Luminosity Database, COMA (COnditions MetadatA), & TAGs (Event Metadata)

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Outline

3 General Topics:

1. Luminosity
   - Formulae, Techniques, Measurements, Normalization
     - Several ATLAS detectors … multiple algorithms
     - van der Meer scans
   - Conditions DB Storage … use in analysis
2. TAGs (Event Metadata)
   - What are TAGs … Why & How to use them
3. COMA (Conditions Metadata)
   - Selected/derived Run/Lb-wise Conditions in relational format
     - Built in support of dynamic queries of TAG DB
     - Facilitates finding Run/LB of interest

- … and how all the above are related …
- Summary and Conclusions
- Thanks to many

1. Luminosity

Luminosity: Documentation and Links

- CDS Notes w/ Details of the Luminosity determination:
  - "Luminosity Determination Using the ATLAS Detector"
    - ATL-ATLAS-CONF-2010-060
  - "Luminosity Determination at sqrt{s}=7TeV using the ATLAS Detector at the LHC"
    - Draft in review ... ATL-COM-LUM-2010-???
- ATLAS Week: Copenhagen (June 30, 2010)
  - "Luminosity Determination Using the ATLAS Detector" W.Kozanecki
    - http://indico.cern.ch/conferenceDisplay.py?confId=66743
- TWiki(s) of interest for DB storage of Luminosity:
  - CoolOnlineData
  - LuminosityOnlineCool
  - LuminosityOfflineCool
  - CoolLumiCalc
  - CoolLumiCalcTutorial

Techniques for Luminosity Determination

(BC == live LHC bunch crossing)

Measurement Techniques:

1. Event Counting

   Measure fraction of BC satisfying event criteria

   Primary method

2. Hit Counting

   Count hits above threshold per BC

   Secondary method: Use as tool to study systematics

3. Particle Counting

   Determine number of particles from reconstructed quantities/BC which reflect particle flux

Luminosity Formulae (Ideal → Measured)

$$\mathcal{L} = \frac{\mu n_b f_r}{\sigma_{inel}} = \frac{\mu^{meas} n_b f_r}{\varepsilon \sigma_{inel}} = \frac{\mu^{meas} n_b f_r}{\sigma_{vis}}$$

μ = # of inelastic pp collisions per bunch crossing

n_b = # of bunch pairs colliding in ATLAS (1 … 8....2808)

f_r = LHC revolution frequency (11245.5 Hz)

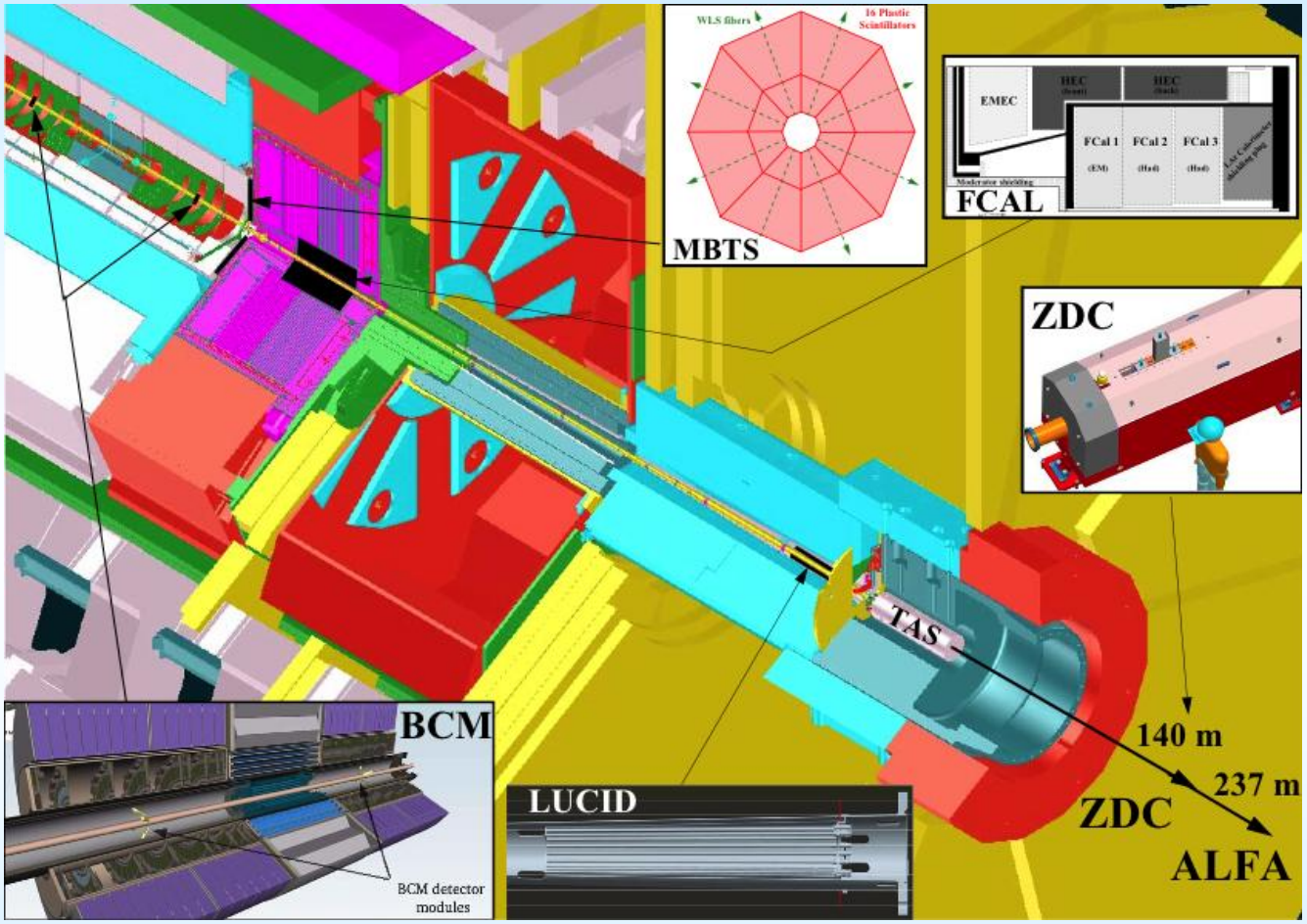
σ_{inel} = total inelastic pp cross-section (Pythia 6: 71.5 mb)

μ^{meas} = # of detected events / BC

ε = acceptance x efficiency of luminosity detector

σ_{vis} = visible cross-section = luminosity calibration constant

Luminosity measurements in ATLAS



- **BCM**
  - Event OR/AND
- **MBTS**
  - Event OR/AND
- **LUCID**
  - Event OR/AND
  - Hit OR/AND
- **ZDC**
  - Event OR/AND
- **Vertex counting**
  - from beamspot
- **FCAL**
  - A, C currents
- …

Several $\mathcal{L}$ detectors, for redundancy/consistency

→ different efficiencies, backgrounds, systematics, …

Issues in Absolute Luminosity Determination

Sorry, limited time ! Here's bottom line !

