Royal Holloway
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Trigger Tools for Physics Analysis

Some use cases
Building a data sample
Event by event analysis
Input from across the Atlantic
conclusions

Thank you! Michael Begel, Gustaaf Brooijmans, Tomasz Bold, Till Eifert, Sinead Farringdon, Teresa Fonseca, Simon George, Rasmus Mackeprang, Srini Rajagopalan, Joerg Stelzer, et al.

Data selection and normalization

Tag and probe

Trigger efficiency correction

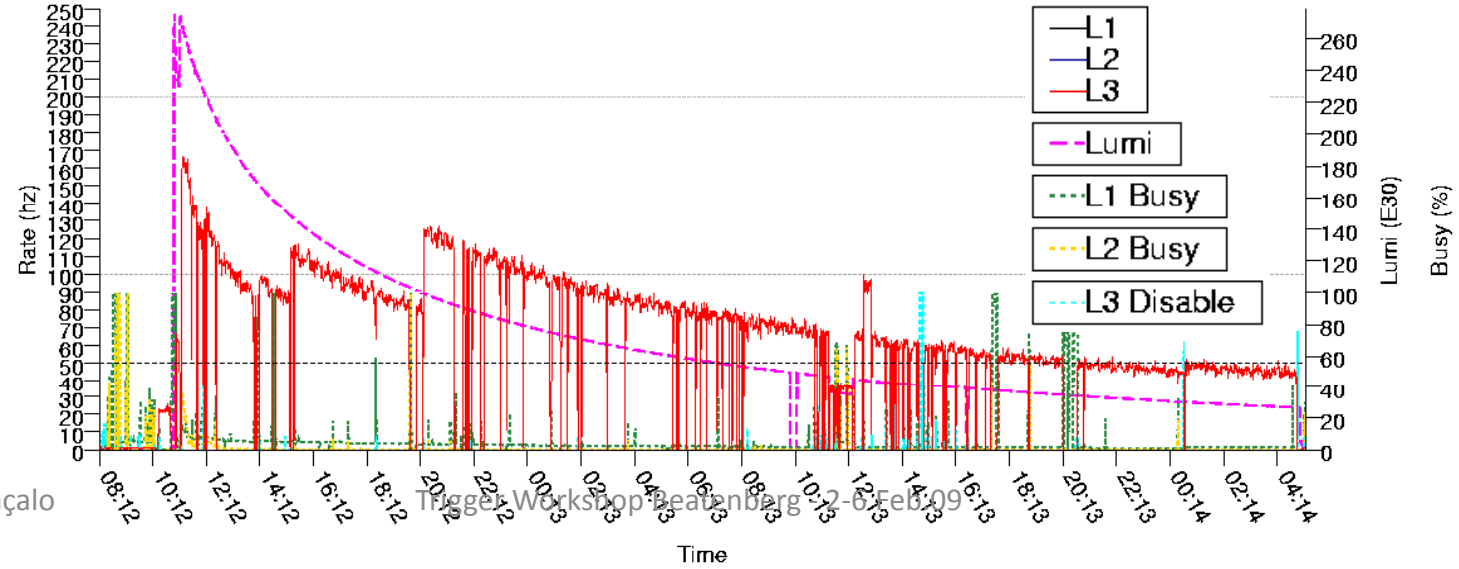
Menu for Monte Carlo generation

USE CASES

Selecting and normalising a data set

- Analysis may rely on a specific trigger or group of triggers (OR) to select events
- Trigger decision used to stream events
- Tag database can be used to build up dataset based on trigger decision

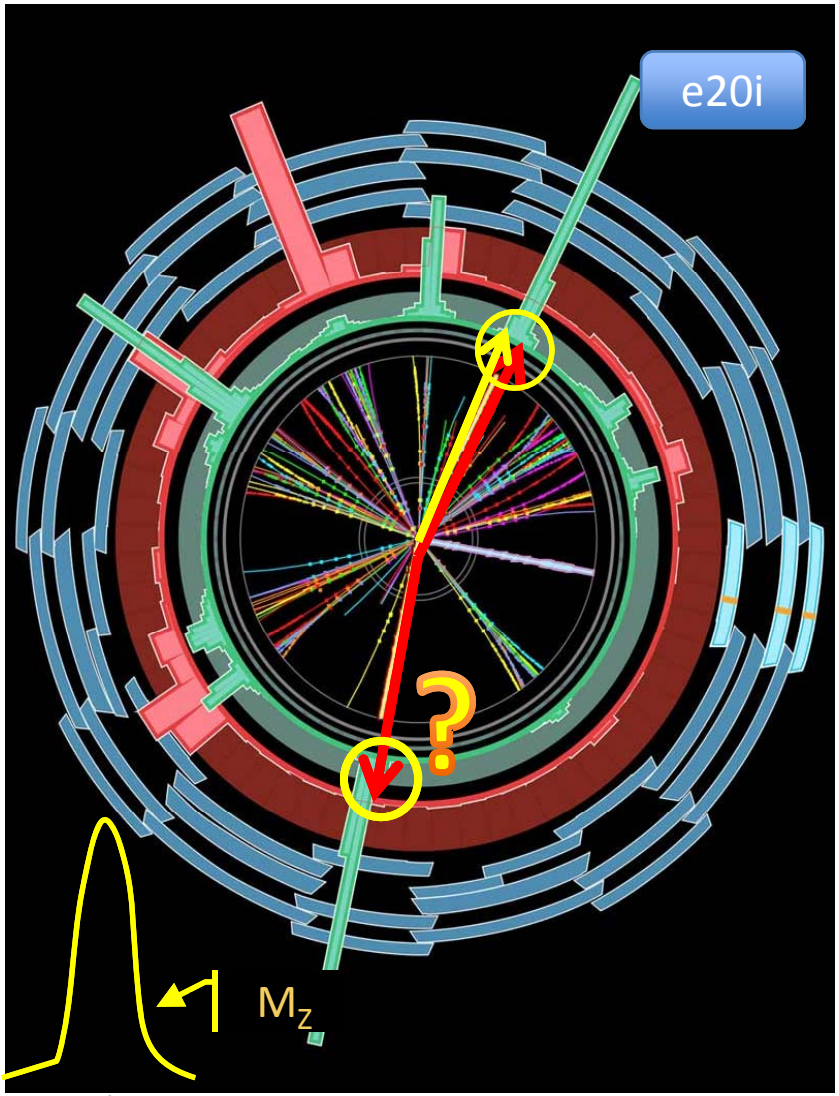
- Normalising a dataset:
  - Need to either take the trigger efficiency into account
  - Or guarantee that the trigger efficiency with respect to the offline selection is ≈100%
  - Efficiency of prescaled trigger needs further correction
  - Prescale factor may change frequently – constant for each luminosity block
    - too frequent changes should probably be limited, at least in the beginning
  - The situation becomes more complicated for an OR of several prescaled triggers…
  - Similar issues in other experiments, but with prescale periods longer than luminosity blocks



Tag and probe

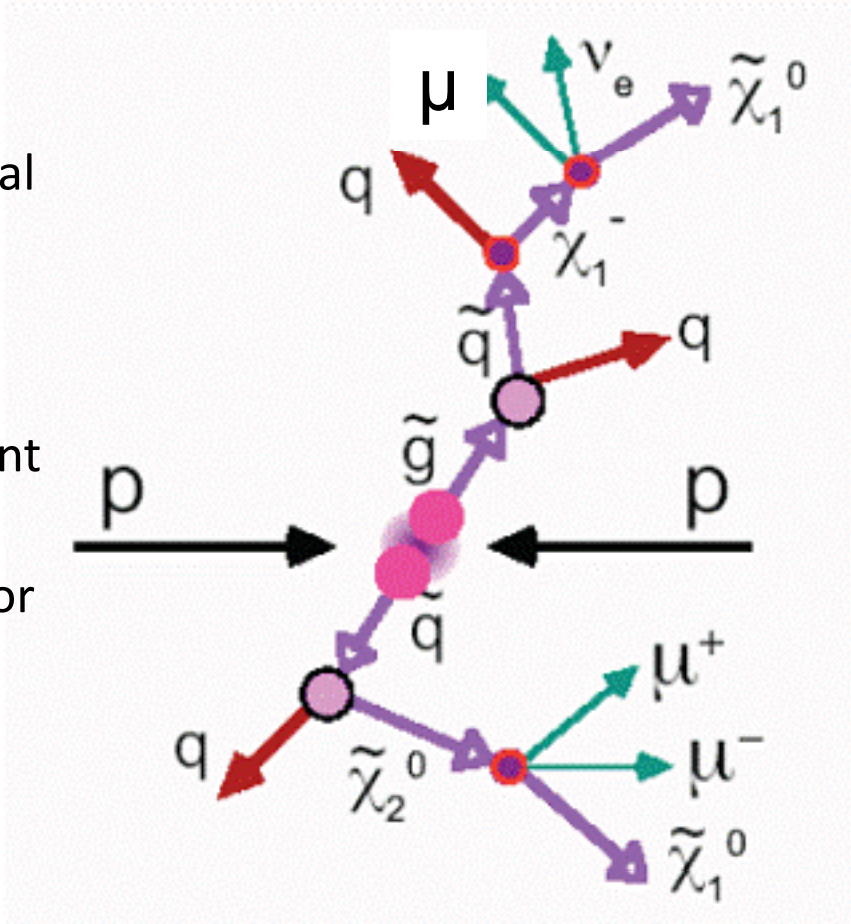
- Tag & Probe:
- Selected events with single-lepton trigger
- Offline: select Z->l^+l^- events
  - Reconstruct >=2 leptons
  - Apply m_Z and fiducial cuts etc
- Match one of the 2 leptons with a trigger lepton passing single trigger
- Search for second matching trigger lepton
- Count successes in 2nd matching

