Update on the status of the Jet Trigger Signature

Trigger General Meeting

Ricardo Goncalo, David W. Miller

April 1, 2015

Todays overview of the Jet Slice

1. *Jet Trigger Menu, Operations and Infrastructure*
   - Jet trigger menu
   - Online monitoring
   - Offline monitoring
   - Software developments and validation
2. *Jet Trigger Performance*
   - L1Topo emulation validation
   - Single jet efficiency studies
   - Multi-jet efficiency studies
   - HLT jet calibrations
   - Trigger commissioning and plans for public results
3. *Open Issues*
   - Core software, Trigger Menu, Performance Metrics
4. *Summary and conclusions*

Jet Trigger Menu for Run 2 (I)

→ We have a large number of new options for jet reconstruction and calibration for Run 2!

- **Jet Algorithm:**
  - **a4** = anti-k_t jet finding algorithm with $R = 0.4$ **(default)**
  - **a10** = anti-k_t jet finding algorithm with $R = 1.0$
  - **a10r** = anti-k_t jet finding algorithm with $R = 1.0$ using $R = 0.4$ jets as input
- **Input objects used for jet finding:**
  - **tc** = TopoClusters reconstructed from calorimeter cells **(default)**
  - **TT** = Level 1 TriggerTowers read out in HLT to allow fast but coarse full calo scan (L1.5)
- **Calorimeter scan:**
  - **PS** = partial calorimeter scan seeded by L1 RoI or L1.5
  - **FS** = full calorimeter scan **(default)**
- **Pseudorapidity range:**
  - **xxETAyy** = jets in interval $xx < |\eta| < yy$; default is `0eta32` (old central jets)
- **Cluster Energy Scale correction:**
  - **em** = no weights applied **(default)**
  - **lcw** = local cluster weighting
- **Jet Energy Scale correction:**
  - **jes** = JES calibration factors without pileup subtraction
  - **sub** = pileup subtraction applied but no JES factors
  - **subjes** = both pileup subtraction and JES factors **(default)**
  - **nojcalib** = no jet-level calibrations or corrections at all

Jet Trigger Menu for Run 2 (II)

Examples of jet trigger combinations for Run 2

- **a4tcemnojcalib**: $R = 0.4$ jets built from EM-scale clusters with no jet level calibration
- **a10tcemsubjes**: $R = 1.0$ jets built from EM-scale clusters with pile-up subtraction and jet-level calibration
- **a4tclcwsub**: $R = 0.4$ jets built from LC-scale clusters with only a pile-up subtraction applied at the jet level

A few HLT and L1 trigger chains for Run 2

HLT	Level 1
j175	L1_J50
j175_jes	L1_J50
6j45	L1_4J15
ht400	L1_HT150-J20s5.ETA30
j360_a10r_L1J100	L1_J100

Jet Trigger Menu for Run 2 (III)

Primary jet menu items at low & high lumi

- 0.5×10^{34} cm^{-2}s^{-1} menu:
  - `j360_a4, j360_a10, 4j85, 5j60, 6j50.0ETA24`
- 2×10^{34} cm^{-2}s^{-1} menu:
  - `j400_a4, j450_a10, 4j100, 5j85, 6j50.0ETA24`
- Current default calibration: `emsubjes`

Primary jet chains at low & high lumi

Chain type	L1 at 0.5×10^{34}	HLT at 0.5×10^{34}	L1 at 2×10^{34}	HLT at 2×10^{34}
Single jet	J75	j360	J100	j400
Fat jet	HT150	j360_a10	HT190	j450_a10
4 jet	3J40	4j85	3J50	4j100
5 jet	4J15	5j60	4J20	5j85
6 jet	5J15.0ETA24	6j50.0eta24	5J15.0ETA24	6j50.0eta24
H_T	HT190	ht800	HT190	ht1000

Menu requests for special runs

Jet triggers in beam splashes menu

- Primary triggers will be L1Calo EM
- L1Calo jet triggers (`L1_J75A/C`) are available as backup

Jet triggers in low $\langle\mu\rangle$ run ($\langle\mu\rangle$ <0.01)

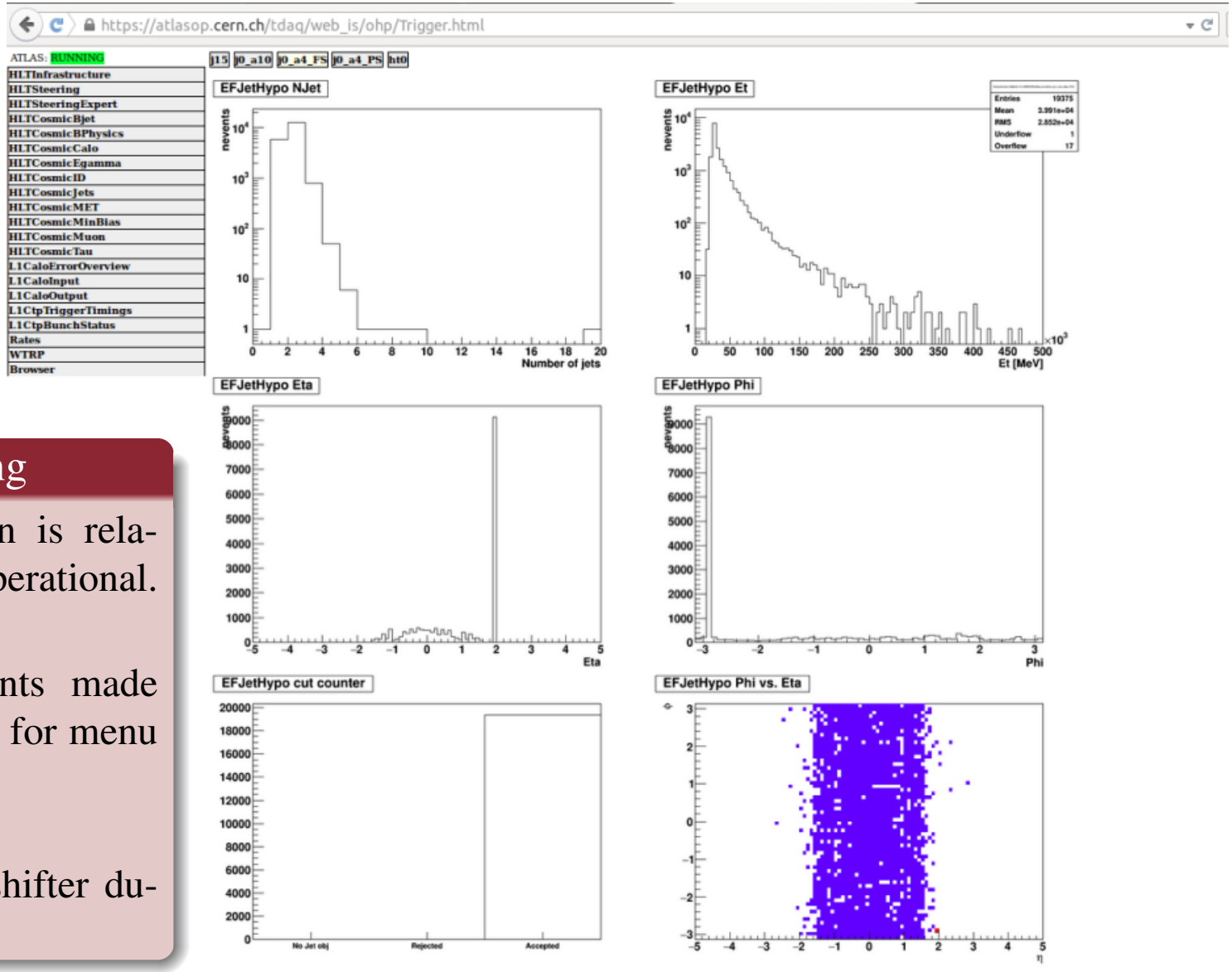
- No specific jet triggers requested
- E/p triggers would be important (see "Open Issues" later)