Physics uncertainties in MC based normalization:

- pp 900 GeV / 7 TeV cross section not known
- Relative contributions of ND, SD, DD poorly known
  - Efficiency/Acceptance depend on the physics model

→ MC based uncertainty 20-25%

Instead, use a data driven normalization from measured accelerator parameters

- Technique: "van der Meer" (beam separation) scans

Absolute $\mathcal{L}$ Calibration using van der Meer scans

Principle: measure <u>simultaneously</u>

$\mathcal{L} = f\ (I_1, I_2, \Sigma_x, \Sigma_y)$

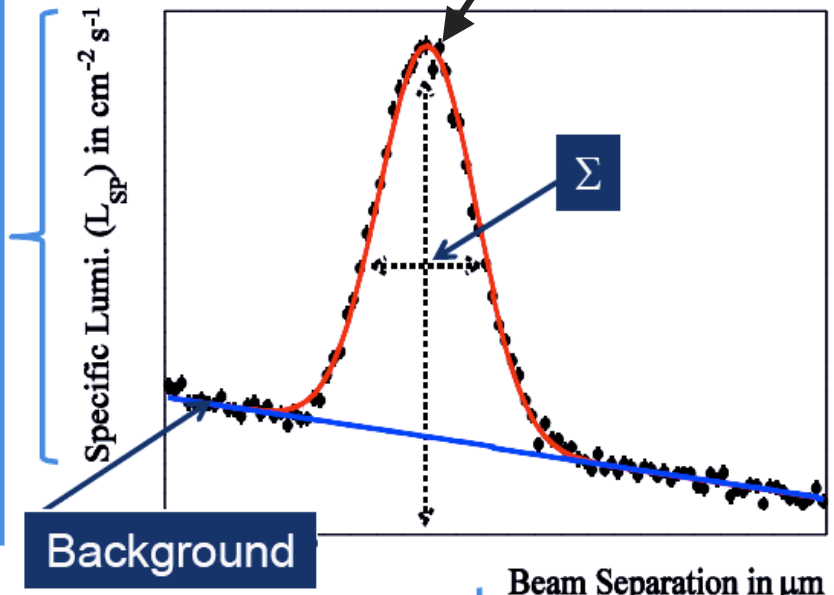
R_{max} = peak counting rate

$$\mathcal{L} = \frac{n_b f_r I_1 I_2}{2\pi \Sigma_x \Sigma_y}$$

$R_{max} \sim \mathcal{L}\, \sigma_{inel}\, \varepsilon_{det}$

Simplest: $\Sigma_x = (\sigma^2_{1x} + \sigma^2_{2x})^{1/2}$

From LUCID, ZDC,MBTS BCM,FCAL, HLT



From LHC machine during the Van der Meer Scan (either from BPM or from Magnet Settings)

$\mathbf{k = \sigma_{vis} = \mathcal{L} / R_{max}}$

$\Delta k/k \sim \Delta I_{1,2} / I_{1,2}$

$\sim \Delta\Sigma_{x,y} / \Sigma_{x,y}$

$\sim \Delta R_{max} / R_{max}$

Source	Uncertainty on Luminosity (%)
Beam Intensities	10
Length Scale Calibration	2
Decentering of Beams	2
Transverse Emittance Rise	3
μ Dependence	2
Total	11

100% correlated across the methods.

Luminosity in the ATLAS Conditions DB

- Challenge: Store luminosity measurements
  - A variety of sources
    - Online and Offline
    - Each having one/more algorithms and counting techniques
  - Must be available to multiple and diverse clients
    - Monitoring, Reporting, User level Queries
    - Physics User jobs running Athena from anywhere on the grid
    - Experts analyzing calibrations needing luminosity/beam conditions
  - In a way that facilitates comparison and use of those measurement
- CondDB architecture addresses each of these challenges and the infrastructure built around it also facilitates that access
  - Fundamental assumption: All “conditions” are constant in a LumiBlock:
    - CondDB time granularity: is the Run/LB (dates to lumi prototype)
  - Different measurement sources and algorithms:
    - Use “Channels” (next slide)
  - Non-Athena based monitoring, reporting, querying (e.g. runQuery):
    - COOL API and applications like CoolCherryPy
  - Availability grid-wide to Athena jobs:
    - distributed to Tier-1s & available to Tier-2s via Frontier

Storage: Luminosity in the ATLAS CDB

- COOL Folders for Luminosity have IOV basis: Run/LB
  - Online – Folder /TRIGGER/LUMI/LBLESTONL/ (single version)
  - Offline – Folder /TRIGGER/OFLLUMI/LBLESTOFL/ (multi-version)
- Payload:
  - LBAvInstLumi = Average **instantaneous delivered** luminosity
  - LBAvEvtsPerBX = Average pp interactions/BC
  - Flag = indicating validity (0 = valid), or error code
- Channels: specific detectors/algorithms

BENEFITS:

- Experts can compare various methods
  - Just by changing the Channel #
- As new Detectors/Algorithms available
  - Allocate new channel number
- As measurements improve offline:
  - New version in new Lum COOL tag
- LumiCalc by default
  - Channel 0: preferred offline alg

Channel	Detector / Alg
0	0 Preferred
101	LUCID_Zeros_OR
102	LUCID_Zeros_AND
103	LUCID_Hits_OR
104	LUCID_Hits_AND
…	…
201 - …	BCM …
301 - …	MBTS …
401 - …	ZDC …
501 - …	FCAL …
601 - …	HLT …

Luminosity related quantities in the ATLAS CDB

What do EXPERTS need to know:

- Subdetector specific measurements are stored in their relative subsystem Conditions DB Schemas
  - Many different TWiki pages or documents
- Luminosity Calibrations are stored in COOL:
  - i.e. CoolOnlineData **Folder /TDAQ/OLC/CALIBRATIONS**
- Additional LHC/beam related Folders:
  - LuminosityOnlineCool
    - Used for luminosity/beam studies
- Additional Lumi related Trigger and TDAQ Folders:
  - CoolOnlineData
    - Used by LumiCalc (e.g. prescales, deadtimes …)

What does END USER need to know:

- Your ESD, AOD, TAG dataset
  - Automatic: contains Run/LB Ranges in each dataset
- Follow CoolLumiCalcTutorial
  - Use iLumiCalc.exe
    - INPUT: your dataset, your trigger, Lumitag (the COOL version)
    - OUTPUT: Integrated luminosity for your dataset

2. TAGS
(Event level metadata)

TAGS: Outline

- Introduction:
  - What is a TAG ?
  - TAGs in the ATLAS Computing model
  - TAG Content and Formats
  - Latest TAG News
- Overview of TAG DB System and Services
- TAGS related hyperlinks
- Tutorial Overview
- ELSSI – Event Level Selection Service Interface
  - Overview of workflow and services
  - ELSSI tour
- TAGS Summary

What's a "TAG" (in this talk)

- **Caution !!** ATLAS users may experience: "tag" overload
  - TAG, Tag, tag… is not an acronym
  - Not a CVS tag or a release tag
  - Not what is tracked by ATLAS Tag Collector
  - Not a COOL (Conditions Database) Tag
  - Not a configTag (AMI tag) or a project tag
  - Not a B, flavor, or muon tag ...