Need to be able to match offline objects with online objects:
✓Minimal info needed is RoI η and ϕ
✓Better matching would need trigger objects (muon hits, perigee, etc)



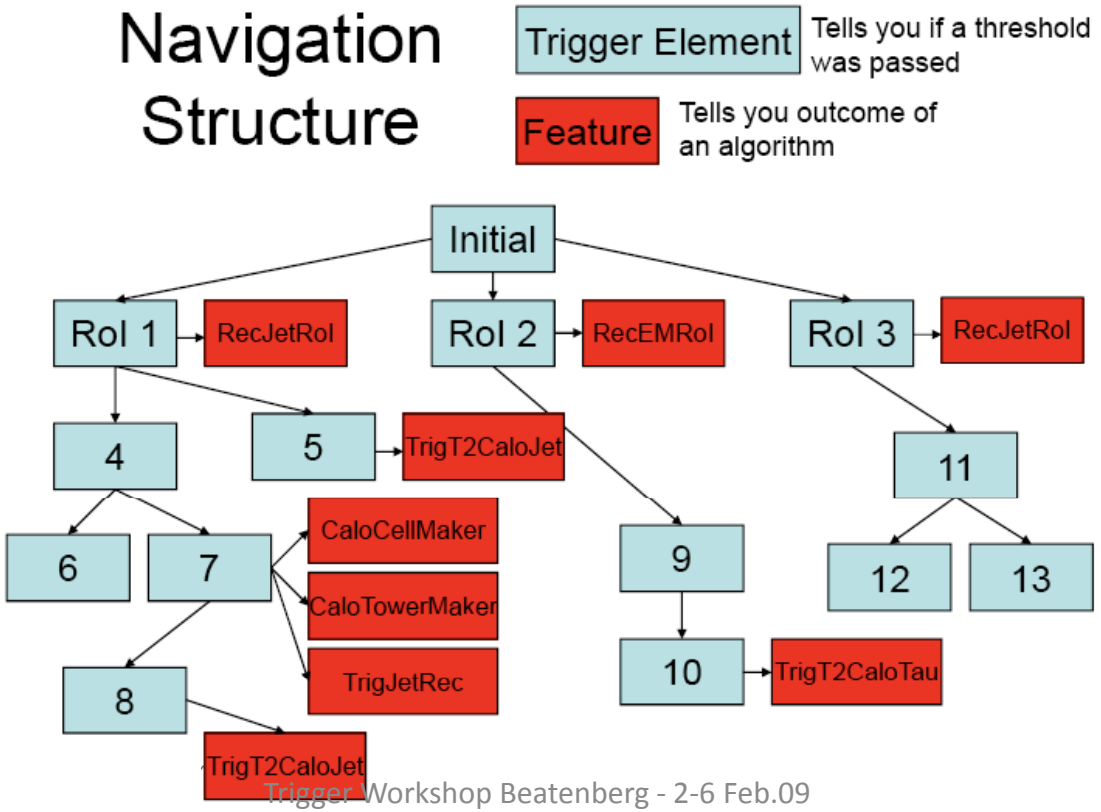
Another example (artificial?... not so much)

- X_2^0 cross section:
  - $\sigma = (N_{obs}-N_{bkg})/(A\ \varepsilon_{trig}\ \varepsilon_{off}\ L)$
  - Trigger and offline muon efficiency determined per initial muon (tag&probe)
  - Select events with >= 2 μ to increase stats
  - Find μμ pair in one side of event and identify X_2^0
  - Correct trigger efficiency ε_{trig} for events with 3 muons
- Needs to match trigger and offline objects to avoid miscalculation



Trigger Navigation

• Trigger event processing coded into navigation tree: chains, sequences, trigger elements – navigation is 'snapshot' of event at end of trigger processing
• Data produced during trigger processing ("features") attached to nodes of navigation tree ("trigger elements")
• Navigation tree and features stored in HLTResult objects (into ESD, AOD, DPD)
• Allows to "navigate" to data produced somewhere in trigger chain



Menus for Monte Carlo generation

- Related issue:
  - What trigger menu to use when generating MC samples?
    - What menu composition?
    - What prescale set?

- For MC samples to be compared with data in store:
  - Menu composition determined by triggers active during running period
  - Prescale set:
    - May be possible to determine an average prescale factor, p, for each trigger
      - Prescale per lumi block, p_i , weighted according to integrated luminosity per block L_i
      - Assumes instantaneous luminosity doesn't change by a huge factor
    - Otherwise need to divide sample into smaller chunks according to instantaneous luminosity?

Data quality

Trigger configuration

Luminosity and prescales

BUILDING A DATA SAMPLE

Need to know…

- Data quality check:
  - Use data quality flags
  - Different analysis will need different parts of detector active and working well

- Configuration: necessary trigger/set of triggers active in the menu
  - Determines which stream to run on
  - And with convenient configuration – selection cuts consistent with offline analysis cuts
  - Efficiency (Is it adequate to the analysis? Object based/simulation?)
  - Prescale factors (Fixed? Changing?)

- Integrated luminosity: how much in selected runs?
  - To normalise distributions and compare with MC
  - To calculate cross sections

Data quality flags

- Filled by online shifter, automatically by DQMF, verified by offline shifter
  - Stored in COOL per lumi block
  - Analysed in user analysis jobs, DPD making, etc
- Flags have several states
  - **Red**, **Green**, **Yellow**, **Black**, White
- Expected in trigger (ongoing):
  - one flag per slice
  - one flag per detector system
  - one for L1Calo, L1 muon
- Should be possible to run job on:
  - **Physics.egamma stream**
  - **From run X to run Y**
  - **Requiring e.g. Pixel, SCT and TRT >=yellow**

Red: bad
Green: good
Yellow: partially bad, some channels missing, hole in calo, etc
Black: disabled, not in partition
White: in partition
Grey: or blue, undefined, tried to check quality but couldn't

PIXEC	SCTB	SCTEA	SCTEC	TRTB	TRTEA	TRTEC
G	G	G	G	U	U	U
G	G	G	G	G	G	G
G	G	G	G	U	U	U
n.a.	R	R	R	G	G	G
n.a.	R	R	R	G	G	G
n.a.	R	R	R	G	G	G
n.a.	R	R	R	G	G	G
n.a.	G	G	G	G	G	G

Configuration Data Flow

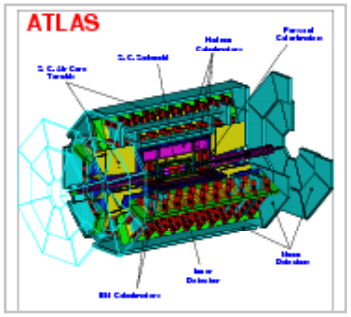
Preparation

TriggerDB
All configuration data

Configures

Stores decoded Trigger Menu

Data taking



COOL

Encoded trigger decision (trigger result from all 3 levels)

Decoded Trigger Menu

Reconstruction/ Trigger aware analysis

Trigger Result

- passed?, passed through?, prescaled?, last successful step in trigger execution?

Trigger EDM

- Trigger objects for trigger selection studies

Trigger Configuration

- Trigger names (version), prescales, pass throughs

Data formats:

ESD

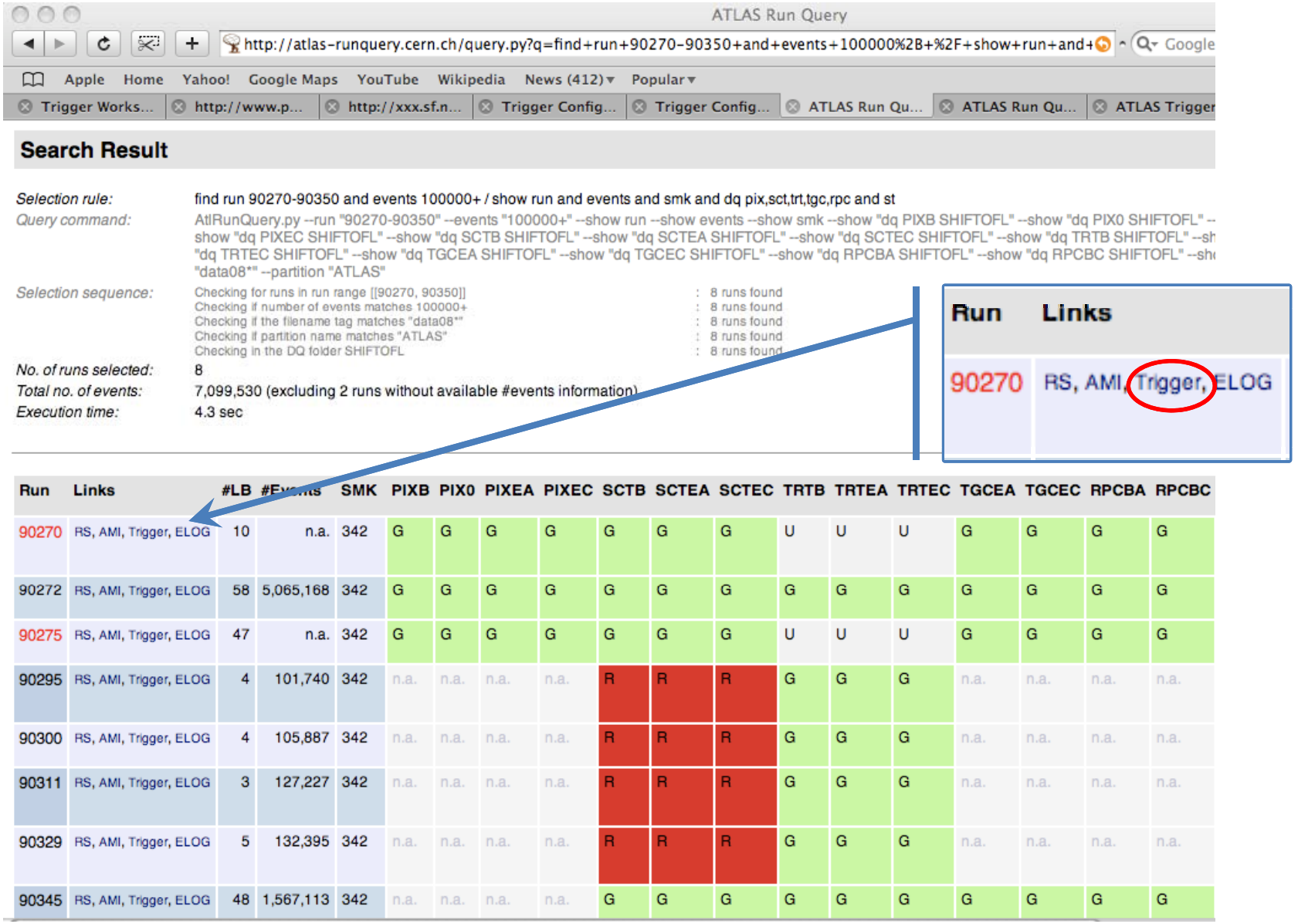
AOD

DPD

TAG

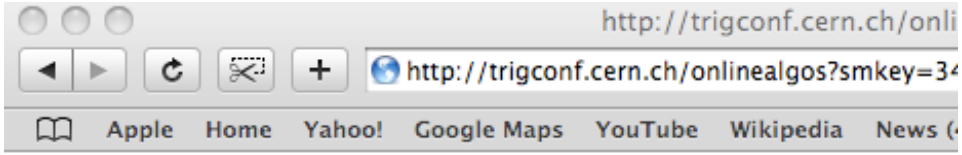
With decreasing amount of detail

Examine runs, streams, DQ, trigger SMK, etc: http://atlas-runquery.cern.ch/

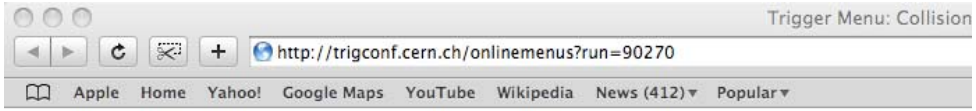


Run	Links	#LB	#Events	SMK	PIXB	PIX0	PIXEA	PIXEC	SCTB	SCTEA	SCTEC	TRTB	TRTEA	TRTEC	TGCEA	TGCEC	RPCBA	RPCBC
90270	RS, AMI, Trigger, ELOG	10	n.a.	342	G	G	G	G	G	G	G	U	U	U	G	G	G	G
90272	RS, AMI, Trigger, ELOG	58	5,065,168	342	G	G	G	G	G	G	G	G	G	G	G	G	G	G
90275	RS, AMI, Trigger, ELOG	47	n.a.	342	G	G	G	G	G	G	G	U	U	U	G	G	G	G
90295	RS, AMI, Trigger, ELOG	4	101,740	342	n.a.	n.a.	n.a.	n.a.	R	R	R	G	G	G	n.a.	n.a.	n.a.	n.a.
90300	RS, AMI, Trigger, ELOG	4	105,887	342	n.a.	n.a.	n.a.	n.a.	R	R	R	G	G	G	n.a.	n.a.	n.a.	n.a.
90311	RS, AMI, Trigger, ELOG	3	127,227	342	n.a.	n.a.	n.a.	n.a.	R	R	R	G	G	G	n.a.	n.a.	n.a.	n.a.
90329	RS, AMI, Trigger, ELOG	5	132,395	342	n.a.	n.a.	n.a.	n.a.	R	R	R	G	G	G	n.a.	n.a.	n.a.	n.a.
90345	RS, AMI, Trigger, ELOG	48	1,567,113	342	n.a.	n.a.	n.a.	n.a.	G	G	G	G	G	G	G	G	G	G

• Allows to browse the trigger menu used in that run



L2 configurations



Collision_v1

SMK 342 HLT Prescales Key: 344 Lvl1 Prescales Key: 486

If more advanced browsing is needed please launch TriggerTool Follow this link if you have trouble to launch it.

Streams

L1Calo | RNDM | TGCwBeam | MBTS_BCM_LUCID | RPCwBeam | CosmicMuons | IDCosmic | IDTracks | express | BPTX | Tile |

L1Calo

EF chain	PS	PT	STP	L2 chain	PS
e10_loose	1	0	1	e10_loose	1
e10_loose_passL2	1	0	1	e10_loose_passL2	1
e10_loose_passEF	1	0	1	e10_loose_passEF	1
e10_medium	1	0	1	e10_medium	1
g10	1	0	1	g10	1
tau12_loose	1	0	1	tau12_loose	1
tau16i_loose	1	0	1	tau16i_loose	1
tauNoCut	1	0	1	tauNoCut	1
J5	1	0	1	J5	1
J10	1	0	1	J10	1
J70	1	0	1	J70	1
3J10	1	0	1	3J10	1
FJ18	1	0	1	FJ18	1
2FJ18	1	0	1	2FJ18	1
te150	1	0	1	te150	1
xe20	1	0	1	xe20	1
tau16i_EFxe30	1	0	1	tau16i_loose	1
J50	1	0	1	J23	1
vtxbeamspot_FSTracks	1	0	1	vtxbeamspot_FSTracks	1
te150_EFonly	1	0	1		
te150_EFonly_noMu	1	0	1		
trk9i	1	0	1	trk9i	1
trk16i	1	0	1	trk16i	1
trk9i_id	1	0	1	trk9i_id	1
tauNoCut_TauRecNoTopo	1	0	1	tauNoCut_TauRecNoTopo	1
tauNoCut_calo	1	0	1	tauNoCut_calo	1

TrigL2CaloHypo/L2CaloHypo_e10_loose

AcceptAll=False
ET2thr=[90000.0,90000.0,90000.0,90000.0,90000.0,90000.0,90000.0]
HADET2thr=[999000.0,999000.0,999000.0,999000.0,999000.0,999000.0,999000.0]
dETACLUSTERthr=0.1
dPHICLUSTERthr=0.1
CAERATIOthr=[0.6,0.6,0.6,0.6,0.6,0.6,0.6]
EtaBins=[0,0.75,1.37,1.52,1.8,2.0,2.35,2.5]
ETthr=[9000.0,9000.0,9000.0,9000.0,9000.0,9000.0,9000.0]
HADETthr=[2000.0,2000.0,2000.0,2000.0,2000.0,2000.0,2000.0]
CARCOREthr=[0.85,0.85,0.85,0.85,0.85,0.85,0.85]

