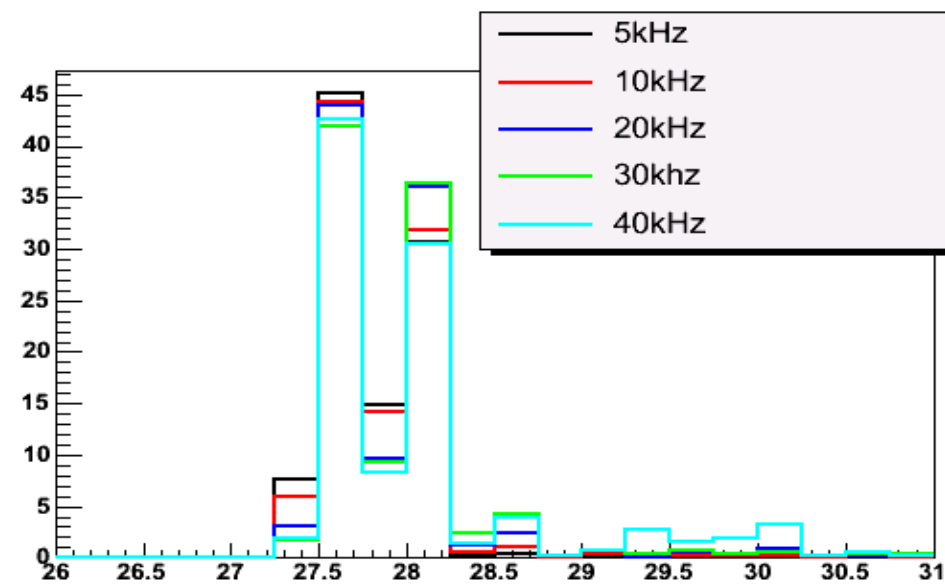
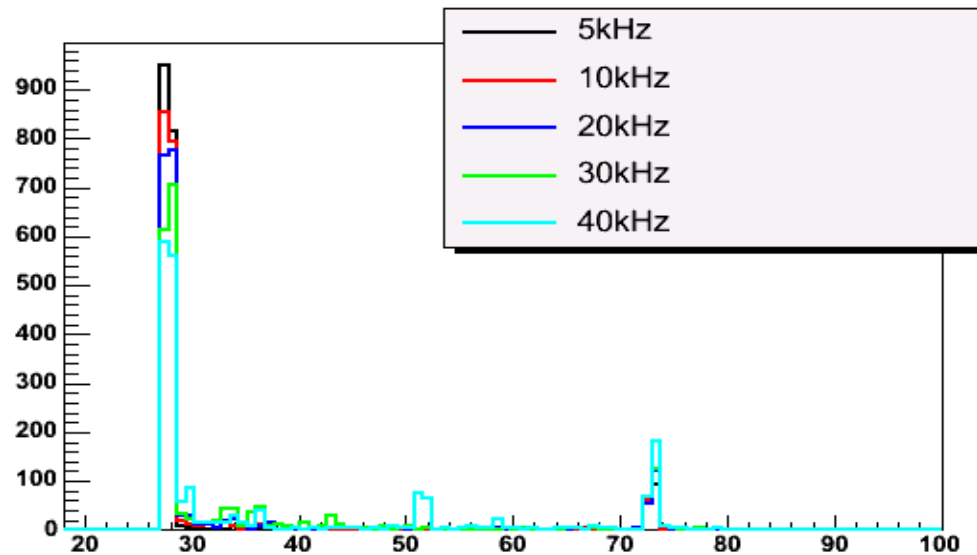
- L2 latency slowly increases with higher L1A rate