- **In this talk:**
  - ATLAS TAGS are "Event-level metadata":
    - The top 280 things people want to know about each event
      - Size: ~1 kB/event -> 2TB/nominal year

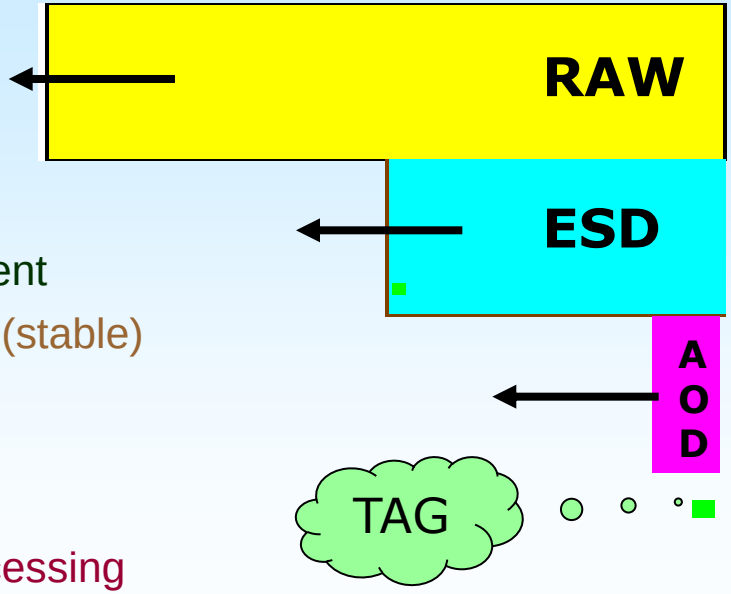
      (ROOT files per pass)
  - TAG Services are
    - A variety of supporting tools and infrastructure

    which help you use TAGS where ever you are and on the grid

PURPOSE: Facilitates event selection for analysis

ATLAS TAGs in the ATLAS Computing model

- **Stages of ATLAS reconstruction**
  - **RAW** data file
    - **ESD** (Event Summary Data) ~ 500 kB/event
      - **AOD** (Analysis Object Data) ~ 100 kB/event
        - **TAG** (not an acronym) ~ 1 kB/event (stable)



- **TAGS**
  - Are available in 2 formats:
    - **File based** – produced in reconstruction/reprocessing
      - POOL Collections format which is based on ROOT
        - TAG files are distributed on Tiers of ATLAS
    - **Oracle Database**
      - A relational database populated from TAG files in 'upload' process
        - To CERN DB and voluntary TAG sites (BNL, TRIUMF, DESY, PIC…)
      - '**Conditions**' and '**Catalogue**' Metadata is added to support TAG Services
      - TAG Browser (ELSSI) – uses combined Event, Run, Processing Metadata
        - Makes TAG DB available globally through network connection
- TAGs are produced in initial reconstruction and every reprocessing
- Customized TAGs can be defined/produced
- **TAGS are available for BOTH real data and MC simulation !!**

What does the "TAG" contain ?

- "TAG content": Your event-level selection variables
  - ~280 variables/event:
    - Event identification (run, event, lumi block, time …)
    - Trigger decisions at all three levels (bit encoded)
    - Numbers of electrons, muons, photons, taus, jets
      - **pT, eta, phi for highest-pT objects**
    - Global quantities (e.g., scalar and missing ET)
    - Physics & Performance group 32 bit status words
      - **Flag interesting events for their group analysis**
  - References to AOD,ESD,RAW… for back-navigation
- PAT (Physics Analysis Tools)
  - PAT group supports the 'Official' TAG content with input from the physics groups (YOU !)
  - See the PAT TWiki: TagForEventSelection

What you need to know to decide if the event is interesting for further analysis

The magic that allows the TAG to retrieve your events for event display… further analysis

Thanks
Tulay Donszelmann

News: TAGS now even better

- Before ~mid 2010, 2 flavours of TAGS were produced
  - TAG_COMM – for commissioning experts
  - TAG – for physics analysis

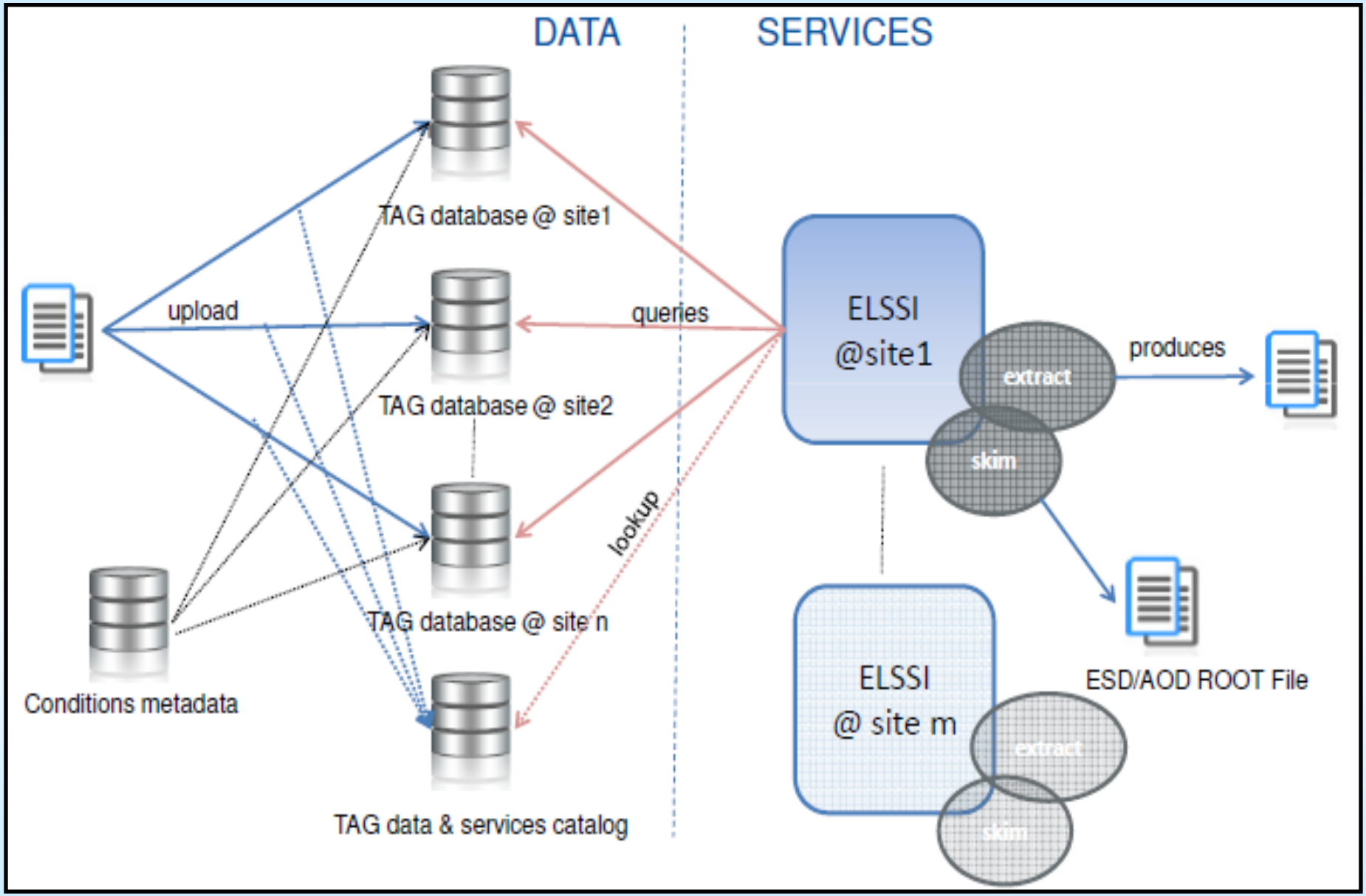
  →TAG + TAG_COMM now combined: keep most useful attributes from both
    - You may see some remaining references to TAG_COMM
    - You should just use the latest TAGS