Jet triggers in moderate $\langle\mu\rangle$ run ($\langle\mu\rangle \sim 0.5$)

- `j10,j15,j25...j175` and `_320eta490` (i.e. from `j10` up to the first unprescaled jet trigger)
- Considering adding requests for multiple calibration configurations as well for early calibration comparisons

OHP monitoring working

Giulio Grossi, Lee Sawyer



Online monitoring

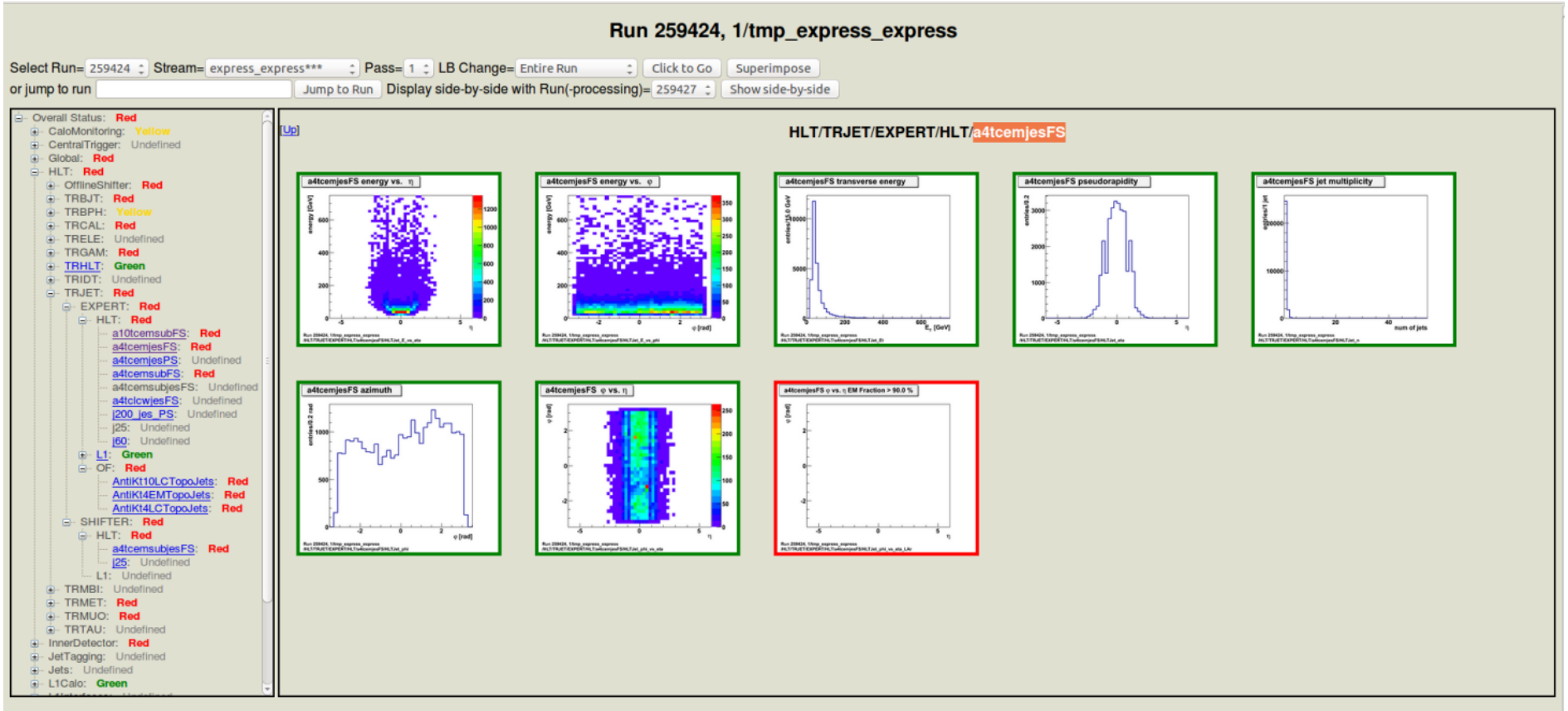
OHP configuration is relatively stable and operational.

Regular adjustments made and cross-checked for menu updates.

Standard task in shifter duties

Offline monitoring working

Giulio Grossi, Lee Sawyer



- Extensive and up-to-date **offline** monitoring in place
- Again, standard task in shifter duties
- Plans for extensions to the monitoring plots for efficiency comparisons and calibration checks w.r.t. offline (see “Open Issues”)

Software development and validation (I)

Peter Sherwood, Nuno Anjos, Lee Sawyer (+ offline group!)

```
TrigEDMChecker REGTEST Got jet container HLT_xAOD__JetContainer_a4tclcwsubjesFS, size: 7
TrigEDMChecker REGTEST Looking at jet 1
TrigEDMChecker REGTEST    pt: 152665
TrigEDMChecker REGTEST    eta: -0.00683636
TrigEDMChecker REGTEST    phi: 2.81077
TrigEDMChecker REGTEST    m: 7678.41
TrigEDMChecker REGTEST    e: 152861
TrigEDMChecker REGTEST    px: -144387
TrigEDMChecker REGTEST    py: 49588.2
TrigEDMChecker REGTEST    pz: -1043.68
TrigEDMChecker REGTEST    type: xAOD::Type::Jet
TrigEDMChecker REGTEST    algorithm (kt: 0, cam: 1, antikt: 2, ...): 2; should be 2
TrigEDMChecker REGTEST    size parameter: 0.4; should be 0.4
TrigEDMChecker REGTEST    input (LCTopo: 0, EMTopo: 1, TopoTower: 2, ...): 0; should be 0
TrigEDMChecker REGTEST    constituents signal state (uncalibrated: 0, calibrated: 1): 1; should be 1
TrigEDMChecker REGTEST    number of constituents: 8
TrigEDMChecker REGTEST    Got constituent vector, size: 8; should be 8
TrigEDMChecker REGTEST    FracSamplingMaxIndex: 2
TrigEDMChecker REGTEST    ActiveArea: 0.498666
TrigEDMChecker REGTEST    AverageLArQF: 111.318
TrigEDMChecker REGTEST    BchCorrCell: 0
TrigEDMChecker REGTEST    CentroidR: 1893.06
TrigEDMChecker REGTEST    HECQuality: 0
TrigEDMChecker REGTEST    LArQuality: 0
TrigEDMChecker REGTEST    NegativeE: -790.483
TrigEDMChecker REGTEST    Timing: 0.02109
TrigEDMChecker REGTEST    FracSamplingMax: 0.542925
TrigEDMChecker REGTEST    EMFrac: 0.812707
TrigEDMChecker REGTEST    HECFrac: 0
TrigEDMChecker REGTEST    N90Constituents: 2
TrigEDMChecker REGTEST    OotFracClusters10: 0
TrigEDMChecker REGTEST    OotFracClusters5: 0
```