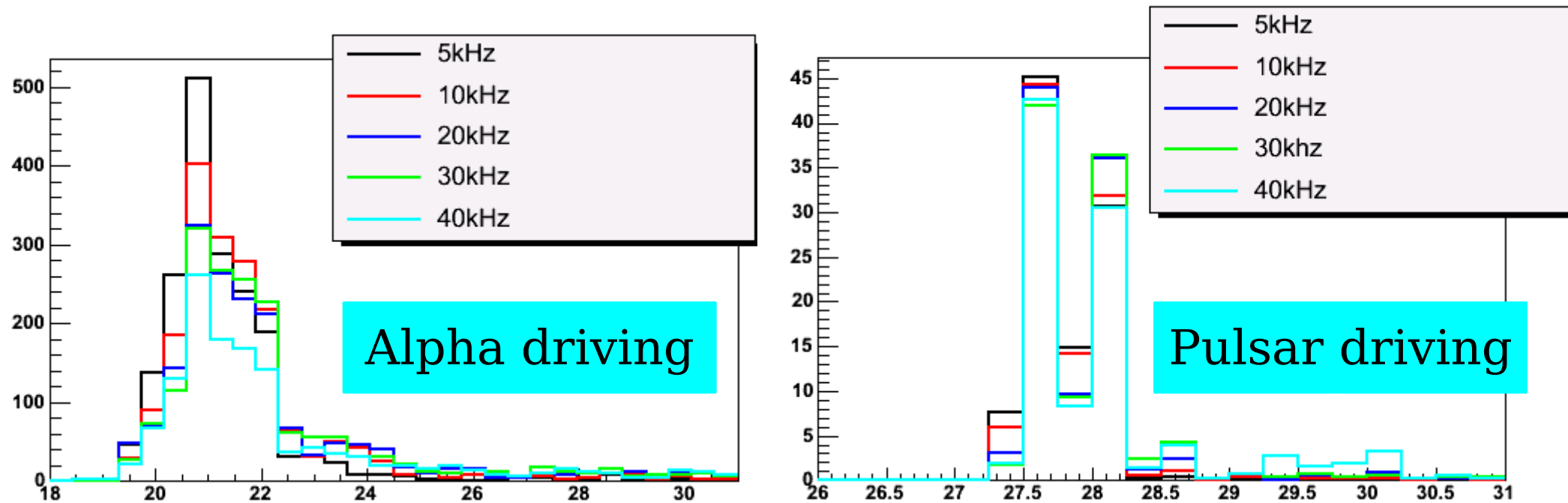
L2 latency dependency of L1 rate (2)

Pulsar driving L2Torture

Tue Feb 8 16:50:26 2005



L2 latency dependency of L1 rate (3)