- Recent "TAG"-only reprocessing campaign !
  - Successfully executed in September 2010
  - Added some new and corrected a few TAG attributes
  - Producing the best quality TAGS in existence
  - Of course, November reprocessing will produce new AOD … TAGS
    - Using the latest software release and calibrations

- New Distributed TAG DB Architecture now in place
  - Infrastructure to streamline uploads, optimize resources
  - ELSSI – Web based interface: transparent site selection

- More robust Extract and Skim services

TAG DB System Overview



TAG related hyperlinks:

- Tutorial TWiki:

  https://twiki.cern.ch/twiki/bin/view/Atlas/EventTagTutorials
- TAG content, trigger decoding etc:

  https://twiki.cern.ch/twiki/bin/view/Atlas/TAGInformationForUsers
- ELSSI portal:

  https://cern.ch/tagservices
- HyperNews for TAG questions:

  hn-atlas-physicsMetadata@cern.ch
- CHEP 2010 presentations related to ATLAS TAGS

  http://cdsweb.cern.ch/search?sysno=000707439CER

TAG Tutorial Components:

1. Event selection using ELSSI

   Note: ELSSI is a web based service (using TAG Database) …
   You need a Grid certificate to access ELSSI !

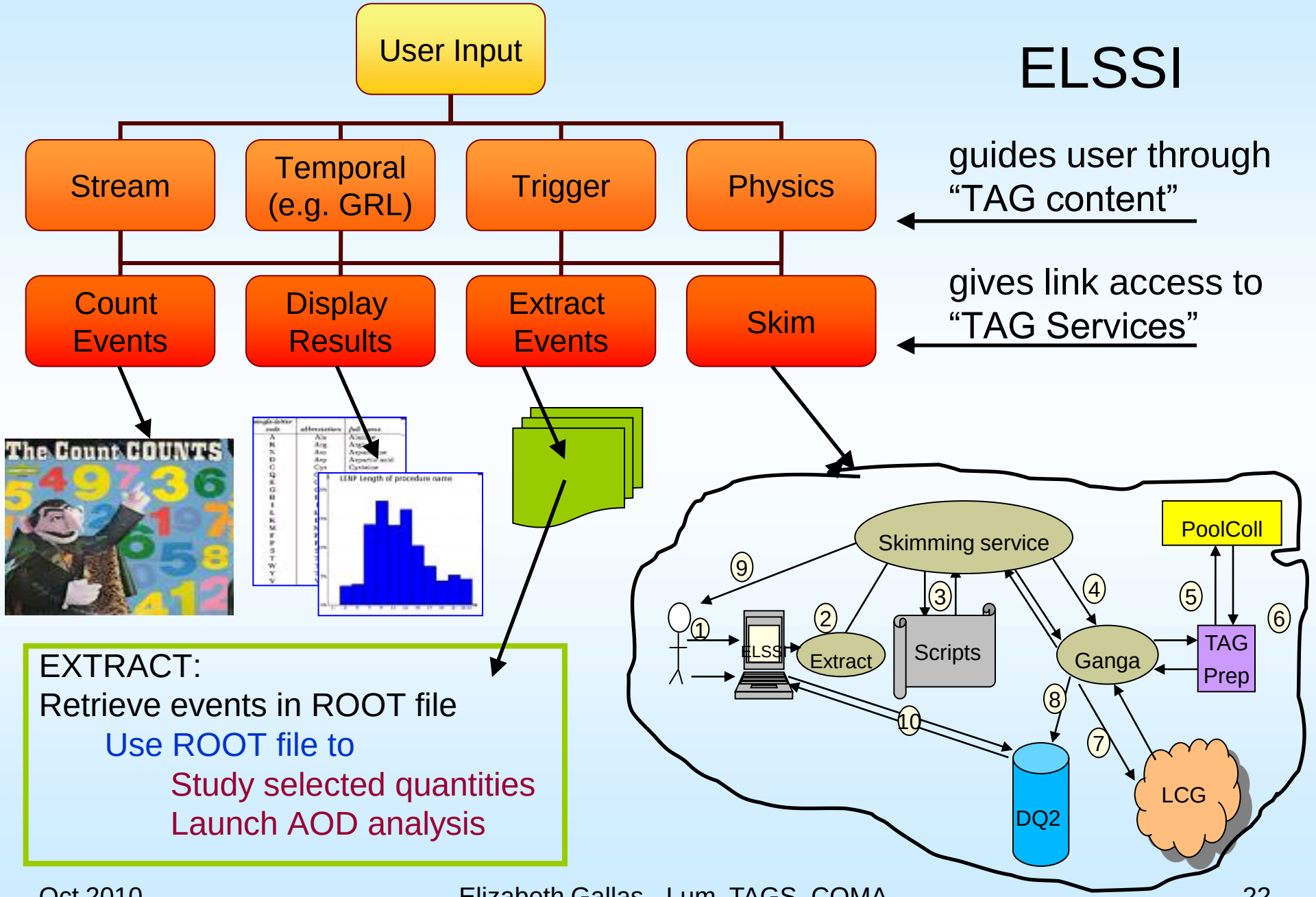
   - Making queries
   - Extracting a POOL ROOT file
   - Skimming
2. Calculate the luminosity of the extracted file
3. Using TAGs with Athena
   - Using the selection from Part I with Athena
   - Doing TAG selections directly with Athena
   - Utilities for monitoring and diagnosing problems

Data used in examples:

Physics TAGs from May 2010 reprocessing :

data10_7TeV, MinBias stream, Run Nr 152221

ELSSI User Workflow: Select criteria, service, get results!