Jet properties

Year:	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015
Month:	3	3	3	3	3	3	3	3	3	3	3	3
Day:	21	22	23	24	25	26	27	28	29	30	31	31
rel	_5	_6	_0	_1	_2	_3	_4	_5	_6	_0	_1	_2
Job CPU time (sec):	5230	3656	3271	3342	3171	2911	1656	1246	1312	1875	1442	1434
Job Max memory (MB):	1662	1656	1658	1642	1649	1657	1589	1589	1600	1583	1595	1589
n events in test:	999	999	999	999	999	999	1000	1000	1000	1000	1000	1000
HLT_j55	920	920	920	920	920	920	934	934	934	934	934	934
HLT_j55_L1RD0	922	922	922	922	922	922	934	934	934	934	934	934
HLT_j60	890	890	890	890	890	890	901	901	901	901	901	901
HLT_j60_280eta320	27	27	27	27	27	27	27	27	27	27	27	27
HLT_j60_320eta490	24	24	24	24	24	24	22	22	22	22	22	22
HLT_j60_L1RD0	891	891	891	891	891	891	901	901	901	901	901	901
HLT_j85	655	655	655	655	655	655	644	644	644	644	644	644
HLT_j85_280eta320	19	19	19	19	19	19	17	17	17	17	17	17
HLT_j85_280eta320_jes	21	21	21	21	21	21	17	17	17	17	17	17
HLT_j85_280eta320_lcw	18	18	18	18	18	18	18	18	18	18	18	18
HLT_j85_280eta320_lcw_jes	21	21	21	21	21	21	18	18	18	18	18	18
HLT_j85_280eta320_lcw_nojcalib	18	18	18	18	18	18	14	14	14	14	14	14
HLT_j85_280eta320_nojcalib	9	9	9	9	9	9	4	4	4	4	4	4
HLT_j85_320eta490	14	14	14	14	14	14	9	9	9	9	9	9
HLT_j85_jes	778	778	778	778	778	778	644	644	644	644	644	644
HLT_j85_L1RD0	655	655	655	655	655	655	644	644	644	644	644	644
HLT_j85_lcw	600	600	600	600	600	600	641	641	641	641	641	641
HLT_j85_lcw_jes	737	737	737	737	737	737	643	643	643	643	643	643
HLT_j85_lcw_nojcalib	616	616	616	616	616	616	544	544	544	544	544	544
HLT_j85_nojcalib	410	410	410	410	410	410	337	337	337	337	337	337

Trigger counts

None of the above would have been possible without significant, persistent and skilled efforts to upgrade our software for in deep ways for Run 2

- Completely revamped jet configuration allows for enormous flexibility to define multiple calibrations, jet algorithms, and jet hypos easily and **consistently**
- Extensive collaboration with offline made this possible, and dedication from our software experts (incl. monitoring!) made it happen: **Thanks Peter, Nuno and Lee!**

Software development and validation (II)

Peter Sherwood, Nuno Anjos, Lee Sawyer (+ offline group!)

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TrigEDMChecker REGTEST    size parameter: 0.4; should be 0.4
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Day:	21	22	23	24	25	26	27	28	29	30	31	31
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HLT_j60	890	890	890	890	890	890	901	901	901	901	901	901
HLT_j60_280eta320	27	27	27	27	27	27	27	27	27	27	27	27
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HLT_j60_L1RD0	891	891	891	891	891	891	901	901	901	901	901	901
HLT_j85	655	655	655	655	655	655	644	644	644	644	644	644
HLT_j85_280eta320	19	19	19	19	19	19	17	17	17	17	17	17
HLT_j85_280eta320_jes	21	21	21	21	21	21	17	17	17	17	17	17
HLT_j85_280eta320_lcw	18	18	18	18	18	18	18	18	18	18	18	18
HLT_j85_280eta320_lcw_jes	21	21	21	21	21	21	18	18	18	18	18	18
HLT_j85_280eta320_lcw_nojcalib	18	18	18	18	18	18	14	14	14	14	14	14
HLT_j85_280eta320_nojcalib	9	9	9	9	9	9	4	4	4	4	4	4
HLT_j85_320eta490	14	14	14	14	14	14	9	9	9	9	9	9
HLT_j85_jes	778	778	778	778	778	778	644	644	644	644	644	644
HLT_j85_L1RD0	655	655	655	655	655	655	644	644	644	644	644	644
HLT_j85_lcw	600	600	600	600	600	600	641	641	641	641	641	641
HLT_j85_lcw_jes	737	737	737	737	737	737	643	643	643	643	643	643
HLT_j85_lcw_nojcalib	616	616	616	616	616	616	544	544	544	544	544	544
HLT_j85_nojcalib	410	410	410	410	410	410	337	337	337	337	337	337

Trigger counts

New capabilities and understanding:

- Multiple jet definitions (`a4, a10, a10r`), calibrations, pile-up subtraction, and chain definitions
- Jet properties for jet cleaning and calibration (incl. GSC!)
- New and updated monitoring plots and capabilities (e.g. trigger aware monitoring)

Software development and validation (III)

Huge amount of effort just in the past few month to resolve outstanding issues!

*(Jan 26th compared to April 1st...**not an April Fool's joke!**)*

Thanks to Sebastien Prince, Nuno Anjos, Peter Sherwood, and many more!

Issue Subscription
Filter: Jet Trigger Bug Reports (184 issues)
Subscriber: fizisist