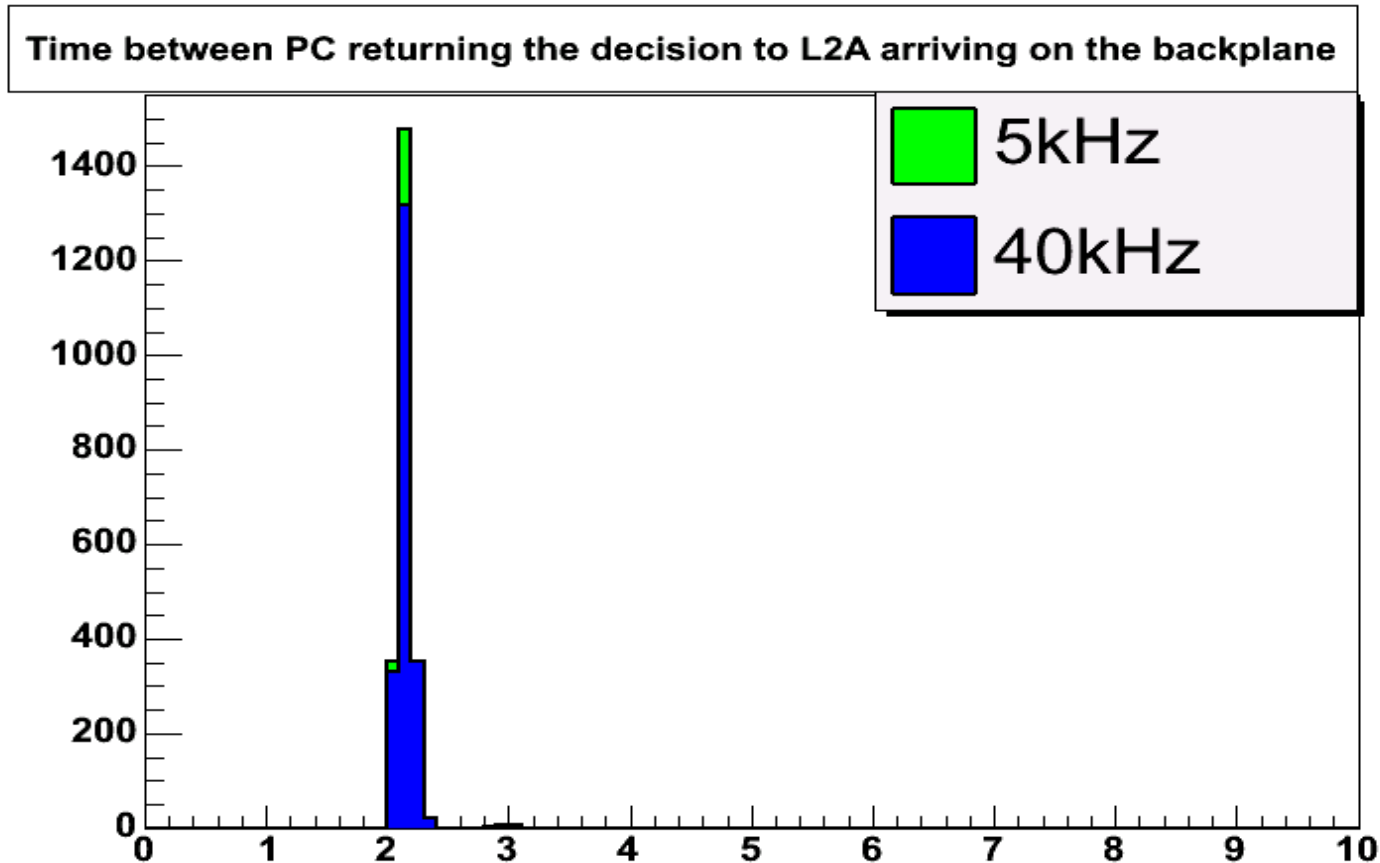


- Sharp edge on the Pulsar side because of RECES
- 6 μ s difference between Pulsar and Alpha
 - recall the 5 μ s RECES-Muon timing from before
- Alpha gives smooth distribution (no RECES needed)
- They both exhibit the same L1A rate dependency

TS Handshaking overhead

Pulsar timing run 193425

Tue Feb 8 16:47:27 2005

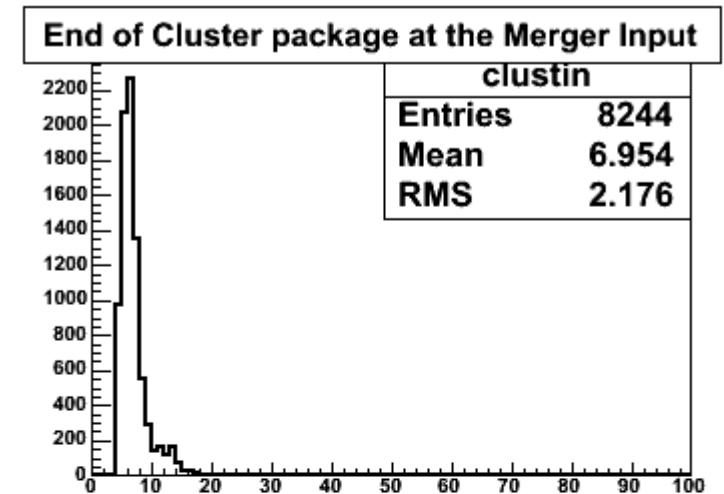
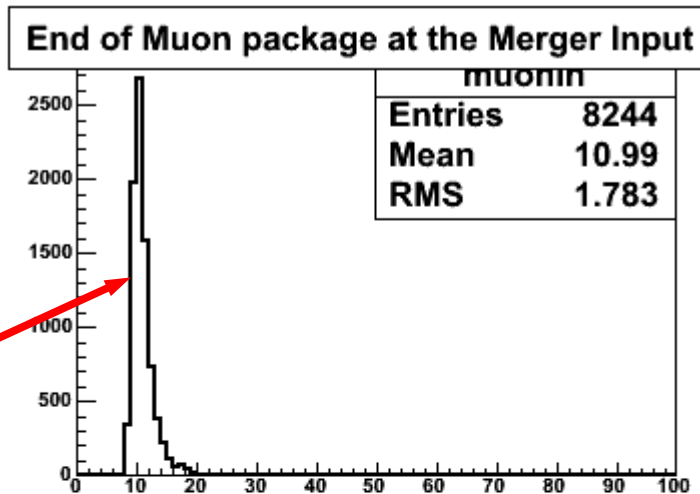


- Consistent measurement of $\sim 2\mu\text{s}$ across L1A rate range
- Independent of data volume/rate/running conditions
- We will add this on top of the Pulsar decision time in order to be able to compare with the Alpha