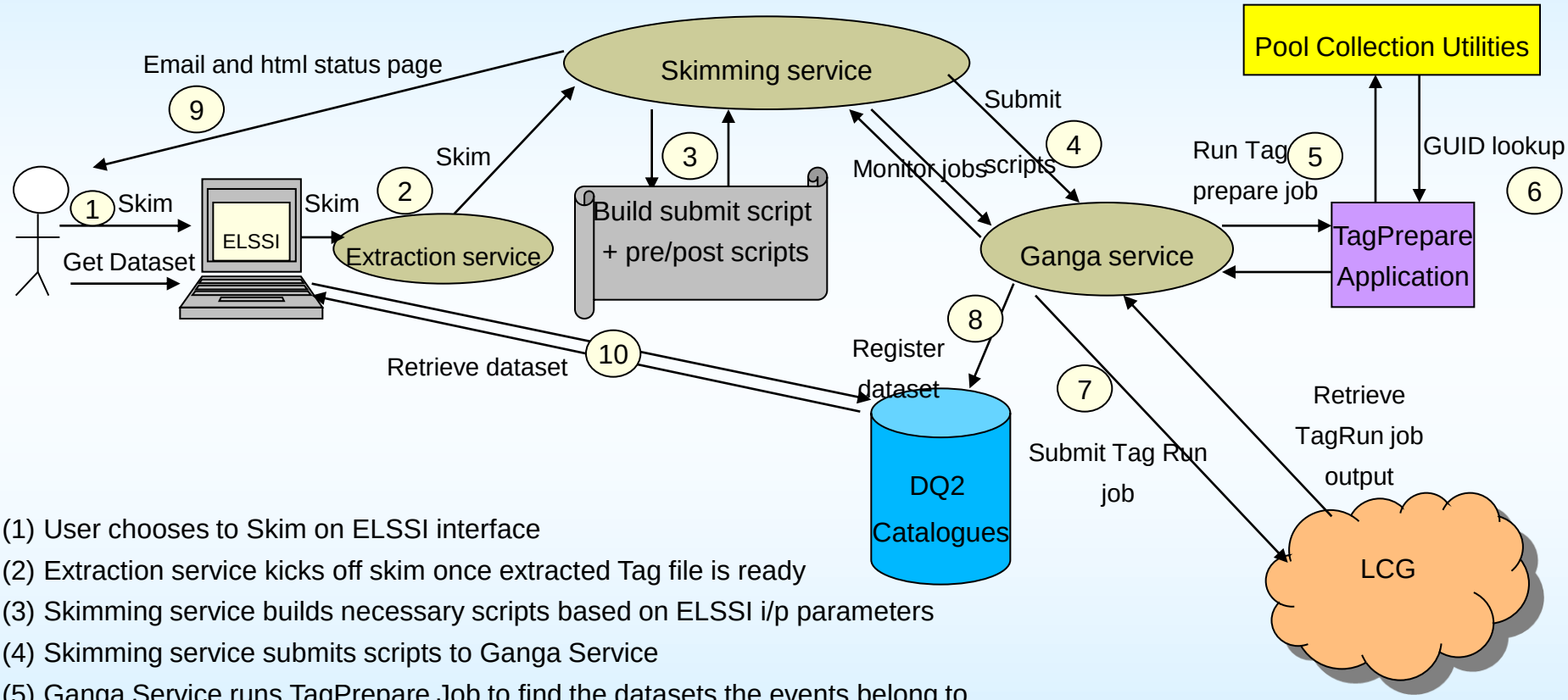


EXTRACT:
Retrieve events in ROOT file
Use ROOT file to
Study selected quantities
Launch AOD analysis

Skimming Service Overview

Purpose: Simplify the submission of Athena based analysis jobs on the grid for users who have an analysis specific collection of events selected from the TAG database.

Grid jobs are submitted on the user's behalf; email reports job outcome.



(1) User chooses to Skim on ELSSI interface
(2) Extraction service kicks off skim once extracted Tag file is ready
(3) Skimming service builds necessary scripts based on ELSSI i/p parameters
(4) Skimming service submits scripts to Ganga Service
(5) Ganga Service runs TagPrepare Job to find the datasets the events belong to
(6) TagPrepare Application runs the guid lookup using Coll utilities.
(7) Using the o/p from prepare job the run job is submitted to the Grid
(8) Ganga retrieves the job output and registers the dataset in DQ2
(9) The user is informed the job is completed and can retrieve the dataset

ELSSI Portal: https://cern.ch/tagservices

Atlas WEB/PHP services for event selection via TAGs. For comments/suggestions please refer to ATLAS Physics Metadata Hypernews

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ELSSI Website for Relational TAGS
You must have a grid certificate for access.Please choose the server nearest you:

- CERN ELSSI 04-00-03
- BNL (USA, Brookhaven, NY) ELSSI 03-01-01
- TRIUMF (Canada, Vancouver) ELSSI Portal

- RunBrowser Latest version(00-04-00)
- RunBrowser Previous version(00-03-00)

Information Twikis:

- TUTORIAL: Using ELSSI, the Tag Database Portal
- Introduction to tags and tag content

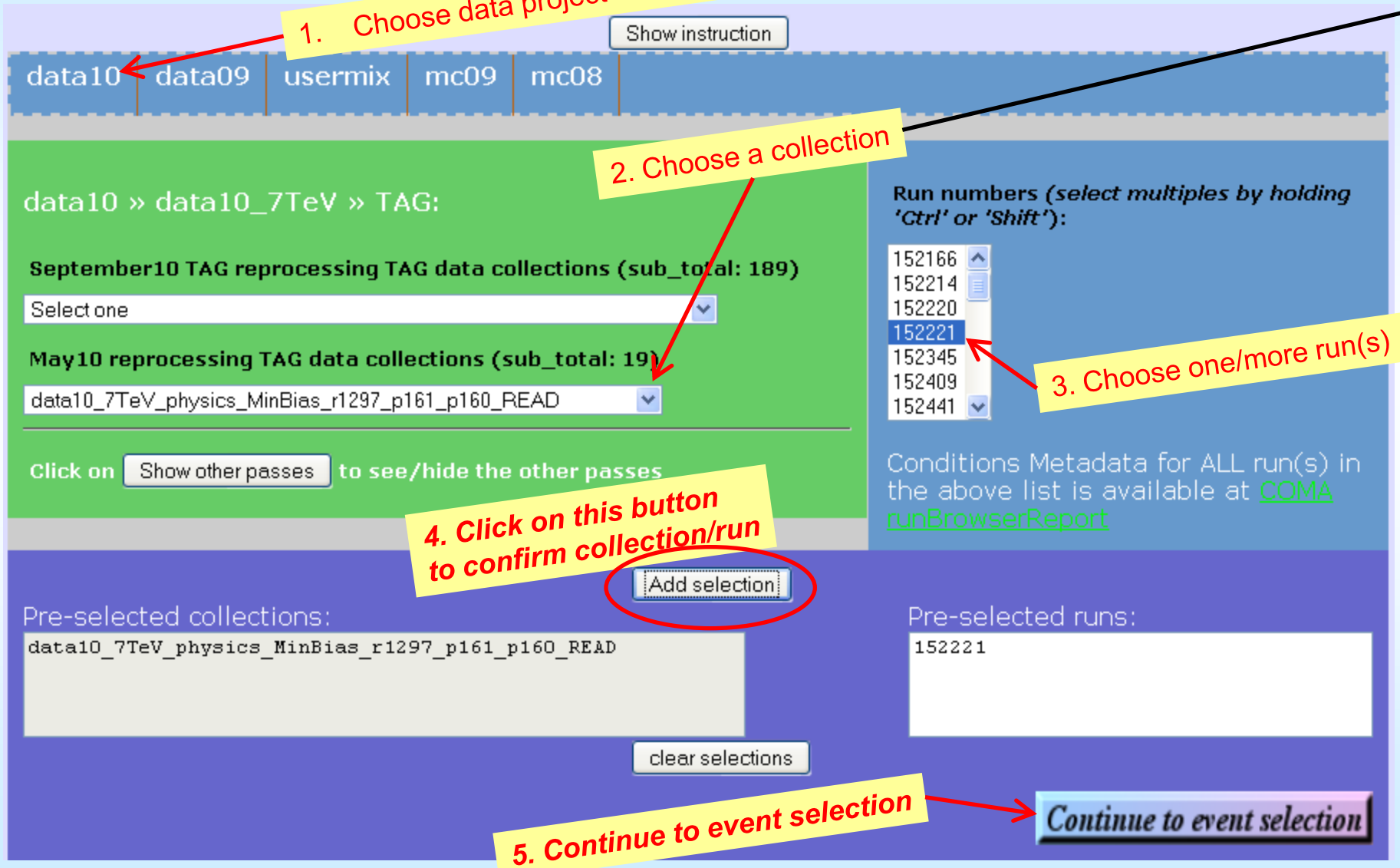
- Production Visitors statistics (awstats)
- EventLookup Visitors statistics on the old lxvm0341
- Development Visitors statistics (awstats)