T	Key	Summary	Assignee	Reporter	P	Status	Resolution	Created	Updated	Due
	ATR-9895	Jet trigger diagnositcs algorithms are crashing due ot '.' in the chain name	Moritz Backes	Peter Sherwood	*	RESOLVED	Fixed	20/Jan/15	21/Jan/15	
	ATR-9881	Difference in TrigJetHypo results with different chain order	Aranzazu Ruiz Martinez	Stewart Martin-Haugh	*	OPEN	Unresolved	19/Jan/15	20/Jan/15	
	ATR-9870	Difference in Trigger Results when using TrigSteer_HLT.sortChains 1 vs. -1	Aranzazu Ruiz Martinez	Patrick Czodrowski	*	OPEN	Unresolved	16/Jan/15	21/Jan/15	
	ATR-9869	WARNING Could not retrieve xAOD::EventShape	Nuno Miguel Goncalves Dos Anjos	Sebastien Prince	*	OPEN	Unresolved	16/Jan/15	16/Jan/15	
	ATR-9865	JetContainers not filled	Ricardo Jose Morais Silva Goncalo	Sebastien Prince	*	OPEN	Unresolved	15/Jan/15	15/Jan/15	
	ATR-9860	Aux containers missing	Ricardo Jose Morais Silva Goncalo	Sebastien Prince	*	OPEN	Unresolved	15/Jan/15	16/Jan/15	
	ATR-9836	Memory leak in LVL1::L1JEMJetTools	Alan Watson	Antonio Limosani	*	OPEN	Unresolved	14/Jan/15	26/Jan/15	
	ATR-9820	EFRazor monitoring warning (variable not exported)	Peter Sherwood	Frank Winklmeier	*	OPEN	Unresolved	13/Jan/15	13/Jan/15	
	ATR-9815	Remove INFO message in TrigHLTEnergyDensity	Peter Sherwood	Frank Winklmeier	*	OPEN	Unresolved	13/Jan/15	13/Jan/15	
	ATR-9813	Jet slice memory leaks	Ricardo Jose Morais Silva Goncalo	Sebastien Prince	*	OPEN	Unresolved	12/Jan/15	12/Jan/15	
	ATR-9812	Changes in trigger counts	Sebastien Prince	Sebastien Prince	*	OPEN	Unresolved	12/Jan/15	12/Jan/15	
	ATR-9792	JetSplitterAllTE WARNING Got an empty inputTE	Ricardo Jose Morais Silva Goncalo	Frank Winklmeier	*	OPEN	Unresolved	09/Jan/15	22/Jan/15	
	ATR-9771	Missing L1 thresholds (XE and Jet)	Kunihiro Nagano	Frank Winklmeier	*	CLOSED	Fixed	09/Jan/15	15/Jan/15	
	ATR-9752	HT chains implemented in JetDef	Aranzazu Ruiz Martinez	Kunihiro Nagano	*	OPEN	Unresolved	06/Jan/15	12/Jan/15	
	ATR-9744	Wrong trigger counts in multi-jet chains	Sebastien Prince	Ricardo Jose Morais Silva Goncalo	*	CLOSED	Fixed	05/Jan/15	08/Jan/15	
	ATR-9696	Use of THistSvc in JetBadChanCorrTool	Pierre-Antoine Delsart	Frank Winklmeier	*	OPEN	Unresolved	11/Dec/14	22/Jan/15	
	ATR-9672	Bug in Trigger EDM AuxContainer names	Fabrizio Salvatore	David Miller	*	CLOSED	Fixed	09/Dec/14	15/Jan/15	
	ATR-9633	ERROR The method dumpxAODJetContainer() failed	Sebastien Prince	Stewart Martin-Haugh	*	IN PROGRESS	Unresolved	06/Dec/14	12/Jan/15	
	ATR-9614	ERROR Unable to find input collection: CaloCalTopoClusters	David Adams	Stewart Martin-Haugh	*	OPEN	Unresolved	03/Dec/14	15/Jan/15	
	ATR-9598	Errors and unexpected behaviour in AthenaTrigRDOtoESDAOD test	Peter Sherwood	Nuno Miguel Goncalves Dos Anjos	*	CLOSED	Fixed	02/Dec/14	13/Jan/15	
	ATR-9596	How to switch off JetAlfgorithm?	David Adams	Peter Sherwood	*	CLOSED	Won't Fix	02/Dec/14	02/Dec/14	
	ATR-9581	xAOD Migration of TrigEFJetMassDEta.cxx in TrigJetHypo	David Miller	Florian Urs Bernlochner	*	CLOSED	Fixed	30/Nov/14	07/Jan/15	
	ATR-9580	EventShape with key Kt4EMTopoEventShape already exists.	David Adams	ATLAS Trigger Release Validation Shifter	⊘	CLOSED	Fixed	30/Nov/14	09/Dec/14	
	ATR-9574	TrigHLTJetRec-00-00-27, TriggerMenu-00-05-10 incompatible with JetRec-02-04-54 and beyond	Nuno Miguel Goncalves Dos Anjos	Nuno Miguel Goncalves Dos Anjos	⊘	CLOSED	Fixed	30/Nov/14	30/Nov/14	
	ATR-9571	Crash in JES for Trigger	Joseph Peter Kirchhorm-Taehzer	Nuno Miguel Goncalves Dos Anjos	⊘	CLOSED	Fixed	29/Nov/14	03/Dec/14	
	ATR-9521	Jet trigger menu	Moritz Backes	David Miller	*	OPEN	Unresolved	26/Nov/14	23/Jan/15	
	ATR-9421	Failure to initialize calib_AntiKt4TopoEM_a tool	Unassigned	Lauren Alexandra Tompkins	⊘	CLOSED	Cannot Reproduce	14/Nov/14	18/Nov/14	
	ATR-9393	AntiKt4TopoEM fails to find ../Root/JetCalibrationTool.cxx	Unassigned	Sami Kama	⊘	CLOSED	Duplicate	12/Nov/14	12/Nov/14	
	ATR-9359	dijet data-scouting chain for M7	Catrin Bernius	Tetiana Hryn'Ova	*	CLOSED	Fixed	10/Nov/14	25/Nov/14	
	ATR-9354	Jet trigger chains for M7	Catrin Bernius	Ricardo Jose Morais Silva Goncalo	*	RESOLVED	Fixed	10/Nov/14	10/Nov/14	
	ATR-9331	Drop in jet and b-jet counts	Unassigned	Katharine Leney	*	CLOSED	Duplicate	05/Nov/14	07/Nov/14	
	ATR-9329	Drop in the bjet and jet counts	Ricardo Jose Morais Silva Goncalo	Merve Sahinsoy	*	CLOSED	None	05/Nov/14	24/Nov/14	
	ATR-9321	Jet L1 seed change	Elisabetta Pianori	Ricardo Jose Morais Silva Goncalo	*	REOPENED	Unresolved	04/Nov/14	26/Jan/15	
	ATR-9291	L1 seed for razors	Moritz Backes	Noam Tal Hod	*	CLOSED	Fixed	31/Oct/14	14/Nov/14	
	ATR-9290	Jet + Central jet triggers for eta intercalibration	Unassigned	David Miller	⊘	CLOSED	Duplicate	30/Oct/14	10/Nov/14	
	ATR-9288	ht+b trigger placeholders for sampleT	Unassigned	Noam Tal Hod	*	OPEN	Unresolved	30/Oct/14	08/Jan/15	
	ATR-9287	Warning from JetPileupCorrection initilization: jet area correction without residual offset correction	Nuno Miguel Goncalves Dos Anjos	Thomas Mccarthy	⊘	CLOSED	Fixed	30/Oct/14	08/Jan/15	
	ATR-9247	Menu compiling failure from TrigHLTJetRec_param: No module named JetSimTools.JetSimToolsConf	Pierre-Antoine Delsart	Yu Higuchi	*	CLOSED	Cannot Reproduce	27/Oct/14	29/Oct/14	
	ATR-9243	Problem accessing online containers	Nuno Miguel Goncalves Dos Anjos	Katharine Leney	*	CLOSED	Cannot Reproduce	24/Oct/14	12/Nov/14	
	ATR-9215	b-jet chains to test offline tools	Yu Higuchi	Kunihiro Nagano	*	CLOSED	Fixed	20/Oct/14	28/Nov/14	
	ATR-9165	Chain error: j200_PS and 3j175_PS	Aranzazu Ruiz Martinez	Iwona Grabowska-Bold	*	CLOSED	Fixed	07/Oct/14	05/Nov/14	
	ATR-9084	Core dump in mc12_all_fpeAna/RecExAnaTest	Stefania Xella	Fairouz Malek	*	CLOSED	Duplicate	17/Sep/14	24/Sep/14	17/Sep/14
	ATR-9070	Implement permanent solution for xAOD::EventInfo	Ricardo Jose Morais Silva Goncalo	Sebastien Prince	*	OPEN	Unresolved	14/Sep/14	14/Sep/14	
	ATR-8994	Floating point exception in TrigHLTJetRec	David Miller	Stewart Martin-Haugh	*	CLOSED	Fixed	01/Sep/14	05/Nov/14	
	ATR-8924	Unable to access online jet info in xAOD	Gordon Watts	Katharine Leney	*	CLOSED	Won't Fix	19/Aug/14	10/Sep/14	
	ATR-8868	Jet trigger chains for M5	Catrin Bernius	Ricardo Jose Morais Silva Goncalo	⊘	CLOSED	Duplicate	11/Aug/14	11/Aug/14	

Software development and validation (III)