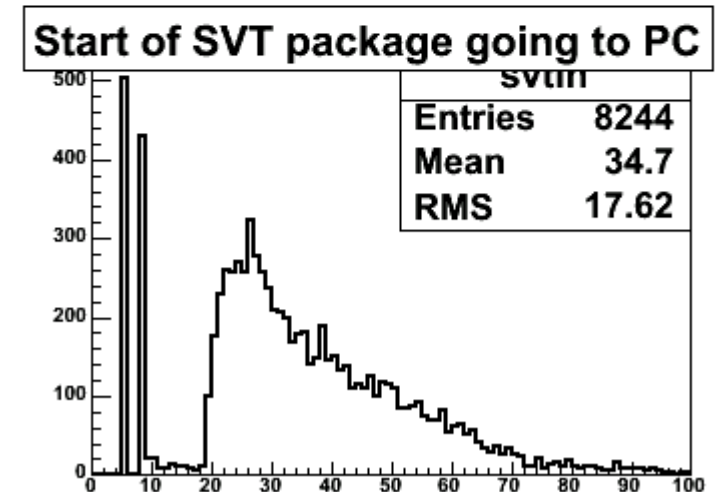
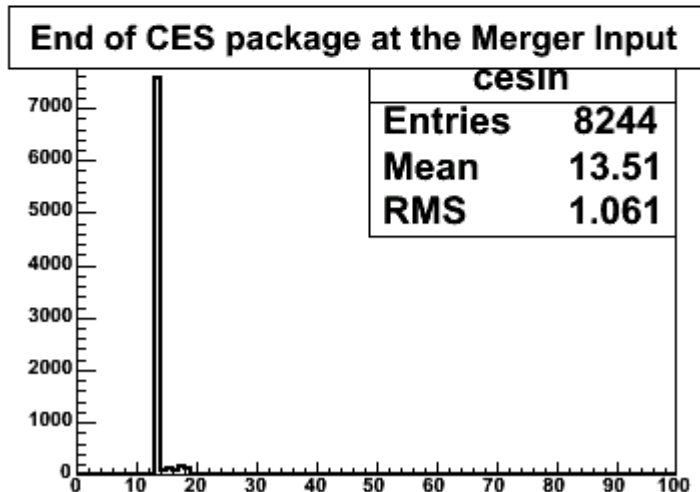
Input Latency in Low Luminosity Run (~30E30)

Pulsar timing run 193242

Tue Feb 8 17:04:49 2005



note the 2 μ s
increase relative to
L2Torture



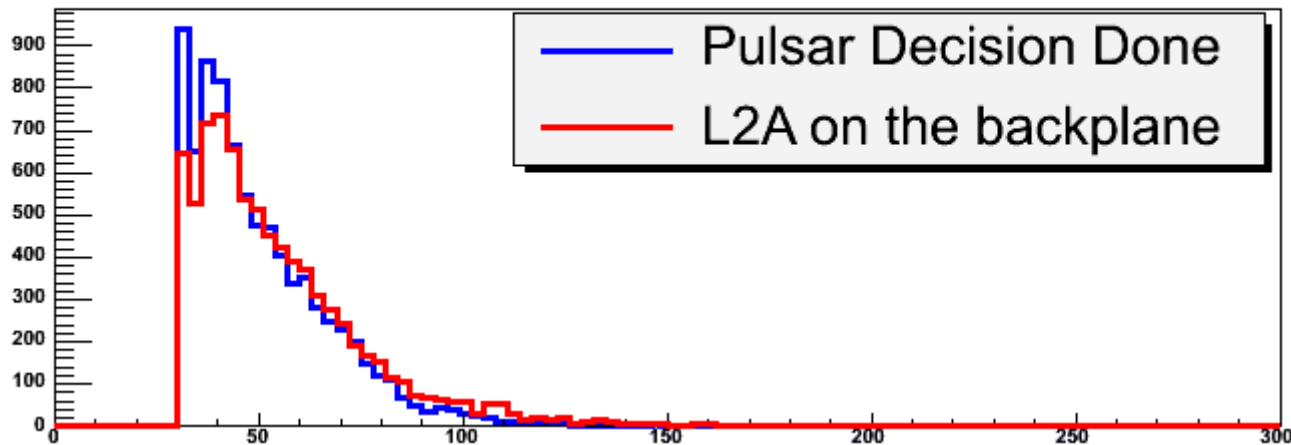
- RECES stays at about the same values
 - Data is most of the time zero anyway
- The system is still RECES dominated, but the Muon/XTRP starts to come in