Newest ELSSI production version

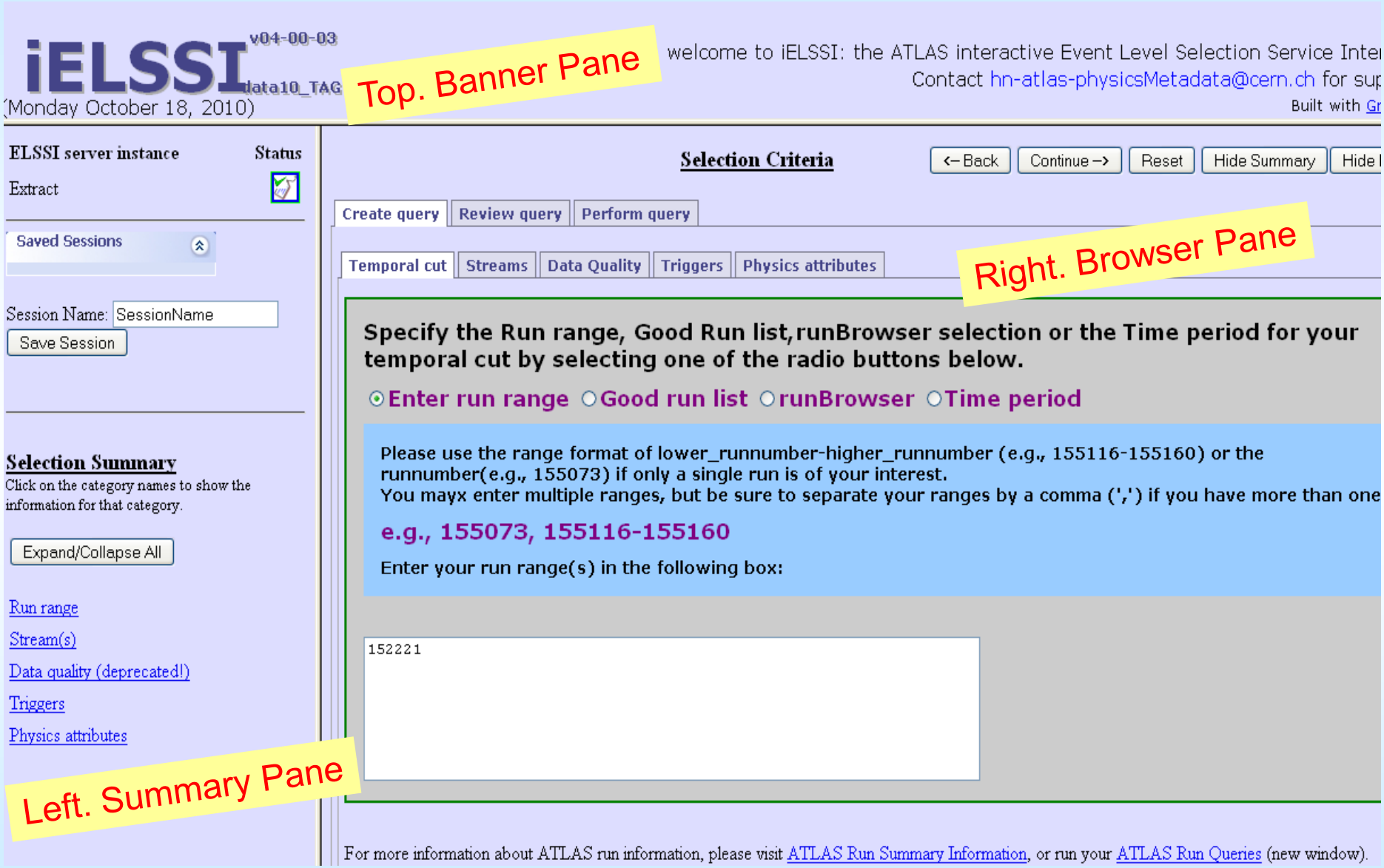
Tour of ELSSI starts here …
(https://cern.ch/tagservices)
Note: grid certificate required.

ELSSI entry (navigator) page

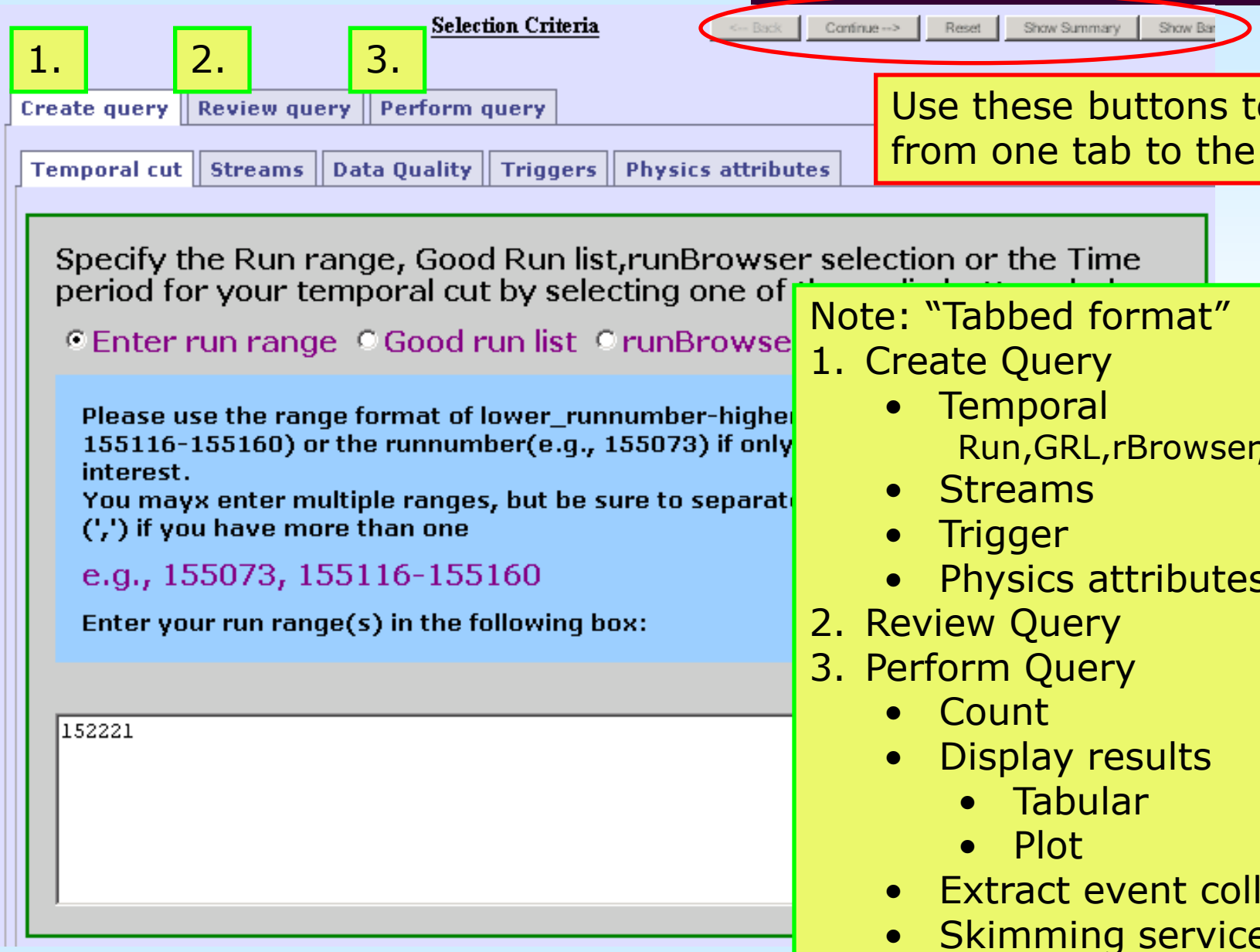
A TAG „Collection“ contains all runs for a (project _ stream _ AMI tag)