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	ATR-10714	Emulation and simulation discrepancies in DETA-JJ	Unassigned	Imma Riu	*	OPEN	Unresolved	31/Mar/15	31/Mar/15	
	ATR-10690	j0 chains have 0 counts	Peter Sherwood	Sebastien Prince	*	OPEN	Unresolved	30/Mar/15	30/Mar/15	
	ATR-10687	trivial menu 'fixes'	Viviana Cavaliere	Anna Sfyrla	*	CLOSED	Fixed	30/Mar/15	31/Mar/15	
	ATR-10643	ToolSvc.calib_AntiKt4TopoEM_trigger_aj WARNING	Ricardo Jose Morais Silva Goncalo	Sebastien Prince	*	CLOSED	Not a Bug	25/Mar/15	26/Mar/15	
	ATR-10640	a10r containers having misleading information?	Ricardo Jose Morais Silva Goncalo	Sebastien Prince	*	OPEN	Unresolved	25/Mar/15	25/Mar/15	
	ATR-10638	Emulation discrepancies of L1_HT using sorted lists of jets	Maria Veronica Sorrri	Imma Riu	*	RESOLVED	Fixed	25/Mar/15	01/Apr/15	
	ATR-10630	problem with ht triggers	Peter Sherwood	Tetiana Hryn'Ova	*	CLOSED	Duplicate	24/Mar/15	26/Mar/15	
	ATR-10623	ERROR std::exception caught: SG::ExcInvalidLink: Attempt to dereference invalid DataLink / ElementLink in LeptonJetMatchAlgTE_CloseBy_RZ	Unassigned	ATLAS Trigger Release Validation Shifter	*	CLOSED	Duplicate	23/Mar/15	23/Mar/15	
	ATR-10619	No event in jets+met triggers	Stefania Xella	Antoine Marzin	*	CLOSED	Fixed	23/Mar/15	26/Mar/15	
	ATR-10594	RDOtoESDAOD_Physics Core dump from CoreDumpSvc Current algorithm: jetalg	Sebastien Prince	ATLAS Trigger Release Validation Shifter	*	CLOSED	Moved	20/Mar/15	27/Mar/15	
	ATR-10580	Algorithms producing ABORT_EVENT online, ending in debug_stream	Michael Christian Rammensee	Carlos Chavez Barajas	*	OPEN	Unresolved	19/Mar/15	01/Apr/15	
	ATR-10561	TrigEDMChecker reported "ERROR There was no filled jet containers", but returned a StatusCode "SUCCESS"	Sebastien Prince	ATLAS Trigger Release Validation Shifter	*	CLOSED	Fixed	18/Mar/15	30/Mar/15	
	ATR-10554	L1 eta region for L1_5J15.0ETA24?	William James Fawcett	Ricardo Jose Morais Silva Goncalo	*	RESOLVED	Fixed	18/Mar/15	31/Mar/15	
	ATR-10542	Observation of strange EF__ numerical Jet-trigger names/items/hypos	Peter Sherwood	Patrick Czodrowski	*	CLOSED	Not a Bug	18/Mar/15	18/Mar/15	
	ATR-10539	EF.jetHypoNoiseConfig WARNING Cannot really use ISInfo publication. got exception Incorrect type LArNoiseBurstCandidates	Denis Oliveira Damazio	Sebastien Prince	*	CLOSED	Fixed	18/Mar/15	29/Mar/15	
	ATR-10481	AthenaTrigRDO_noFPE failing in 20.1.3.Y, P1HLT with EFRazor_j30_Razor170	Aranzazu Ruiz Martinez	Francesca Pastore	*	CLOSED	Fixed	10/Mar/15	12/Mar/15	
	ATR-10458	ImportError: No module named JetMomentTools.JetMomentToolsConf	Unassigned	ATLAS Trigger Release Validation Shifter	*	CLOSED	Fixed	09/Mar/15	11/Mar/15	
	ATR-10435	j0 PS chains mostly always rejected	Peter Sherwood	Sebastien Prince	*	CLOSED	Fixed	08/Mar/15	30/Mar/15	
	ATR-10423	PyTriggerMenu.menu.GenerateMenu ERROR GenerateMenu: Problems creating ChainDef	Peter Sherwood	ATLAS Trigger Release Validation Shifter	*	CLOSED	Fixed	05/Mar/15	12/Mar/15	
	ATR-10421	Extending the HT dictionary for clarity	Ricardo Jose Morais Silva Goncalo	Ricardo Jose Morais Silva Goncalo		CLOSED	Fixed	05/Mar/15	31/Mar/15	
	ATR-10415	HLT reprocessing of EnhancedBias data with 20.1.2.1	Simon George	Brian Petersen	*	CLOSED	Fixed	05/Mar/15	27/Mar/15	
	ATR-10413	Too long Trigger element names in MC menu	Moritz Backes	Brian Petersen	*	CLOSED	Fixed	05/Mar/15	16/Mar/15	
	ATR-10412	found jet with negative mass	Ricardo Jose Morais Silva Goncalo	Stefania Xella	*	CLOSED	Duplicate	05/Mar/15	15/Mar/15	
	ATR-10402	WARNINGs in 20.1.3.Y Prod, MC15 prep	Stefania Xella	Stefania Xella	*	CLOSED	Fixed	04/Mar/15	30/Mar/15	
	ATR-10391	INFO printout in TrigHLTJetHemisphereRec	Lawrence Lee Jr	Frank Winklmeier	*	CLOSED	Fixed	04/Mar/15	16/Mar/15	
	ATR-10355	INFO printouts from TrigHLTJetDSSelector in event loop	Caterina Doglioni	Brian Petersen	*	CLOSED	Fixed	01/Mar/15	10/Mar/15	
	ATR-10351	FPE in TrigHLTJetRecFromCluster_a4tcemsubjesFS	Nuno Miguel Goncalves Dos Anjos	Stefania Xella	*	CLOSED	Fixed	01/Mar/15	20/Mar/15	
	ATR-10332	No HLT CaloCellContainers in 20.1.0.4 Validation Samples	Craig Wiglesworth	Craig Wiglesworth	*	OPEN	Unresolved	26/Feb/15	23/Mar/15	
	ATR-10319	Conditional jump or move depends on uninitialised value in jet::JetCalcNegativeEnergy::jetCalculation	David Adams	Gordon Watts	*	CLOSED	Fixed	25/Feb/15	31/Mar/15	
	ATR-10316	FPE in TrigHLTJetRecFromCluster_a4tcemsubjesFS	David Miller	ATLAS Trigger Release Validation Shifter	*	CLOSED	Duplicate	25/Feb/15	10/Mar/15	
	ATR-10300	Jet moments trying to read root file via THistSvc	Unassigned	Brian Petersen	*	CLOSED	Duplicate	24/Feb/15	24/Feb/15	
	ATR-10298	Missingf files in JetCalibTools in GroupData	Unassigned	Michael Christian Rammensee	*	CLOSED	Not a Bug	24/Feb/15	16/Mar/15	
	ATR-10252	L10MATCH-4AJ20.ETA32-4AJj15 giving zero counts	Imma Riu	Imma Riu	*	CLOSED	Fixed	19/Feb/15	26/Feb/15	
	ATR-10201	problem with xe0_L1All	Unassigned	ATLAS Trigger Release Validation Shifter	*	CLOSED	Fixed	15/Feb/15	16/Feb/15	
	ATR-10200	TriggerMenu problem in j0_perf_bperf_L1J12	Unassigned	ATLAS Trigger Release Validation Shifter	*	CLOSED	Fixed	15/Feb/15	19/Feb/15	
	ATR-10197	Bug fix needed for jet slice RTT tests	Peter Sherwood	Peter Sherwood	*	CLOSED	Fixed	14/Feb/15	16/Feb/15	
	ATR-10142	different HLT jet energies in same event	Nuno Miguel Goncalves Dos Anjos	Ignacio Aracena	*	CLOSED	Fixed	11/Feb/15	24/Mar/15	
	ATR-10099	Large changes in counts for TE names corresponding to perf chains	Ricardo Jose Morais Silva Goncalo	Thomas Mccarthy		CLOSED	Not a Bug	09/Feb/15	27/Feb/15	
	ATR-10084	ERROR createHolder: holder can't be done, no predefined storage found for CLID 119371444	Unassigned	Moritz Backes	*	CLOSED	Fixed	07/Feb/15	15/Mar/15	
	ATR-10082	write to JetTrigAuxContainer in LeakCheck_default_igprof	Peter Sherwood	ATLAS Trigger Release Validation Shifter	*	CLOSED	Duplicate	06/Feb/15	07/Feb/15	
	ATR-10065	StreamAOD FATAL Check number of writes failed (coming from xAOD::JetTrigAuxContainer)	Ricardo Jose Morais Silva Goncalo	Stewart Martin-Haugh		CLOSED	Fixed	05/Feb/15	15/Feb/15	
	ATR-10064	Cannot access jet constituents from an xAOD	Nuno Miguel Goncalves Dos Anjos	Sebastien Prince	*	CLOSED	Not a Bug	05/Feb/15	02/Mar/15	
	ATR-10058	fix streaming for M8	Yu Higuchi	Tetiana Hryn'Ova	*	CLOSED	Fixed	04/Feb/15	09/Feb/15	
	ATR-10056	Seg Fault in AthenaTrigESD_HLTMonitoring	Sebastien Prince	ATLAS Trigger Release	*	REOPENED	Unresolved	04/Feb/15	30/Mar/15	