Low Luminosity L2 Latency

- The Pulsar system is in auto-reject mode
- The TS will OR the two decisions
- The TS will broadcast a L2A/R only when both Alpha and Pulsar are finished with the handshaking
 - $L2A = \max(PDD+2, ADD)$
 - L2A = L2A on the backplane
 - PDD = Pulsar Decision Done
 - ADD = Alpha Decision Done

Pulsar timing run 193242

Wed Feb 9 09:24:53 2005



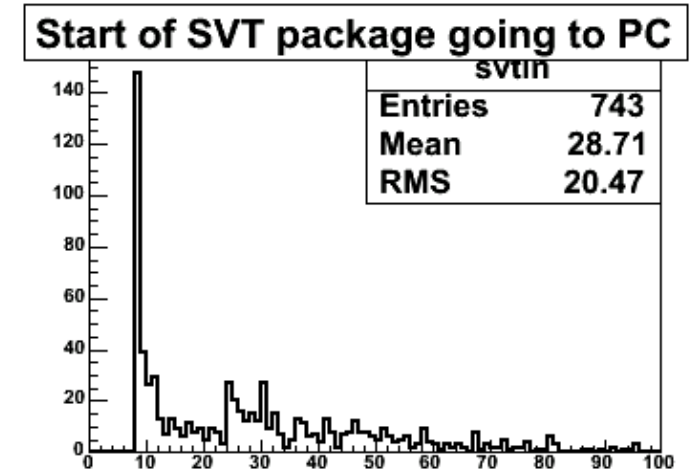
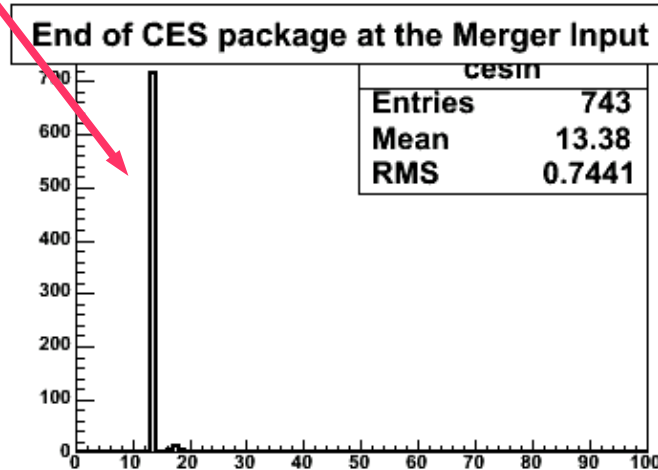
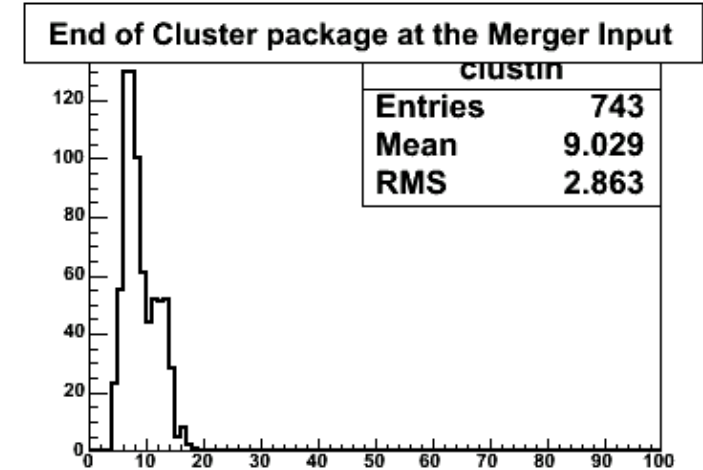
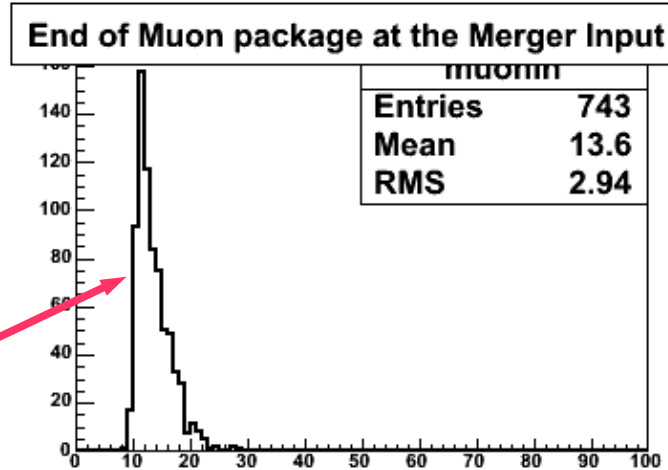
Conclusion:
As in L2Torture case,
the RECES is holding
the Pulsar and
pushes the latency
passed Alpha's

