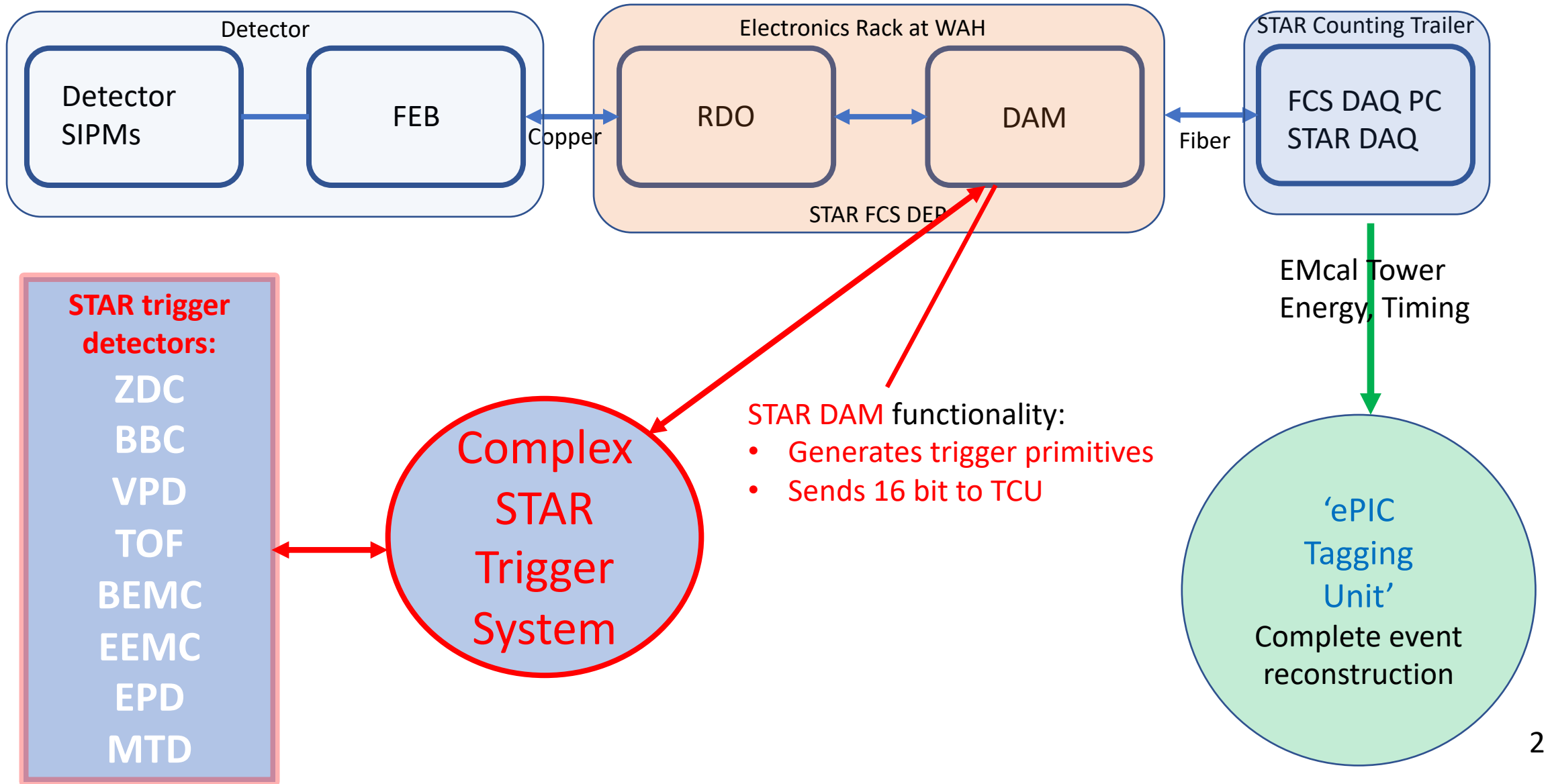


Forward EMcal, Tagging workshop.

O. Tsai (UCLA/BNL)

Lots of materials borrowed from Akio Ogawa's (BNL) different presentations regarding triggering with STAR Forward Calorimeter System.