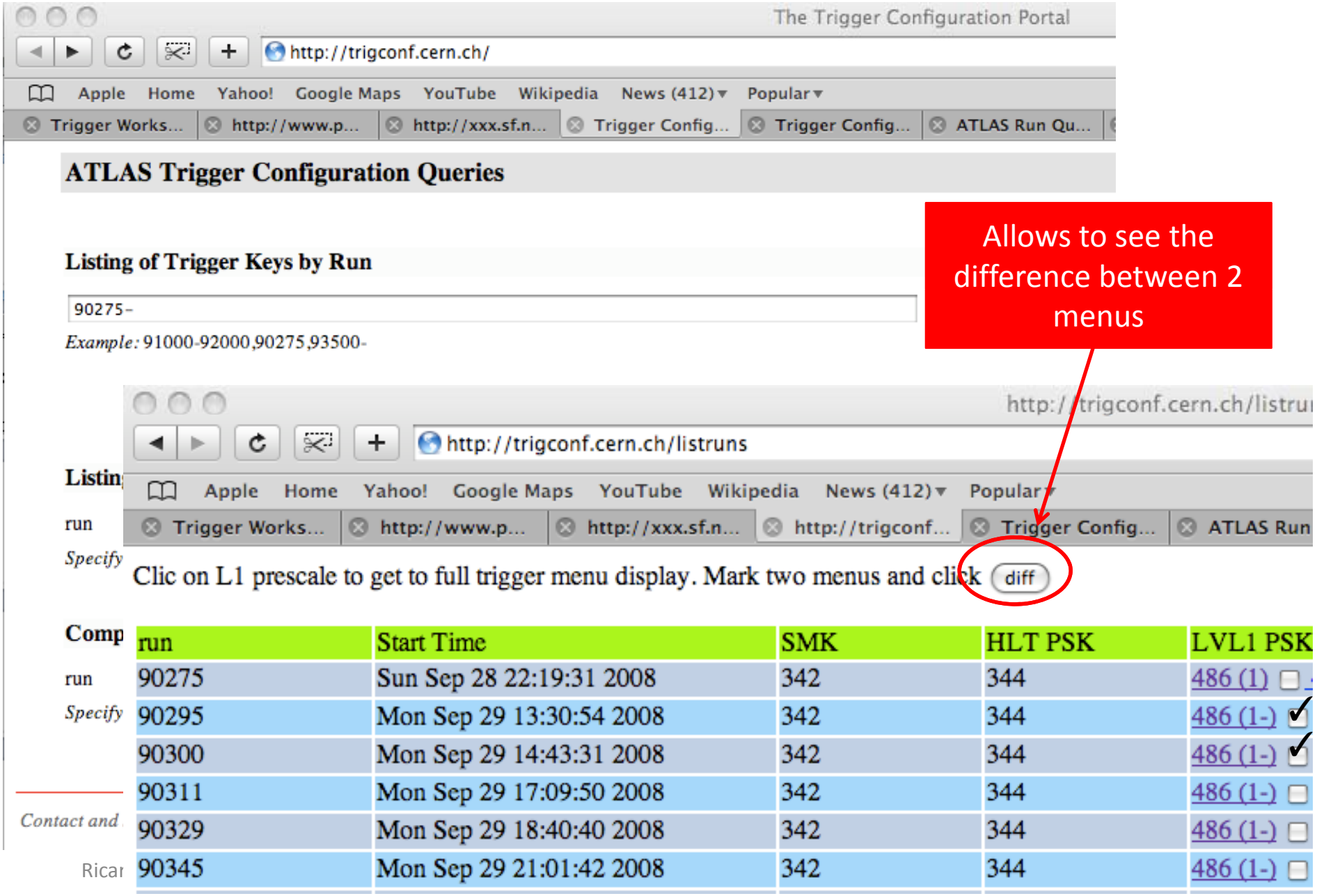
TrigTimeHistTool/L2CaloHypo_e10_loose.Time

AuditTools=False
ProcessNEvents=0(0x0)
histoPathBase=
PreScale=0(0x0)
TriggerChain=
TriggerGroup=
ManagerName=AthenaMonManager
TrigDecisionTool=
FileKey=
DataType=userDefined
Environment=noOutput
MinutesPerLB=1(0x1)
Scaler=1(0x1)
Key=[]
BookingDir=TIMERS
DoPerObjHist=False
TimerPerObjHistLimits=[0,200]
NumberOfHistBins=50(0x32)
TimerHistLimits=[0,200]

3J10	1	0	1	3J10	1	1	3J10	1
FJ18	1	0	1	FJ18	1	0	FJ18	1
2FJ18	1	0	1	2FJ18	1	0	2FJ18	1
te150	1	0	1	te150	1	0	TE150	-1
xe20	1	0	1	xe20	1	0	XE20	
tau16i_EFxe30	1	0	1	tau16i_loose	1	0	TAU9I	
J50	1	0	1	J23	1	1	J10	
vtxbeamspot_FSTracks	1	0	1	vtxbeamspot_FSTracks	1	0		
te150_EFonly	1	0	1					
te150_EFonly_noMu	1	0	1					
trk9i	1	0	1	trk9i	1	0	TAU6	
trk16i	1	0	1	trk16i	1	0	TAU9I	
trk9i_id	1	0	1	trk9i_id	1	0	TAU6	
tauNoCut_TauRecNoTopo	1	0	1	tauNoCut_TauRecNoTopo	1	0	TAU5	1
tauNoCut_calo	1	0	1	tauNoCut_calo	1	0	TAU5	1

• Can now go down to the level of individual properties of e.g. Hypo algorithms

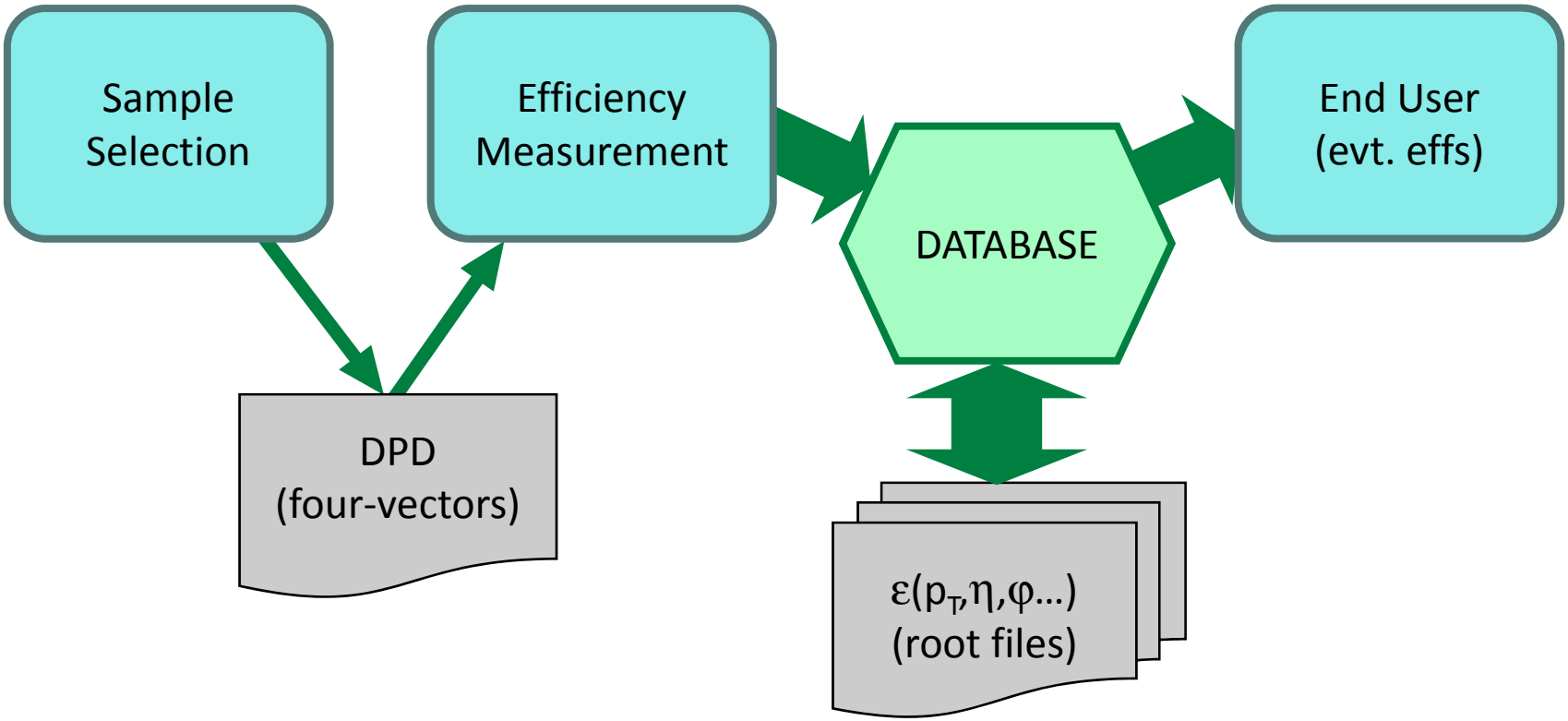
Browse trigger configuration database: http://trigconf.cern.ch/