- L2 Latency distributions are similar, therefore
 - $PDD+2 > ADD$
 - Pulsar decision is later than Alpha's

Input Latency in High Luminosity Run (111E30)

Pulsar timing run 193164

Tue Feb 8 17:18:32 2005

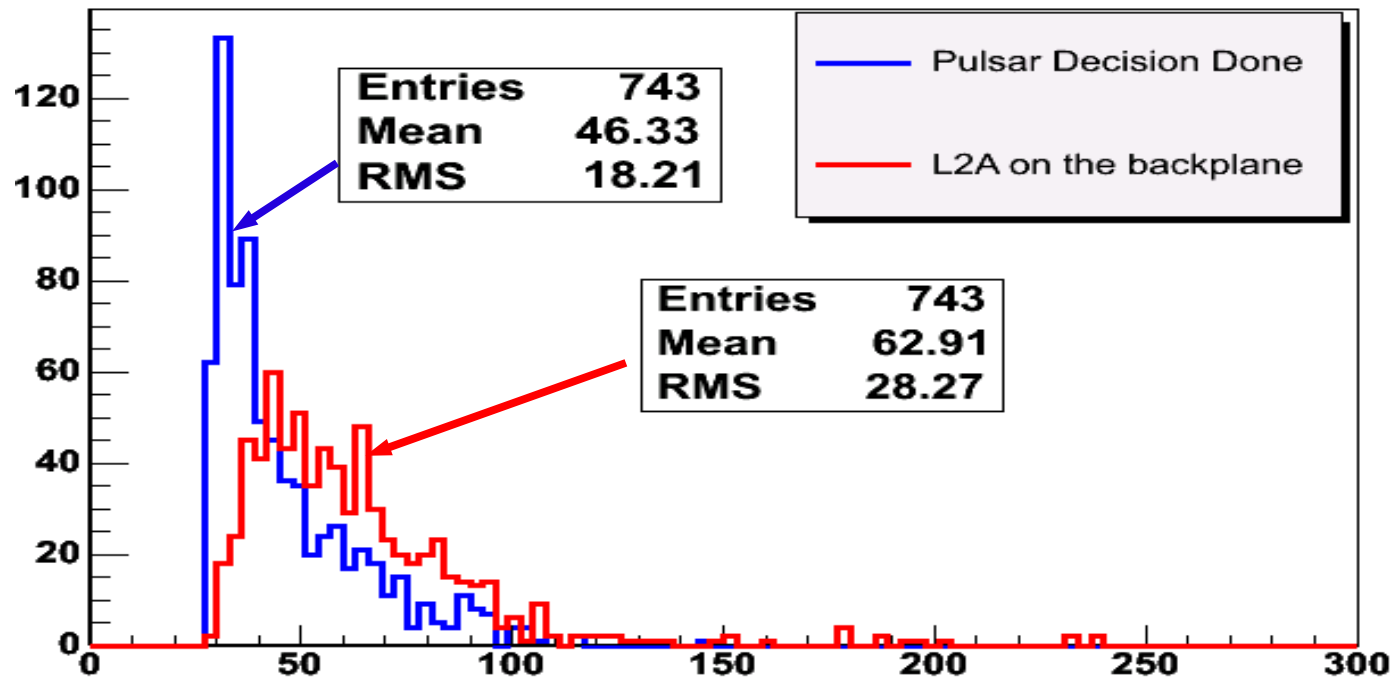


note that RECES and Muon are much closer to each other

- In high luminosity running the system starts to be dominated by the Muon/XTRP arriving time rather than RECES
- Both RunIIa and RunIIb systems will see the same dominating latency in the data arrival time

High Luminosity L2 Latency (111E30)