L1Topo emulation validation

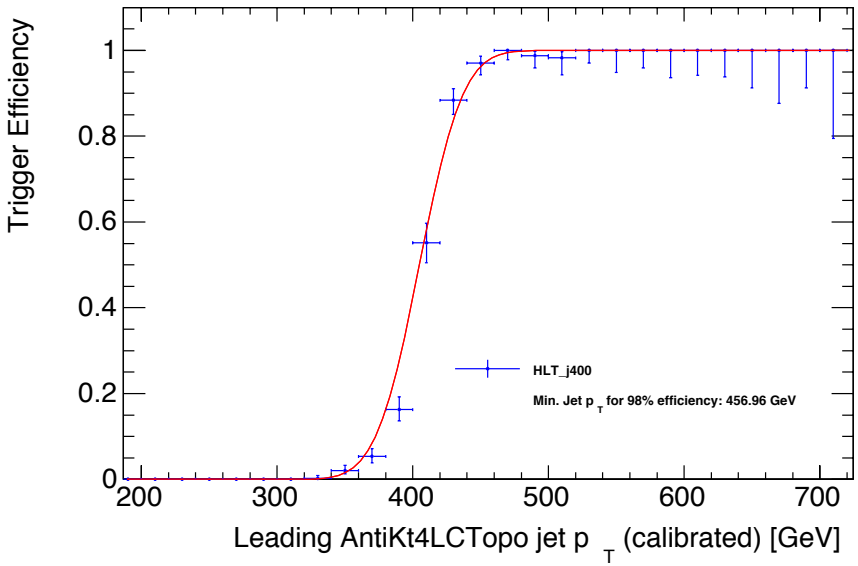
Imma Riu

L1Topo item	Sample A accepts	Emulation accepts
HT190-J15.ETA20	1151	1151
HT190-J15s5.ETA20	1148	1144
HT150-J20.ETA30	1958	1958
HT150-J20s5.ETA30	1958	1957
HT20-AJj15all.ETA49	4879	4879

- Overall, very good agreement with the L1Topo simulation
  - Emulation using xAODs from sample A
  - `valid2.110401.PowhegPythia_P2012_ttbar_nonallhad.recon.AOD.e3099_s2579_r6172`
- Few weird discrepancies found in items using restricted lists of jets.
  - One of our new "issues": `https://its.cern.ch/jira/browse/ATR-10638`

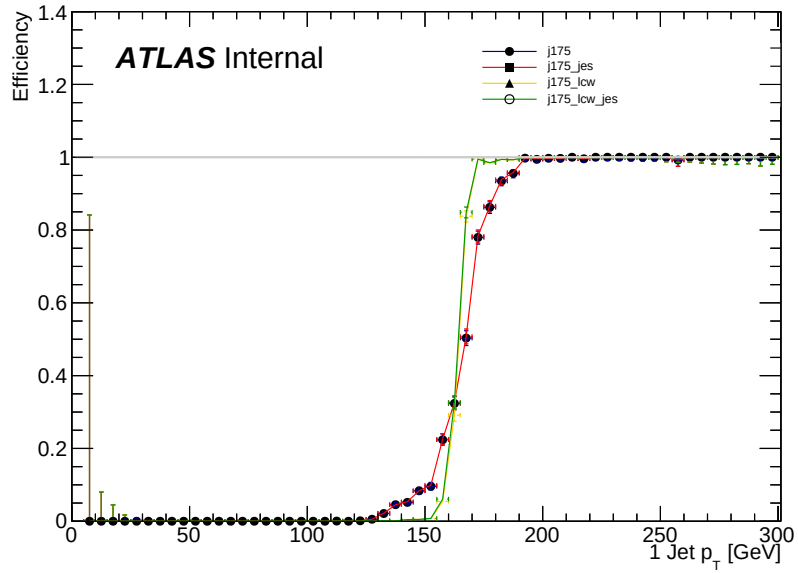
Single jet efficiency studies

Merlin Davies



HLT_j400 ($t\bar{t}$)

Will Fawcett

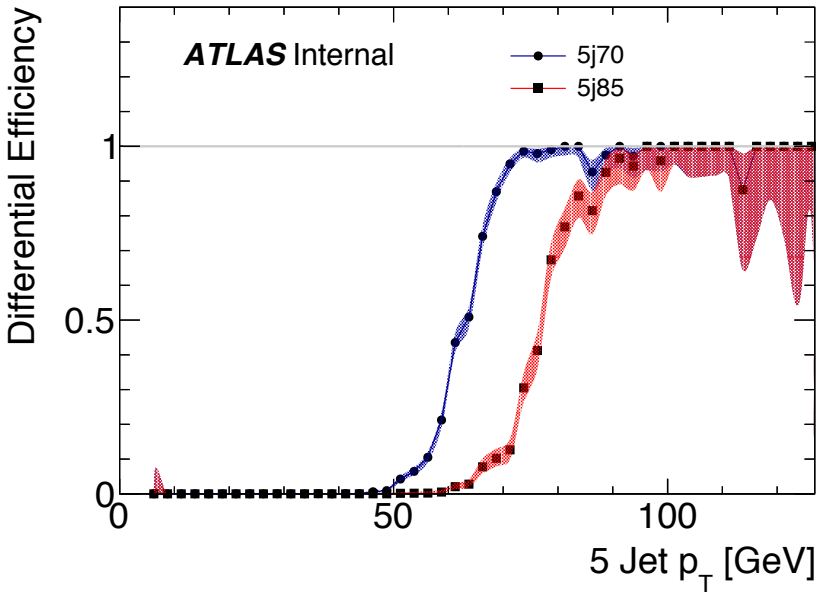


HLT_j175 (various calibrations; $t\bar{t}$)