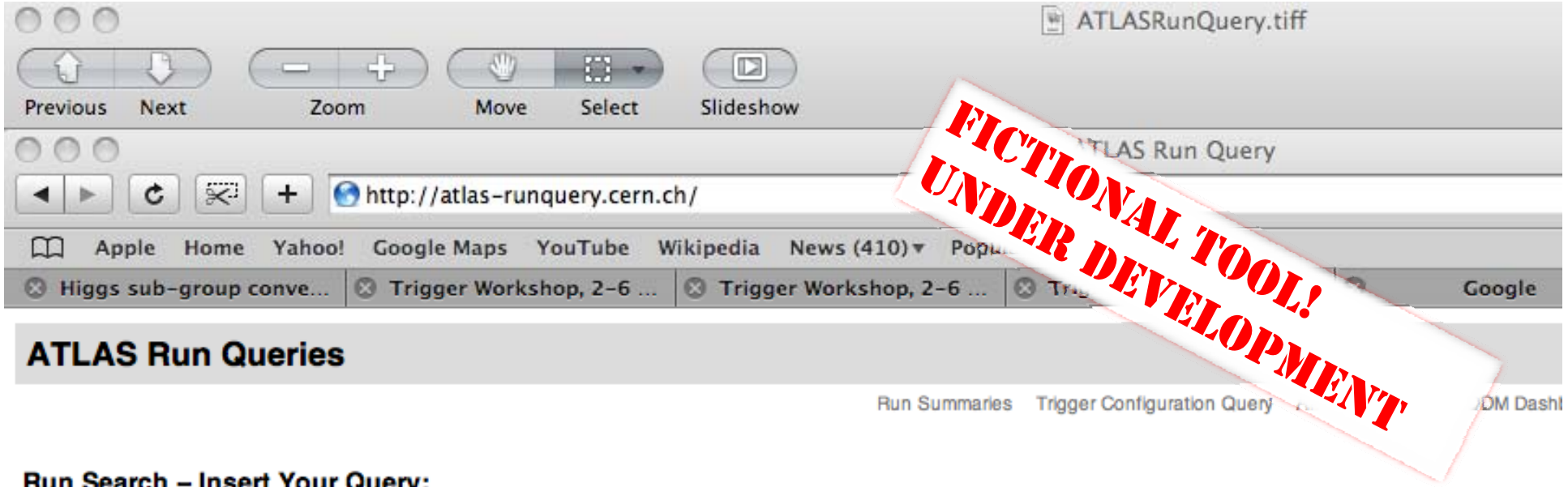


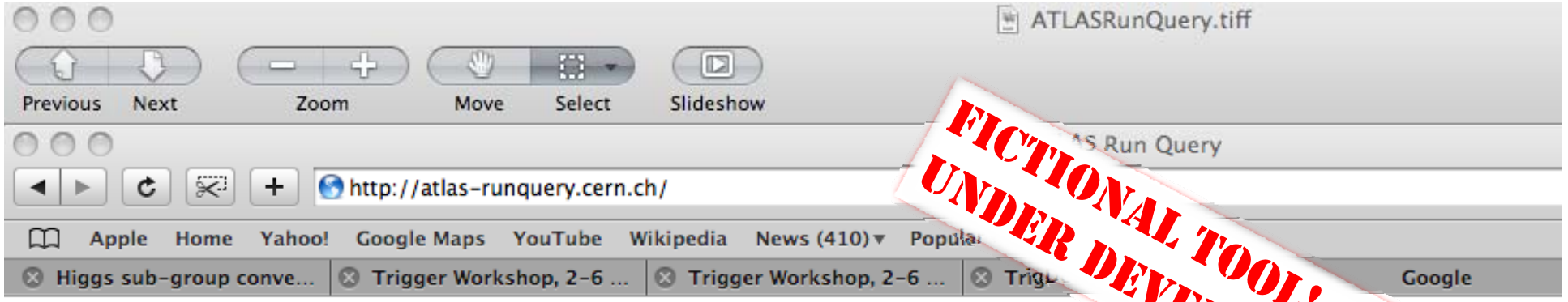
run	Start Time	SMK	HLT PSK	LVL1 PSK
90275	Sun Sep 28 22:19:31 2008	342	344	486 (1)
90295	Mon Sep 29 13:30:54 2008	342	344	486 (1-)
90300	Mon Sep 29 14:43:31 2008	342	344	486 (1-)
90311	Mon Sep 29 17:09:50 2008	342	344	486 (1-)
90329	Mon Sep 29 18:40:40 2008	342	344	486 (1-)
90345	Mon Sep 29 21:01:42 2008	342	344	486 (1-)

Infrastructure for efficiency distribution

- See talks by Corrine Mills and Matthias Schott
- Can provide a common way to apply trigger efficiencies to user analyses




ATLASRunQuery.tiff
Previous
Next
Zoom
Move
Select
Slideshow
FICTIONAL TOOL!
UNDER DEVELOPMENT
http://atlas-runquery.cern.ch/
Apple
Home
Yahoo!
Google Maps
YouTube
Wikipedia
News (410)
Higgs sub-group conve...
Trigger Workshop, 2-6 ...
Trigger Workshop, 2-6 ...
Google
ATLAS Run Queries
Run Summaries
Trigger Configuration Query
Run Search – Insert Your Query:
f r 90270-90350 and dq em y+ and dq and tr e20i / sh dq pix,sct,em,tl, lumi
Examples (query format inspired by SPIRES):
Run and event ranges
Time ranges and duration
Detectors
Streams
Lumi
Data quality
Project tag
Trigger key
Partition
find run 90270-90350 and events 100000+ / show run and events
(select runs in given run number range and min. number of events, and show runs and number of events for selected runs)
f r 90270-90350 and ev 100k+ / sh r and ev
(allowed abbreviations – same query as above; note that the show part could be dropped since same as default)
f r 90270+ and ev 100k-
(select all runs with run number greater or equal than 90270 and less than 100k events)
f r 90270-90350,90500+
(select runs run number in given range or greater or equal than 90500)
f r 90270,90275,90380 and ev 100k-200k
(select any of the given run numbers if number of events in within given range)
(More formatting help)



ATLAS Run Queries

Run Summaries Trigger Configuration Query Av... Board

Run Search – Insert Your Query:

f r 90270-90350 and dq em y+ and dq and tr e10i / sh dq pix,sct,em,til, lumi

Run	Links	#LB	#Events	PIXB	PIX0	PIXEA	PIXEC	SCTB	SCTEA	SCTEC	EMBA	EMBC	EMECA	EMECC	TILBA	Lumi (pb^{-1})
90270	RS, AMI, Trigger, ELOG	10	n.a.	G	G	G	G	G	G	G	G	Y	G	G	G	429
90272	RS, AMI, Trigger, ELOG	58	5,065,168	G	G	G	G	G	G	G	G	G	G	G	G	2051
90275	RS, AMI, Trigger, ELOG	47	n.a.	G	G	G	G	G	G	G	G	Y	G	G	G	1892
Summary:																
3 runs			5,065,168													4372 pb^{-1}

- Should be able to accept groups of triggers to be OR'ed (but need to be careful with this feature)
- Should give the run's integrated luminosity corrected by the prescale factor
- Perhaps it could also return the prescale factor weighted by luminosity

TrigDecisionTool

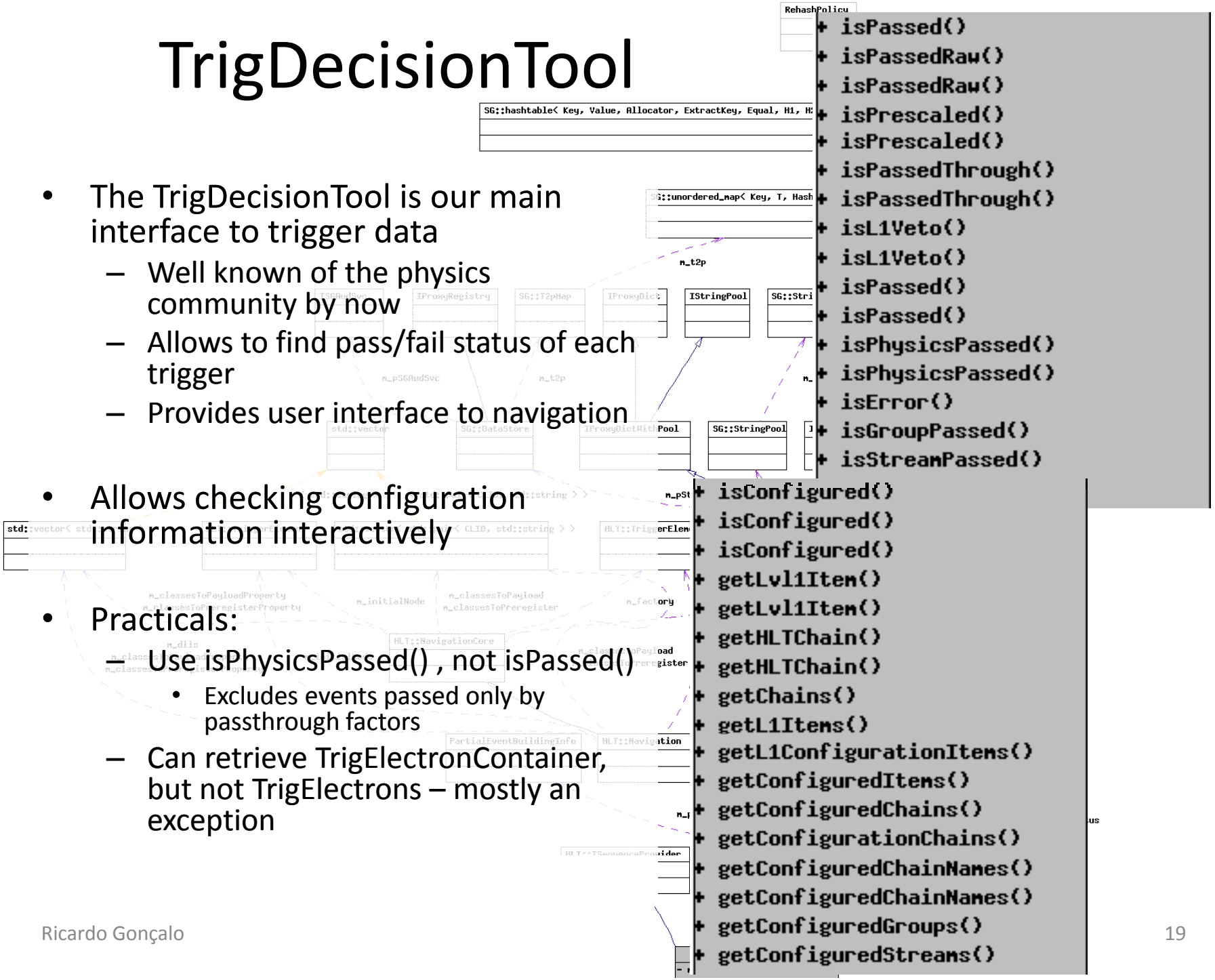
TriggerARA

New TrigDecisionTool interface

EVENT-BY-EVENT ANALYSIS

TrigDecisionTool

- The TrigDecisionTool is our main interface to trigger data
  - Well known of the physics community by now
  - Allows to find pass/fail status of each trigger
  - Provides user interface to navigation
- Allows checking configuration information interactively
- Practicals:
  - Use isPhysicsPassed() , not isPassed()
    - Excludes events passed only by passthrough factors
  - Can retrieve TrigElectronContainer, but not TrigElectrons – mostly an exception