- For the purpose of today's discussion examples of FCS triggering.
- List of FCS triggers are run specific. Defined by STAR physics WGs.



• FCS based Trigger List Run24

#	Category	Trigger	Logic	PS	BandWidth	TPC	EMC/TOF	BBQ/EQ123/MXQ	Physics
0	JP	fcsJP2	JP2	Yes	166	Yes	Yes	Yes	highest threshold jets
1	JP	fcsJPA1	JPA1	Yes	33	Yes	Yes	Yes	Mid threshold JP-A
2	JP	fcsJPA0	JPA0	High	33	Yes	Yes	Yes	Low threshold JP-A
3	JP	fcsJPBC1	JPBC1	Yes	66	Yes	Yes	Yes	Mid threshold JP-BC
4	JP	fcsJPBC0	JPBC0	High	66	Yes	Yes	Yes	Low threshold JP-BC
5	JP	fcsJPDE1	JPDE1	Yes	66	Yes	Yes	Yes	Mid threshold JP-DE
6	JP	fcsJPDE0	JPDE0	High	66	Yes	Yes	Yes	Low threshold JP-DE
7	JP	fcsDiJP	DiJP	Yes	100	No	Yes	Yes	Dijet
8	JP	fcsDiJPAsy	DiJPAsy	Yes	100	No	Yes	Yes	DiJet Asymmetric Threshold
9	ELE	fcsDY	ELE2-N && ELE2-S	1	1000	No	Yes(?)	Yes(?)	Main DY at thr=1.0GeV
10	ELE	fcsJPsi	ELE1-N && ELE1-S	Yes	66	No	Yes	Yes	Jpsi at thr~0.8GeV
11	ELE	fcsDYNoEpd	EM3-N && EM3-S	Yes	66	No	Yes	Yes	Monitor without EPD
12	ELE	fcsDYAsy	DiELEA	Yes	66	No	Yes	Yes	Monitor with asymmetric threshold
13	HAD	fcsHad2	Had2	Yes	66	No	Yes	Yes	Hadron High Thre
14	HAD	fcsHad1	Had1	Yes	66	No	Yes	Yes	Hadron Mid Thre
15	HAD	fcsHad0	Had0	High	66	No	Yes	Yes	Hadron Low Thre
16	EM	fcsEM2	EM2	1	133	No	Yes	Yes	Pi0/gamma Take All
17	EM	fcsEM1	EM1	Yes	133	No	Yes	Yes	pi0/Gamma Mid Thre
18	EM	fcsEM0	EM0	High	133	No	Yes	Yes	pi0/Gamma Low Thre
19	EM	fcsELE2	fcsELE2-N fcsELE2-S	High	0	No	No	Yes	ELE single very low threshold
20	EM	fcsEM3	fcsEM3-N fcsEM3-S	High	0	No	No	Yes	EM single very low threshold
21	UPC	upcJpsiNS	ELE0-N && EHTTP-S && !EPD-E && !TofMult1	1?	10?	Yes	Yes	Yes	FCS-EEMC UPC Jpsi
22	UPC	upcJpsiSN	ELE0-S && EHTTP-N && !EPD-E && !TofMult1	1?	10?	Yes	Yes	Yes	FCS-EEMC UPC Jpsi
23	Debug	fcsEHT-N	EHT-N	-	0	-	-	-	debug
24	Debug	fcsEHT-S	EHT-S	-	0	-	-	-	debug
25	Debug	fcsHHT-N	HHT-N	-	0	-	-	-	debug
26	Debug	fcsHHT-S	HHT-S	-	0	-	-	-	debug
27	Debug	fcsETOT-N	ETOT-N	-	0	-	-	-	cosmic
28	Debug	fcsETOT-S	ETOT-S	-	0	-	-	-	cosmic
29	Debug	fcsHTOT-N	HTOT-N	-	0	-	-	-	cosmic
30	Debug	fcsHTOT-S	HTOT-S	-	0	-	-	-	cosmic

Attributes:

- Topological
- Geometrical
- Conditional (other STAR detectors)
- Different Thresholds

In progress...