- In high luminosity conditions, the fast processing time of the RunIb system starts to pay off

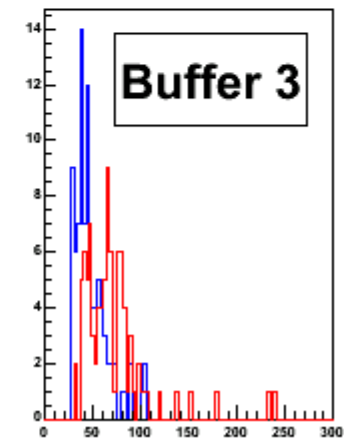
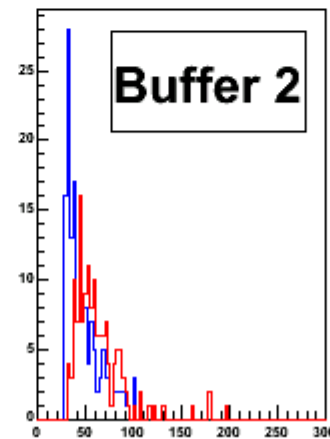
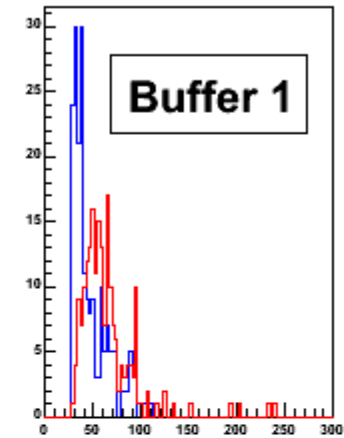
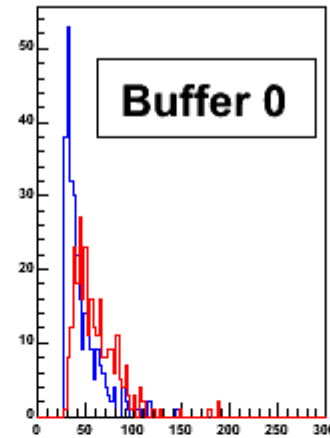
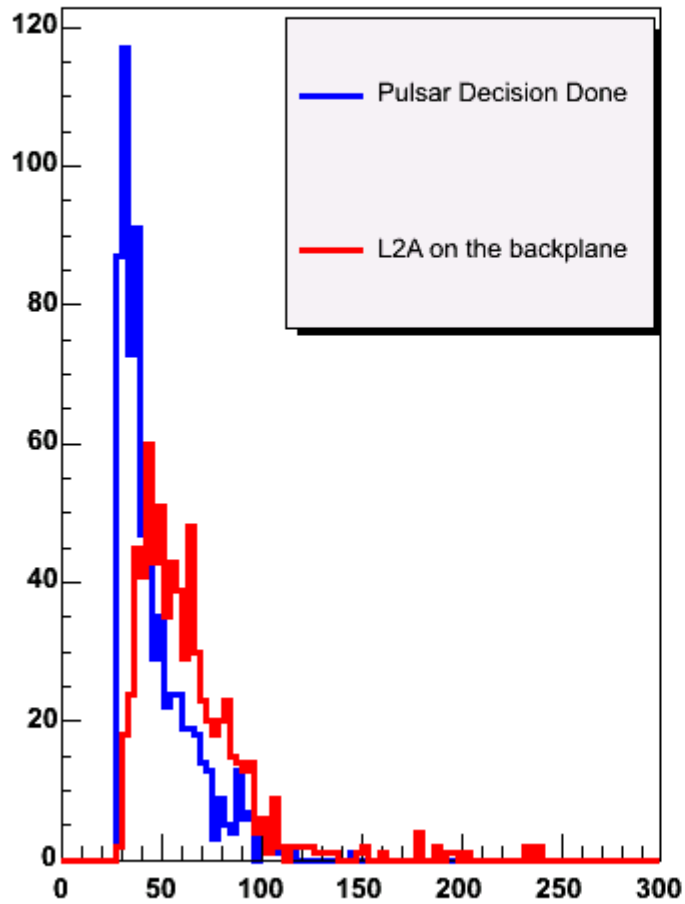


Pulsar system is faster in average and allows for significant reduction in tails at high luminosity