+ getBGCode()
+ getChainSignature()
+ getChainSignature()
+ getChainTEs()
+ getChainTEs()
+ getTELabel()
+ getNavigation()
+ removeNavigation()
+ getFeature()
+ getFeatures()
+ masterKey()
+ getL1Result()
+ getL2Result()
+ getEFResult()
+ decision()
+ findSeqForOutputTeType()
+ getPassFeatures()
+ getAllFeatures()
+ getPassRoIs()
+ getAllRoIs()
+ getPassL1RoIs()
+ getAllL1RoIs()
+ getPassL1RoIs()
+ getAllL1RoIs()

- TrigDecisionTool has a few problems: complexity, robustness, etc; not really a user-friendly tool – being re-written
- See:https://twiki.cern.ch/twiki/bin/view/Atlas/TrigDecisionTool14

- Separate tool to work in ARA – only Python, no c++ version (under development)
- See: https://twiki.cern.ch/twiki/bin/view/Atlas/TriggerARA14
- and an example: http://atlas-sw.cern.ch/cgi-bin/viewcvs-atlas.cgi/groups/Arizona/ARATopAnalysis/src/TrigStudy.cxx?revision=1.1&view=markup

- New interface: TrigDecisionTool is being re-written as a dual-use tool – same usage in Athena and in ARA (M.Begel, C.Hensel)
- See: https://twiki.cern.ch/twiki/bin/view/Atlas/NewTrigDecisionToolInterface

```
std::vector<const TrigTauCluster* > vec_tauClust;
errCode = m_trigDec->getPassFeatures("L2_tau16i", vec_tauClust);
if (errCode == HLT::OK) {
      std::vector<const TrigTauCluster* >::const_iterator CI = vec_tauClust.begin();
      for(;CI != vec_tauClust.end(); ++CI) {
        (*m_log) << MSG::INFO << "REGTEST " <<" Energy in EB sampling 1: "
                        << (*CI)->energy(CaloSampling::EMB1)
                    <<" Energy in EB sampling 2: "<<(*CI)->energy(CaloSampling::EMB2)
                    <<" Energy in EB sampling 3: "<<(*CI)->energy(CaloSampling::EMB3)
                      <<endreq;
}
```

Information pages from D0

IDEAS FROM ACROSS THE SEA

D0 Online Web Query Interface

Per Run Trigger Details

for Run_Number: 208605

Run_Number	Trg_Type	Bit_Num	Depend_Bit	Bit_Name	Eg_Num	Prescale
208605 208605	L1bit	0		Afastz_ncu	0	1800000
	L1bit	1		ALiveBX_ncu	0	3400001
	L1bit	2		L1Mu_download	0	0
	L1bit	3		L1CTT_download	0	0
	L1bit	4		CEM(1,6)_ncu	0	0
	L1bit	5		CJT(1,5)_ncu	0	0
	L1bit	6		mu1pt3wtlx_TTK(1,5.)_ncu	0	1
	L1bit	7		mu1pt2wtlx_TTK(1,3.)_ncu	0	3
	L1bit	8		mu1ptxbttx_TTK(2,1.5)_ncu	0	3
	L1bit	9		mu1ptxbttx_TTK(2,1.5)_ncu^2	0	1
	L1bit	10		CEM(1,12)_ncu	0	1
	L1bit	11		CEM(1,12)_ncu^2	0	1
	L1bit	12		CEM(1,12)_ncu^3	0	1
	L1bit	13		CEM(2,6)_ncu	0	1
	L1bit	14		CEM(2,6)_ncu^2	0	1
	L1bit	15		CEM(2,6)_ncu^3	0	1
	L1bit	16		TTK(1,10.)_CEM(2,3)CEM(1,9)_ncu	0	1
	L1bit	17		TTK(1,10.)_CEM(2,3)CEM(1,9)_ncu^2	0	1
	L1bit	18		TTK(1,10.)_CEM(2,3)CEM(1,9)_ncu^3	0	1

21(10)	ML3_2IPMM_IMP_V / 5	L1: Requires one muon in the forward region meeting tight pixel and tight wire requirements and NOT Calorimeter unsu requirements with tight scint timing but no pT or region requirement. Also requires two STT track, pt>=1.2 and chi2 < 11 least one single muon (M) with no Pt threshold.	
			L2CALTRK(2,1.5,1.5,TTK)_MUON(1,0.,MEDIUM,tg)_L2T / 3
22(11)	E1_ISHT22 / 2	L1: Calorimeter EM objects with E_T>12 GeV. Veto on cal_unsuppressed condition. L2: requires the sum of the two higl	
		CEM(1,12)_ncu / 1	L2CALEM(15,x) / 2
23	E1_SHT25 / 2	L1: Calorimeter EM objects with E_T>12 GeV. Veto on cal_unsuppressed condition. L2: requires the sum of the two higl	

2TRK(2,STTPT,1.2,11)	mp20k_CFTVtx(prvtx1_phys,-35.,35.)_IP(IPTrk,2,3.,1.5)_InvM(PhTrk05,.98,1.08,.494)_Muon(Muon,1,0.,M) / 2
ghest EM towers to be >= 15 GeV. L3: The trigger bit set to true if an isolated electron is found satisfying tight shower shape requirements with Et>22. GeV	
	mp17000_Ele(ELE_NLV_SHT,1,22.,0.,3.6)_Ele(IsoEle_SHT,1,22.,0.,3.6) / 2
ghest EM towers to be >= 15 GeV. L3: The trigger bit set to true if an electron is found satisfying tight shower shape requirements with Et>25. GeV	
	Ele(ELE_NLV_SHT,1,25.,0.,3.6,-99.,99.) / 2
ghest EM towers to be >= 15 GeV. L3: Requires one isolated letal<3.6 electron with E_T>30 GeV with loose shower shape requirements.	
	mp17000_Ele(ELE_NLV_SH,1,30.,0.,3.6)_Ele(IsoEle_SH,1,30.,0.,3.6) / 2
ghest EM towers to be >= 15 GeV. L3: The trigger bit set to true if an electron is found satisfying loose shower shape requirements with Et>35. GeV	

ML3_2IPMM_IMP_V	14490	0.048	1.873	0.336	0.630	MEB1_2IPMM_IMP_V	0.364
E1_ISHT22	22981	0.077	2.971	0.000	0.000	2CEM12_E15_SHT22	1.000
E1_SHT25	21084	0.070	2.726	0.000	0.000	2CEM12_E15_SHT22	1.000
E1_ISH30	14157	0.047	1.830	0.000	0.000	2CEM12_E15_SH30	1.000
Trigger Name	**# of events**	**bandwidth fraction**	**rate to tape (Hz)**	**unique fraction**	**unique rate to tape (Hz)**	**largest overlap with trigger**	**largest overlap**
E1_SH35	12750	0.042	1.648	0.000	0.000	2CEM12_E15_SH30	1.000
E1_L70	865	0.003	0.112	0.146	0.016	E1_SH35	0.692
E1_ISHT15_M25	1210	0.004	0.156	0.001	0.000	E3_ISHT15_M25	0.930
E1_SH30_M15	7558	0.025	0.977	0.000	0.000	2CEM12_E15_SH30	1.000
E1_SHT20_M20	3123	0.010	0.404	0.007	0.003	E3_SHT20_M20	0.911

The word on the grapevine

Conclusions

WHAT ELSE?

Last remarks

- With the 2009 run there will come the need to provide reliable and user-friendly tools to analyse trigger data
  - Part of this exists but hasn't been stressed, and part is under development
- This workshop provided the physics groups with a good reason to re-visit their trigger studies, after the CSC exercise was finished – this should continue!
- What else is missing? (Lots of things for sure! Would be good to find them early!)
  - E.g. easier comparison between online and reconstruction quantities
    - matching between online and offline objects?
  - What else?

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FICTIONAL TOOL! NOT PLANNED!