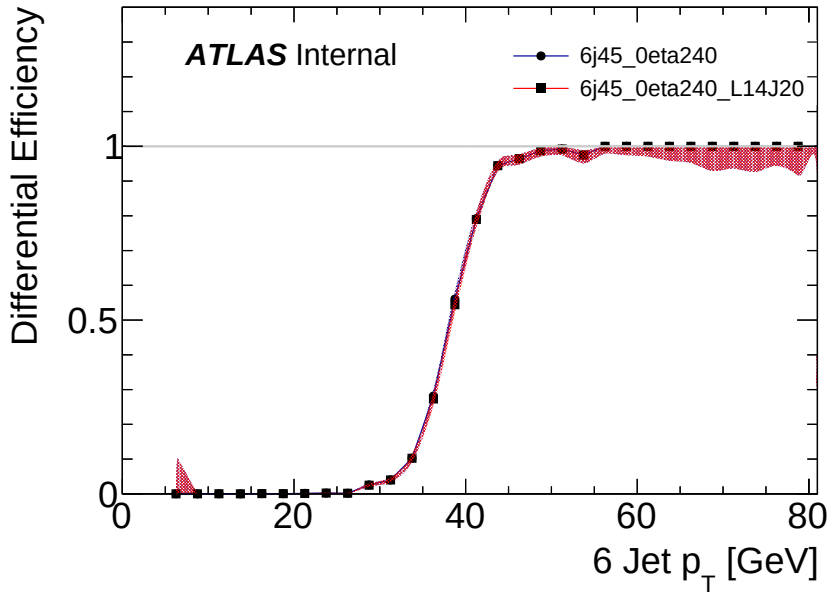
- Significant progress on performance studies; Focusing on trigger efficiency curves
- See very good (and expected!) threshold widths and values
- Initial indication that LCW has advantages, but *offline jet energy scale used as reference not in sync* (i.e. offline LCW jets used for HLT EM+JES jets)
- Next steps: refine details, cross-check rates, direct resolution studies

Multi-jet efficiency studies

Will Fawcett



5 jet triggers

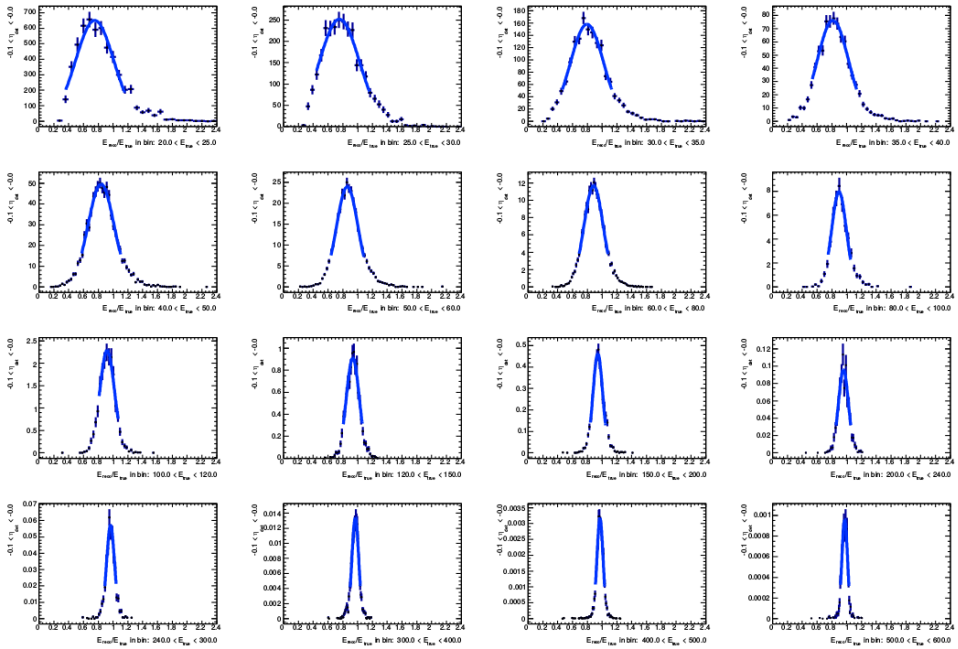


6 jet triggers

- Studies continued with mutlijet trigger chains (primarily in context of SUSY multijet analysis)
- Excellent turn-ons for both 5jet and 6jet triggers!
- Details being followed-up

HLT jet calibration

Markus Wobisch

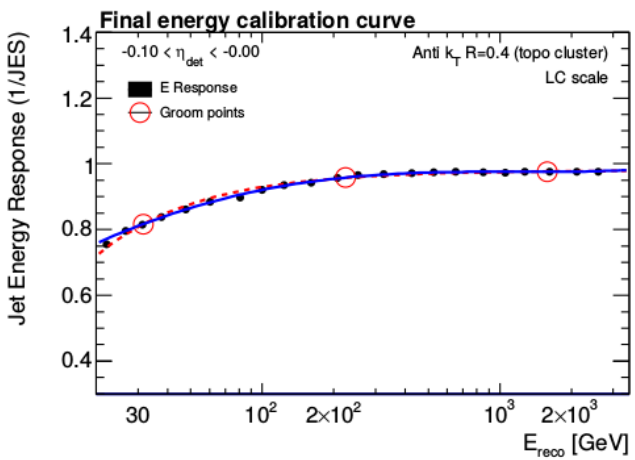


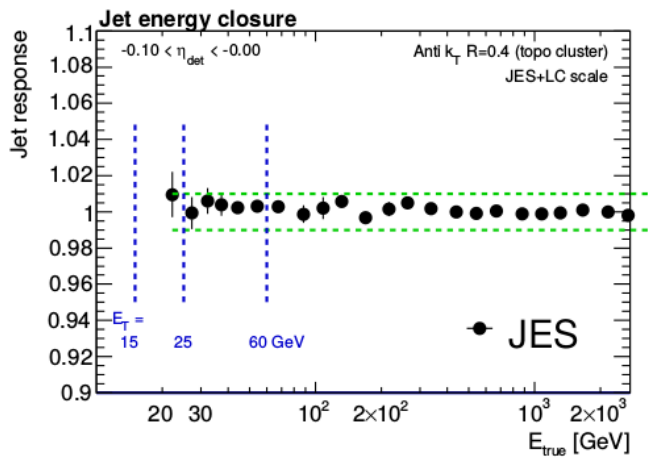
Jet calibration efforts

Good progress towards providing final jet calibrations

Flexible and extensive calibration menu implies many new calibrations required

Identical framework to offline jet calibration being used for HLT JES determination





Trigger commissioning

- Run new features online as early as possible for functional validation and finding potential problems – commission with collisions later
- Compare with offline jets
  - Large overlap in performance is essential to avoid wasting bandwidth – Includes pileup subtraction
- Default running mode is to commission/run with calorimeter full-scan – But keep partial-scan as (essential) plan B and develop Trigger Towers as intermediate backup
- **Staged approach:**
  - Cosmics runs
    - Capitalizing on cosmic muon runs heavily so face
    - Improve monitoring, build operations team, fine-tune strategy **(good progress!)**
  - Continue during beam commissioning period
    - Adapt to issues, and deploy new triggers (e.g. partial scan, online jet cleaning) if absolutely needed
  - Ready to use collisions data when it comes
    - Validate pile-up subtraction and calibrations with comparisons to offline
    - Confirm L1Topo performance using identical HLT HYPOs seeded from non-L1Topo items

Some ideas for initial public results

- **Jet trigger "standalone" performance and properties**
  - Number of topoclusters per event
  - Timing plots with partial scan
  - p_{T} spectra for all jets
  - Trigger rates for each chain
  - Rate vs. N_{PV} or ρ, with and without subtraction
  - Jet p_{T} vs. N_{PV} or ρ, with and without subtraction
  - Jet multiplicity vs N_{PV} or ρ, with and without subtraction
  - Re-clustered jet turn on curve compared to fat-jet turn on curve
  - Jet cleaning on data scouting jets with each successive cut
- **Online vs. offline comparisons**
  - Comparison of pile-up energy density online and offline
  - Turn on curves w.r.t. offline for different jet collections and calibrations
  - p_{T} resolution w.r.t. offline for different calibrations
  - Angular resolution for all jets w.r.t. offline
  - Jet energy resolution and invariant mass resolution for data scouting jets