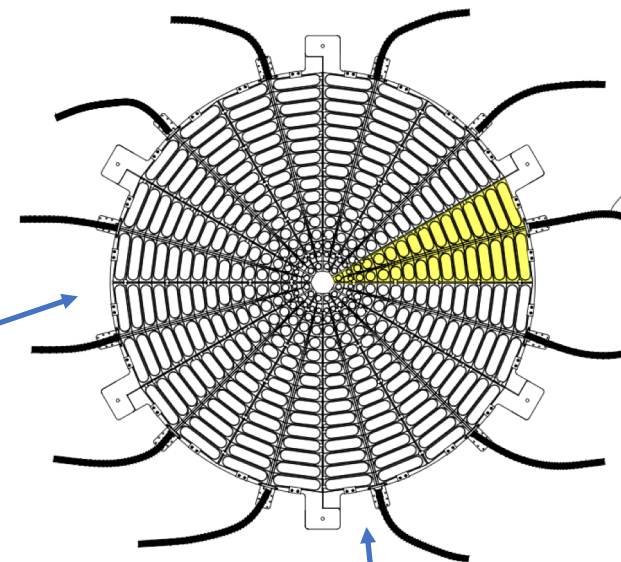
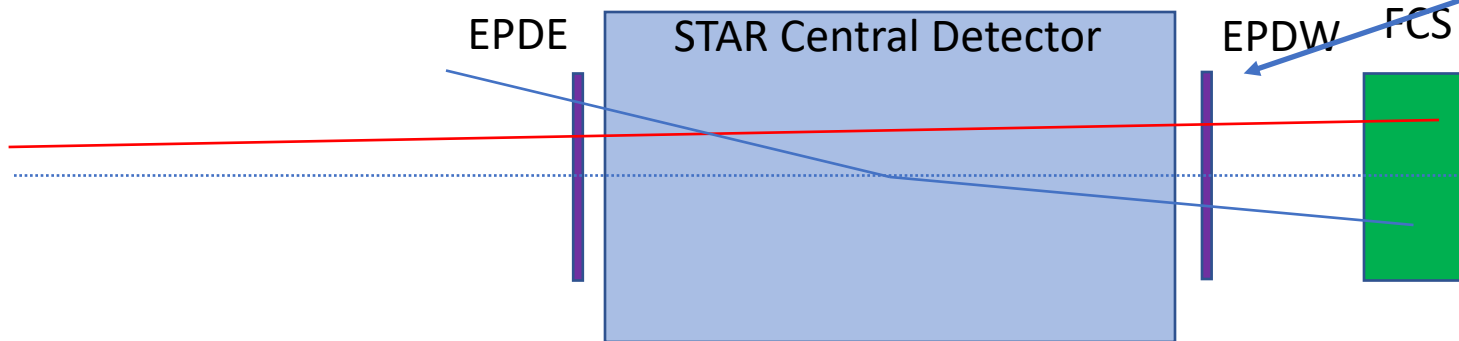
Ready for Physics
Physics ON (433m) [Prepare For Pol Meas]

Blue	100.2 GeV, 16107 ions, Supplemental Ramp Complete
Yellow	100.2 GeV, 14827 ions, Supplemental Ramp Complete
TCU Clock	9383171.0