THE GRAPEVINE BROWSER

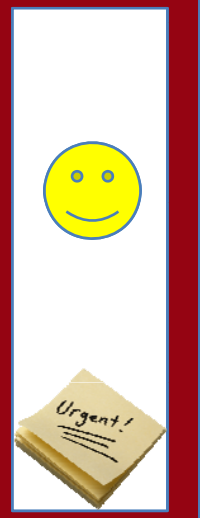
Search (powered by Google)

e10_loose

Search

Latest:

- 2/3/2011: e22i_loose – L2 passthrough factor changed from 0 to 1k from run 991202
- 12/1/2011: FCAL fixed – FJ triggers back into menu (from SMK 4509152)
- 12/12/2010: new luminosity correction - new numbers in DB
- 11/12/2010: optimized cuts in all electron chains – from SMK 4509099

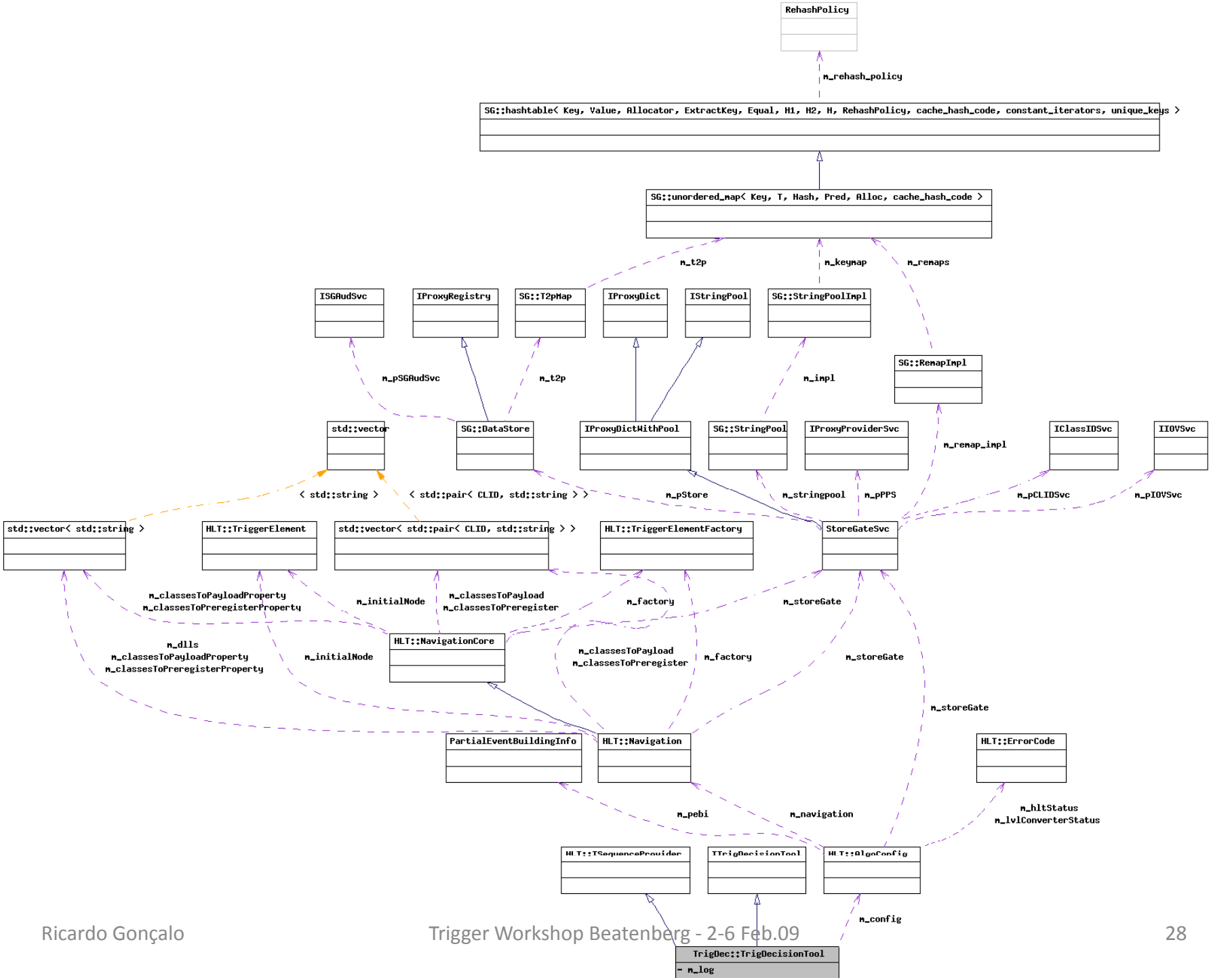


* Cut calo gaps from eta=1.37 to 1.52, otherwise you'll get wrong efficiency
* e10i_loose changed dramatically in September 2010: check out your offline cuts

Slice: e/gamma | Level: L2 | Chain: L2_e10_loose | From: Sep.09

20/9/2010: cuts optimized SMK 4509099 → 11/12/2010: optimized cuts SMK 4509099 → 2/3/2011: L2 passthrough update SMK 4509170

BACKUP SLIDES

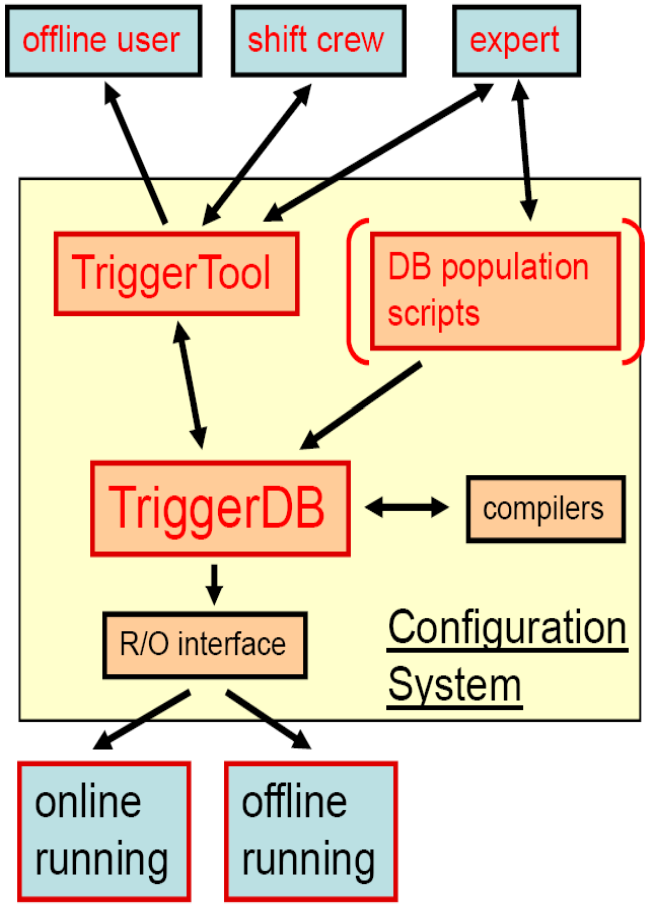

RehashPolicy
m_rehash_policy
SG::hashtable< Key, Value, Allocator, ExtractKey, Equal, H1, H2, H, RehashPolicy, cache_hash_code, constant_iterators, unique_keys >
SG::unordered_map< Key, T, Hash, Pred, Alloc, cache_hash_code >
m_t2p
m_keymap
m_remaps
ISGAudSvc
IProxyRegistry
SG::T2pMap
IProxyDict
IStringPool
SG::StringPoolImpl
SG::RemapImpl
m_pSGAudSvc
m_t2p
m_impl
std::vector
SG::DataStore
IProxyDictWithPool
SG::StringPool
IProxyProviderSvc
m_remap_impl
IClassIDSvc
IIOVSvc
< std::string >
< std::pair< CLID, std::string > >
m_pStore
m_stringpool
m_pPPS
m_pCLIDSvc
m_pIOVSvc
std::vector< std::string >
HLT::TriggerElement
std::vector< std::pair< CLID, std::string > >
HLT::TriggerElementFactory
StoreGateSvc
m_classesToPayloadProperty
m_classesToPreregisterProperty
m_initialNode
m_classesToPayload
m_classesToPreregister
m_factory
m_storeGate
HLT::NavigationCore
m_dlls
m_classesToPayloadProperty
m_classesToPreregisterProperty
m_initialNode
m_classesToPayload
m_classesToPreregister
m_factory
m_storeGate
m_storeGate
PartialEventBuildingInfo
HLT::Navigation
HLT::ErrorCode
m_pebi
m_navigation
m_hltStatus
m_lvlConverterStatus
HLT::TSequenceProvider
TTrigDecisionTool
HLT::AlgoConfig
m_config
TrigDec::TrigDecisionTool
- m_log