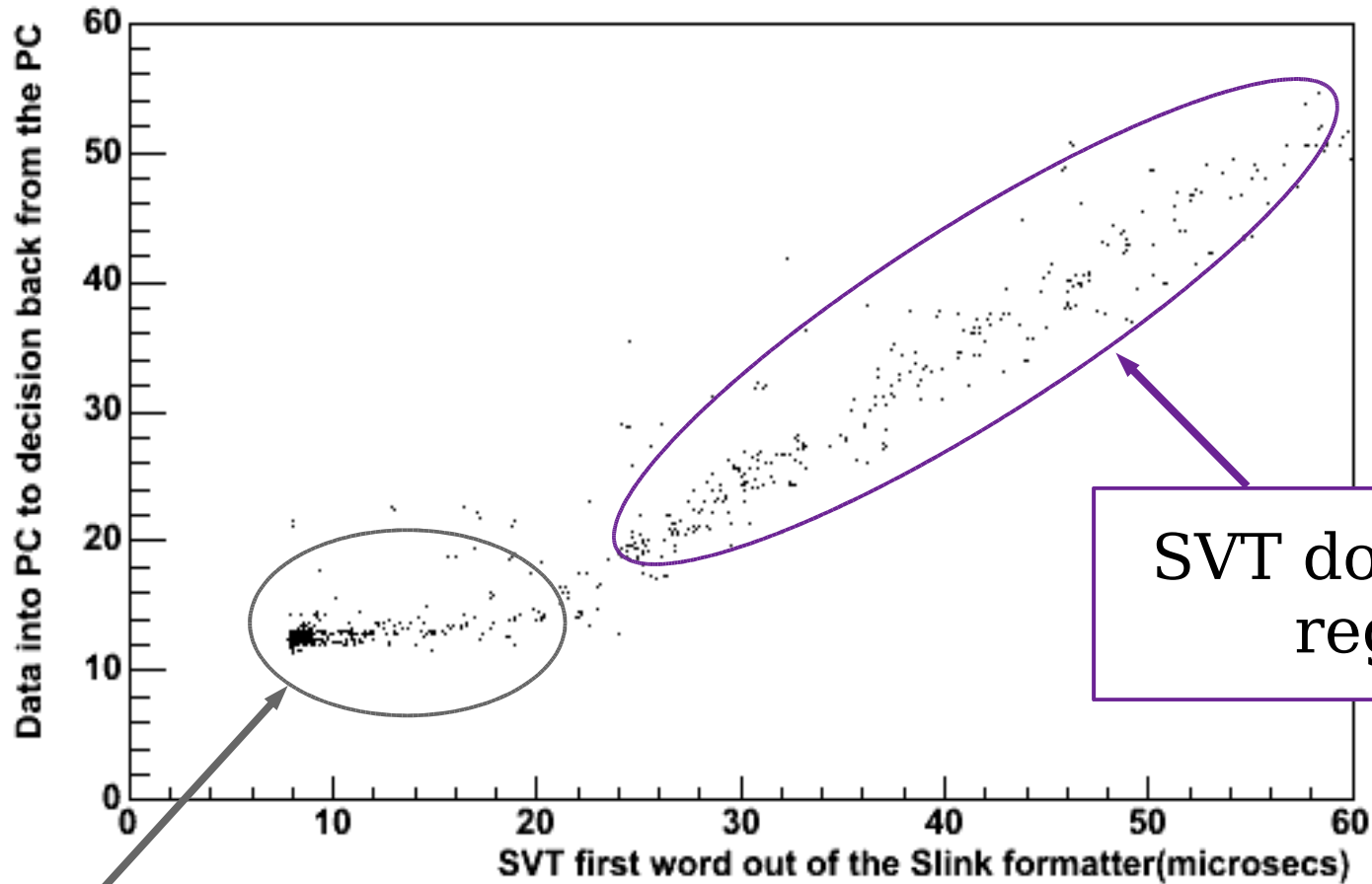
High Luminosity L2 Latency (111E30)

Pulsar timing run 193164

Tue Feb 8 16:42:06 2005



The dynamics of the L2Pulsar system



RECES dominated regime

SVT dominated regime

Final remarks

- The Pulsar system has been running stably in different modes of running
- Initial test results confirm the stability and robustness of the system
- Several functional problems in the RunIIa system will be fixed in the new system
- Initial timing measurement show that at high luminosity the Pulsar performances are better
- Multiple ways to improve the timing (see Ted's talk)
- More tests will come during the next couple of weeks