ELSSI: Pane Overview



ELSSI: Browser Pane

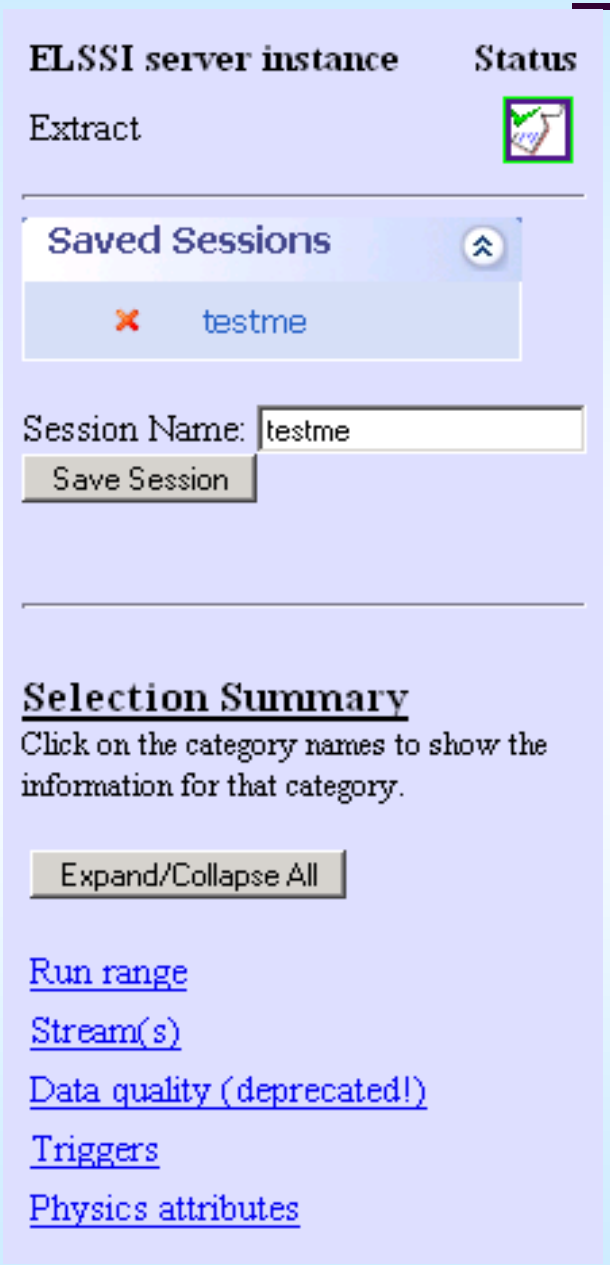


Use these buttons to move from one tab to the next

Note: "Tabbed format"

1. Create Query
   - Temporal
     Run,GRL,rBrowser,time
   - Streams
   - Trigger
   - Physics attributes
2. Review Query
3. Perform Query
   - Count
   - Display results
     - Tabular
     - Plot
   - Extract event collection
   - Skimming service

ELSSI: Session Frame (left bar)



- Show the Extract server status

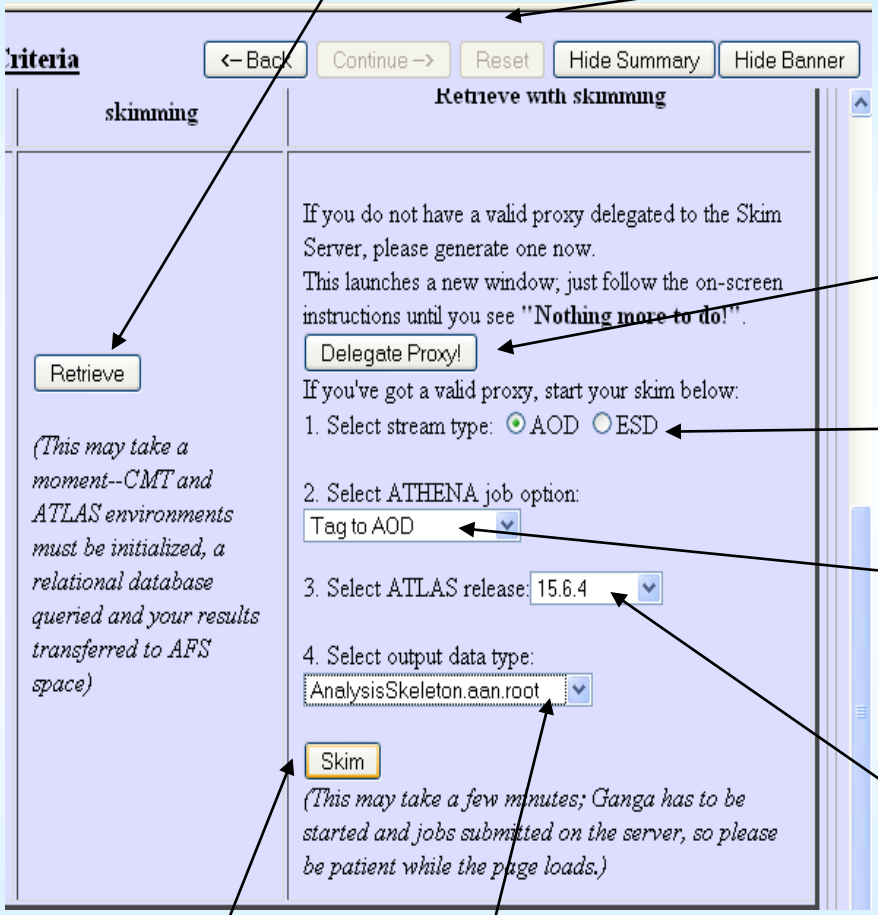
- Save/Share Session(s)
  - Save selection criteria for later use

- Selection Summary
  - Displays selection criteria of your session or previously saved session
  - Links expand/collapse criteria
    - Temporal
    - Stream
    - Trigger
    - Physics Attributes

ELSSI: Extract and Skim Services

To EXTRACT:
Click on the Retrieve Button

For Extract and Skim:
Enter your email address so that the service can notify you of progress



For SKIM Service:

Make sure you have uploaded a voms proxy to the Ganga Service using Acacia

Choose the stream type (StreamAOD_ref or StreamESD_ref)

Choose the Athena JO depending on what type of analysis you want to run or upload your own

Choose release – (deprecated)
Hard coded to latest Release for now.

Click on "Skim"

Choose output data type – depending on what type of analysis you wish (AOD.pool.root or ESD.pool.root).