Notes…

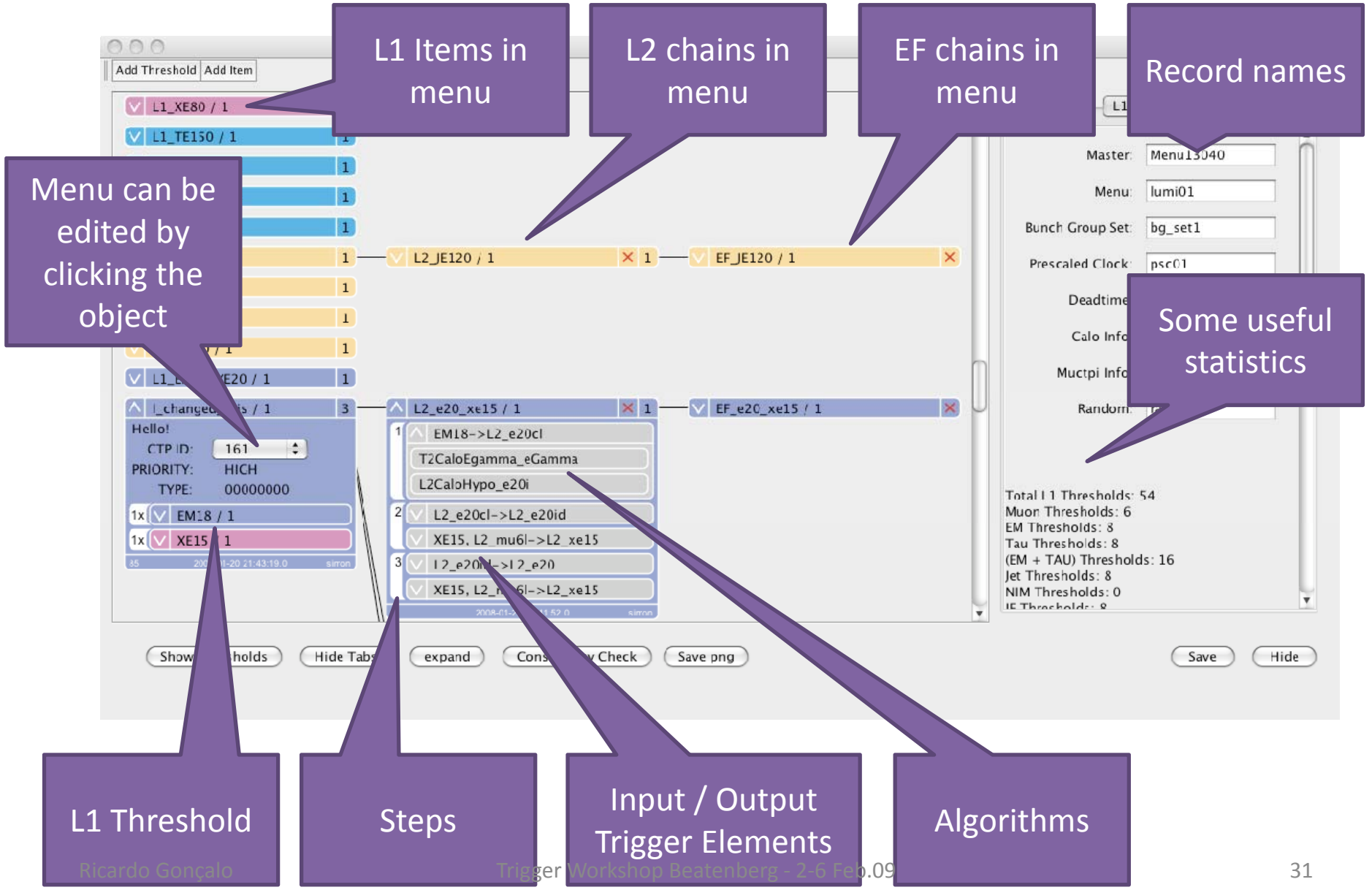
- Conditions database **(COOL) is primary repository of data quality information**
  - **Accessible online, offline, and distributed throughout collaboration**
  - **May mean** copying **some data in**
  - **Or** copying **some data out for efficient use in particular contexts**
    - **Putting some detector status in event files, or into TAG database**
- Reproducibility **from Tier-0 output onwards**
  - **Should be possible to recover status knowledge corresponding to a particular time (e.g. a reconstruction pass), even if 'we now know better'**
  - **Use of** tags **(=calibration versions) in COOL allows this**
- Simplicity **for the end user - should I use this data?**
  - **End-user detector status is 'traffic light' (red/yellow/green = bad/dubious/good) for each subsystem part (TRT endcap C, MDT barrel A side, LVL1 calo trigger, …)**
    - **Also have similar flags for combined performance groups - 'barrel ID good for b-tag'**

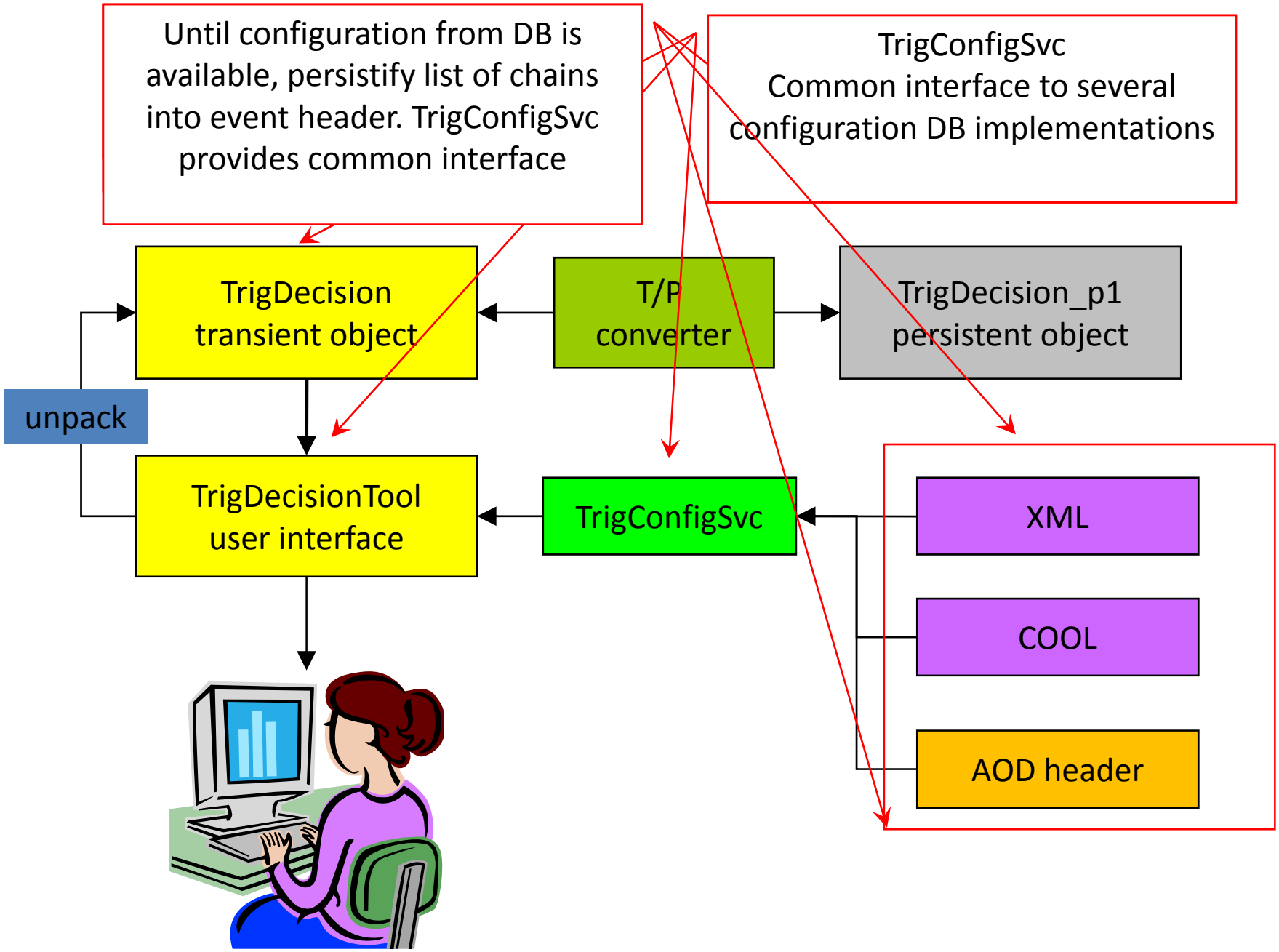
Configuration

- Trigger configuration:
  - Active triggers
  - Their parameters
  - Prescale factors
  - Passthrough fractions
  - Consistent over three trigger levels
- Needed for:
  - Online running
  - Event simulation
  - Offline analysis
- Relational Database (TriggerDB) for online running
  - User interface (TriggerTool)
  - Browse trigger list (menu) through key
  - Read and write menu into XML format
  - Menu consistency checks
- After run, configuration becomes conditions data (Conditions Database)
  - For use in simulation & analysis



Viewing and Modifying a Menu




Until configuration from DB is available, persistify list of chains into event header. TrigConfigSvc provides common interface
TrigConfigSvc
Common interface to several configuration DB implementations
TrigDecision
transient object
T/P
converter
TrigDecision_p1
persistent object
unpack
TrigDecisionTool
user interface
TrigConfigSvc
XML
COOL
AOD header