Primary remaining open issues

Core software

- Trigger Towers for Level 1.5 **(almost there!)**
- Trigger level analysis, needs byte stream converter (many thanks to Ricardo Abreu for helping here!)
  - https://its.cern.ch/jira/browse/ATR-9767

Trigger menu

- Global sequential calibration (GSC) **(almost there!)**
- E/p triggers for single isolated hadrons
- Jet cleaning hypo (in case "noisy" jets are an issue in data)
- Implement final HLT JES calibrations and deploy and test

Operations and monitoring

- Add efficiency to offline monitoring histograms
- Luminosity aware monitoring

Conclusions

- Jet trigger has come a very very long way in a matter of months!
  - Adapted to completely new offline software framework
  - Implemented completely new functionality in jet trigger
  - Built up new software development and operations teams
  - Put in place new monitoring to keep track of all of the new triggers
- **Could not have been done without numerous dedicated, clever, and hard-working individuals!**
- Still have many things to follow-up
  - HLT calibrations (*software workflow now in place!*)
  - Trigger level analysis core software
  - E/p triggers
  - GSC calibration capability (*core functionality in place!*)
- Validation of all of these new functionalities is now our most visible task (*see earlier efficiency studies!*)

Additional Material

Outline

Jet trigger menu (I)

Level 1 seed	Rate @ 0.5 & 2x10^{34}	HLT chain	Rate @ 0.5 & 2x10^{34}	Prescale@2x10^{34}	Clients
L1_RD0		j55_a4tcemsubjes	O(Hz)	?	bootstrap
		j60_a4tcemsubjes	O(Hz)	?	bootstrap
J12	0.95 / 3.8 MHz	j55_a4tcemsubjes	150 / 600 kHz	600,000 – 1 Hz	taus
J15	0.53 / 2.1 MHz	j60_a4tcemsubjes	100 / 400 kHz	400,000 – 1 Hz	taus, btag
J20	240 / 970 kHz	j85_a4tcemsubjes	21 / 85 kHz	85,000 – 1 Hz	taus, multi-j
		j85_a4tcemjes			
		j85_a4tclcwsubjes			
		j85_a4tclcwjes			
J25	130 / 510 kHz	j100_a4tcemsubjes	10 / 41 kHz	41,000 – 1 Hz	taus
J30	75 / 300 kHz	j110_a4tcemsubjes	6.5 / 26 kHz	26,000 – 1 Hz	LAr calib
J40	32 / 130 kHz	j150_a4tcemsubjes	1.6 / 6.5 kHz	6500 – 1 Hz	J+MET
J50	15 / 60 kHz	j175_a4tcemsubjes	0.75 / 3 kHz	3000 – 1 Hz	multijet
		j175_a4tcemjes			
		j175_a4tclcwsubjes			
		j175_a4tclcwjes			

Jet trigger menu (II)

Level 1 seed	Rate @ 0.5 & 2x10^{34}	HLT chain	Rate @ 0.5 & 2x10^{34}	Prescale@2x10^{34}	Clients
J60	7.5 / 30 kHz	j200_a4tcemsubjes	0.4 / 1.6 kHz	1600 – 1 Hz	btag
J75	4 / 17 kHz	j260_a4tcemsubjes	140 / 400 Hz	400 – 1 Hz	btag, low Lumi
J85	2.5 / 10 kHz	j300_a4tcemsubjes	67 / 270Hz	200 – ≈1 Hz	multijet, medium Lumi
		j320_a4tcemsubjes	43 / 170 Hz	150 – ≈1 Hz	multijet, medium Lumi
J100	1.3 / 5 kHz	j360_a4tcemjes	22 / 90 Hz	100 – ≈1 Hz	unprescaled at 1x10^{32} or lower: aim for 1-2 points during year to change lowest unprescaled chain
		j380_a4tcemsubjes	16 / 65 Hz	50 – ≈1 Hz	
		j380_a4tcemjes			
		j380_a4tclcwsubjes			
		j380_a4tclcwjes			
		j400_a4tcemsubjes	9 / 35 Hz	unprescaled	Also re-think set of cross-check chains with different calibrations if needed
		j400_a4tcemjes			
		j400_a4tclcwsubjes			
		j400_a4tclcwjes			
J120	1.3 / 2.7 kHz	j460_a4tcemjes + cross-check chains	<1 / 2.8 Hz	unprescaled	High Lumi
J400	0 / 0 Hz	noAlg	5.5 Hz	unprescaled	Passthrough

Jet trigger menu (III)

Level 1 seed	@ 0.5 & 2x10^{34}	HLT chain	@ 0.5 & 2x10^{34}	Prescale@2x10^{34}	Clients
3J40	0.4 / 1.6 kHz	4j85_a4tcemsubjes	45 / 180 Hz	180	
3J50	0.3 / 1.0 kHz	4j100_a4tcemsubjes	12 / 50 Hz	unprescaled	SUSY, SM, top, jets
4J15	2.4 / 9.5 kHz	5j55_a4tcemsubjes	65 / 260 Hz	260	
4J20	0.5 / 1.9 kHz	5j60_a4tcemsubjes	40 / 170 Hz	170	
4J20	0.5 / 1.9 kHz	5j85_a4tcemsubjes	4 / 15 Hz	unprescaled	SUSY, SM, top, jets
		5j85_a4tcemjes			
		5j85_a4tclcwsubjes			
		5j85_a4tclcwjes			
5J15.0ETA24	0.1 / 0.3 kHz	6j45.0eta24_a4tcemsubjes	25 / 100 Hz	100	SUSY, SM (*)
5J15.0ETA24	0.1 / 0.3 kHz	6j50.0eta24_a4tcemsubjes	10 / 40 Hz	unprescaled	SUSY, SM (*)
5J15.0ETA24	0.1 / 0.3 kHz	6j55.0eta24_a4tcemsubjes	8 / 30 Hz	30	SUSY, SM (*)
HT150	3 / 12 kHz	j360_a10_a4tcemsubjes	14 / 60 Hz	60	exotics, jets
HT190	1.2 / 5 kHz	j460_a10_a4tcemsubjes	2 / 8 Hz	unprescaled	exotics, jets

Jet trigger menu (IV)

Level 1 seed	Rate @ 0.5 & 2x10^{34}	HLT chain	Rate @ 0.5 & 2x10^{34}	Prescale@2x10^{34}	Clients
J15.24ETA49	?	j60.24eta49	?	?	egamma
J15.28ETA32	?	j60.28eta32	?	?	SUSY, SM, top, jets
J20.28ETA32	?	j85.28eta32	?	?	jets
J15.32ETA49	?	j60.32eta49	?	?	jets
J20.32ETA49	?	j85.32eta49	?	?	jets
J30.32ETA49	?	j110.32eta49	?	?	jets
J50.32ETA49	?	j175.32eta49	0	unprescaled	jets
J75.32ETA49	?	j260.32eta49	0	unprescaled	SM
J100.32ETA49	?	j360.32eta49	0	unprescaled	SM

Level 1 seed	Rate @ 0.5 & 2x10^{34}	HLT chain	Rate @ 0.5 & 2x10^{34}	Prescale@2x10^{34}	Clients
HT190	1.2 / 5 kHz	ht1000	3.5/14 Hz (0 unique)	unprescaled	
HT150		Ht500(?)		prescaled	