Trigger	DRQ Evts	DRQ Hz	LO Evts	LO Hz	Sca Hz	Dead	Built	Xpress	Abt	Err	Trigger	DRQ Evts	DRQ Hz	LO Evts	LO Hz	Sca Hz	Dead	Built	Xpress	Abt	Err	
fcsELE2	579	2	578	1	6771	8 %	579	579	0	0	fcsHad1*EPDveto	121330	223	121249	216	1159	8 %	121325	121325	0	5	
fcsEM3	578	1	578	1	11292	8 %	578	578	0	0	fcsHad0*EPDveto	149949	246	149853	259	19759	8 %	149945	149945	0	4	
fcsHad2	58206	106	58173	106	115	5 %	58201	58201	0	5	fcsEM2*EPDveto	37699	71	37671	68	84	19 %	37695	37695	0	4	
fcsJP2	128861	22							0	7	fcsEM1*EPDveto	95287	175	95222	170	381	13 %	95281	95281	0	6	
earlyEPDE-or-EPDW	549	1							0	0	fcsEM0*EPDveto	92327	169	92262	166	1958	12 %	92322	92322	0	5	
fcsDiJP	609	1							0	0	fcsEHT-N	581	1	581	1	2360	8 %	581	581	0	0	
fcsEM2	580	1							0	0	fcsEHT-S	574	1	574	1	2253	8 %	574	574	0	0	
EHT0	4938	7							0	0	fcsHHT-N	581	0	581	1	10306	9 %	581	581	0	0	
EHT0*L2EGamma	4938	7							0	0	fcsHHT-S	576	1	576	1	11357	8 %	576	576	0	0	
TOF0	555	2							0	0	upcJpsiSN_BBCveto	3295	6	3292	5	5	0 %	3295	3295	0	0	
fcsJP2*EPDveto	126687	22							0	7	upcJpsiNS_BBCveto	3917	6	3916	8	7	0 %	3917	3917	0	0	
fcsJPA1*EPDveto	110739	20							0	4	Jpsi*HTTP	5556	10	5552	10	9966	11 %	5556	5556	0	0	
fcsJPA0*EPDveto	108174	18							0	5	gmt	27588	45	27573	49	292063.8	11 %	27587	27587	0	1	
fcsJPBC1*EPDveto	105748	19							0	5	dimuon	23381	40	23365	32	35	6 %	23381	23381	0	0	
fcsJPBC0*EPDveto	107855	18							0	8	earlyEPDE	544	0	544	1	60540	11 %	544	0	0	0	
fcsJPDE1*EPDveto	109354	19							0	8	VPD	553	0	553	1	326020.8	11 %	553	0	0	0	
fcsJPDE0*EPDveto	109097	20							0	7	VPD100	553	1	553	1	292063.8	11 %	553	0	0	0	
fcsDiJP*EPDveto	51137	98							0	0	BBC	554	1	553	1	972949.4	11 %	554	0	0	0	
fcsDiJPAsy*EPDveto	144237	22							0	2	ZDC	559	1	559	1	4533	11 %	559	0	0	0	
fcsJPsiSym	11150	20							0	1	earlyEPDW	561	0	561	1	22821	12 %	561	0	0	0	
MB-BBC_prepost	28343	45							0	2	sendVertex	28343	45	28333	49	0	0 %	27953	0	388	2	
											fcsJPDE0*EPDveto											
											fcsDiJP*EPDveto											
											fcsDiJPAsy*EPDveto											

Example which may be relevant to todays discussion

- RHIC is a living beast, you never know what it will throw at you !
- Run24 beam background is quite high due to multiple reasons
- Machine attempts to reduce background yielded modest improvements
- And at the end it is up to experiments to find efficient solutions to clean it up!



- **Upstream background polluted some FCS trigger by ~ 30% in Run24.**
- EPD has enough resolution to apply timing veto cut to clean it up
- In ePIC. nHCal will help to shield dRICH from such events.
- + Timing information from both nHCl_a and forward HCal similar to EPDE/EPDW

Questions is will it be good to have something similar to EPD/BBC in ePIC? It is much simpler detectors than calorimeters. May be re-used (EPD) from STAR and sPHENIX? Space?

<u>fcsJP2*EPDveto</u>	:
<u>fcsJPA1*EPDveto</u>	:
<u>fcsJPA0*EPDveto</u>	:
<u>fcsJPBC1*EPDveto</u>	:
<u>fcsJPBC0*EPDveto</u>	:
<u>fcsJPDE1*EPDveto</u>	:
<u>fcsJPDE0*EPDveto</u>	:
<u>fcsDiJP*EPDveto</u>	:
<u>fcsDiJPAsy*EPDveto</u>	:

Summary/Discussions:

- Forward EMcal can provide different 'tagging' primitives, but it is not clear how useful they may be for dRICH tagging.
- Forward HCal (and backward HCal) may be more useful for that.
- In ePIC we don't have EPD. This is simple and useful detector in STAR, may be we should consider something similar at ePIC, not just as a tagger for dRICH ? Space is a concern, sure.