Summary

- Latest / greatest TAGS: September 2010
- Distributed TAG DB architecture now in place
  - Has streamlined the upload process …
    - makes data available to users faster
  - Makes data location increasingly transparent to users
- Extract and Skimming Services
  - Now exorcised – thanks to many users for their feedback
- Interfaces are under continuous development to improve
  - Functionality and Usability
- Metadata in a database is a powerful tool (ELSSI)
  - Technical challenge (for databases and ATLAS tools and infrastructure)
  - Variety of dynamic selection criteria, reporting, retrieval become possible
    - Allow users to get a sense for the data
    - Produce TAGs with additional customized criteria
      - For preliminary analysis before full analysis on AOD
    - Launch your analysis on AOD, ESD based on TAG selections
- Success depends on user feedback
  - On TAG applications … On TAG Content (PAT)
  - Send comments/suggestions: hn-atlas-physicsMetadata@cern.ch

3. COMA
(Conditions MetadatA)

Outline

- History of Conditions Metadata … It all began:
  - Developing a Luminosity prototype
  - Developing the ELSSI prototype
- Overview of DB schemas in support of TAGS
  1. TAG DB (Event-wise Metadata)
  2. CATALOG (Dataset Catalogue Metadata)
  3. COMA (COnditions MetadatA)
- Design principles
  - COMA schema
  - runBrowser – report interface for COMA
  - runBrowserReport – browser interface for COMA
- Documentation and Links
- Tour of COMA interfaces:
  - runBrowser and runBrowerReport
- COMA Conclusions

Moved to backup slides

Early history of this Conditions Metadata project

- 2007: first Conditions Metadata tables were filled **for MC simulation** tests/prototype development
  - Streaming Test, Full Dress Rehearsal (FDR) exercises
  - Run/LB-wise conditions were collected from MC log files and other sources into relational DB tables (COMA)
    - And INSERTED into then new folders in Conditions DB (COOL)
    - Which formed the prototype for the ATLAS Luminosity calculation
    - Other Trigger/DAQ COOL folders defined at same time (RichardHawkings, Trigger/TDAQ)
- 2008: COMA tables used by ELSSI prototype (still just MC)
  - Conditions, particularly trigger configuration … things not practical to store event-wise
- 2009: start extracting Run/LB-wise information from COOL into COMA tables to facilitate efficient access to Conditions Metadata by ELSSI **for Online Runs**

History of this Conditions Metadata project

2009 … (continued … #1) …

- **runBrowser prototype:** interface for finding Runs sharing conditions
  - Initially development tool: check data integrity/relationships of COMA
  - We (TAG developers) realized this runBrowser would be more generally useful … separate Run-browsing (runBrowser) from Event-browsing (ELSSI) … make runBrowser a stand-alone tool
  - May2009: TAG group developed first DTD for GoodRunList XML
    - This xml was how runBrowser would communicate to ELSSI the Run/LB selection and selection criteria.
    - This DTD has since been taken up/over by the ATLAS experiment to communicate good Run/LB ranges.
- **runBrowserReport** development started
  - Which will help ELSSI and runBrowser describe underlying COMA info and provides more links to other ATLAS systems
- **COMA tables expanded** to include more conditions in anticipation of use cases / expand selection criteria

Evolution of overall TAG DB project

- TAG DB / ELSSI: evolved to a distributed architecture
  - Realization:
    - Not possible to upload all TAGs at any one Oracle site
    - Advantageous to have some TAGs at multiple sites …
  - ELSSI: needs to know which TAGs uploaded at which voluntary sites
    - Add new relational schema TAGS CATALOG (Elisabeth Vinek)
      - Contains processing/upload information needed to deploy distributed TAG services on the grid
- TAG DB / CATALOG / COMA Schemas work together
  - Common threads include: Run Number, Stream, Project Name …
  - COMA tables also use the CATALOG
    - Upload only Run/LB metadata for Runs in CATALOG
    - This reduces handling of conditions anomalies
      → allowing us to focus on Runs of 'event analysis interest'
- Steps in Database loading – ideally within hours of reconstruction
  1. TAGs uploaded to Oracle
  2. CATALOG tables updated
  3. COMA tables updated from CATALOG Runs

  → Sooner when they appear in Data Periods

Oracle Database: TAG DB and associated metadata tables

- TAG DB Event-wise metadata tables
  - Stores Event-wise attributes:
    - electron (Et, eta, phi …)
    - muon (Et, eta, phi …) …

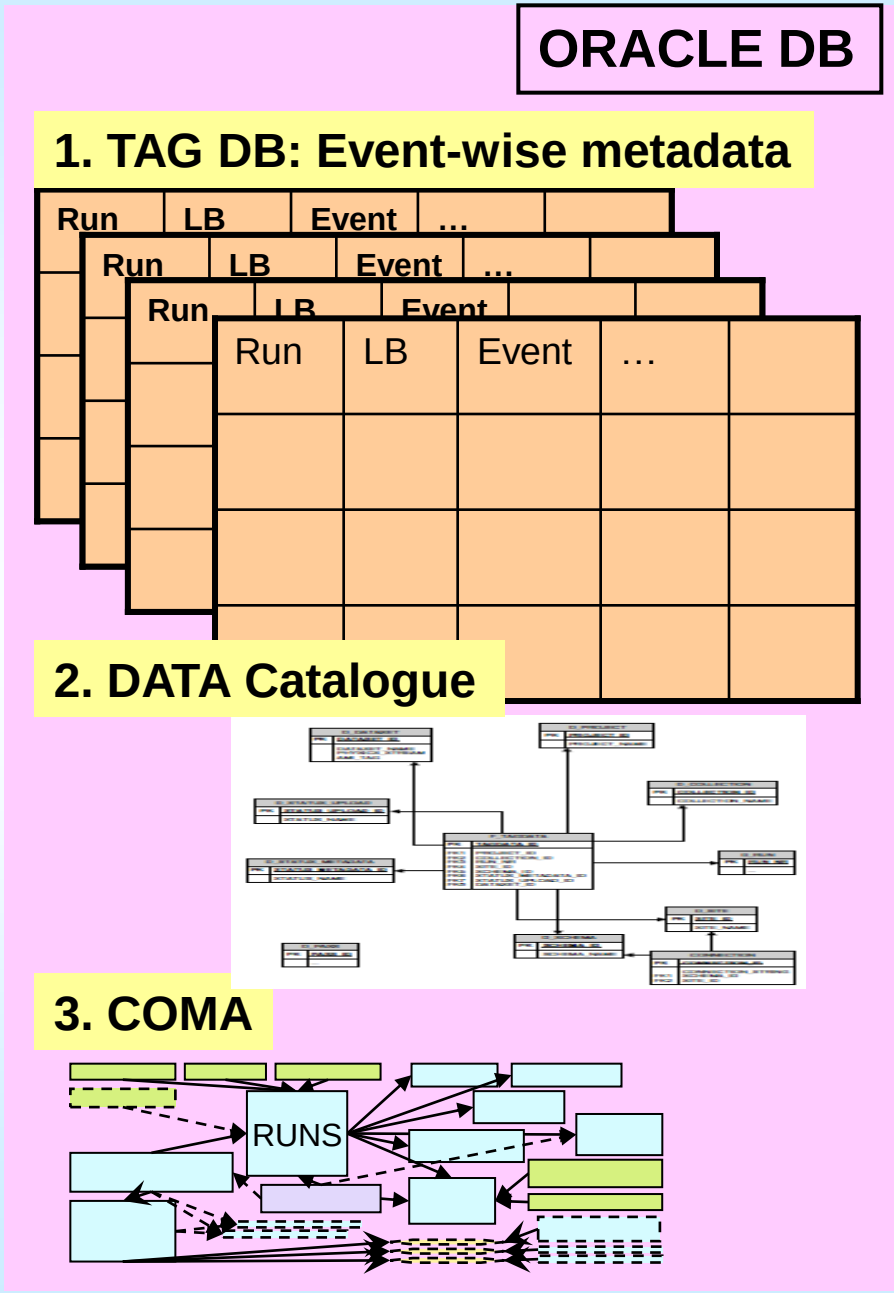
    and references to RAW, ESD, AOD files
  - Source: Official data processing chain

  RAW→ESD→AOD→TAGfiles→TAGDB

- Data Catalogue tables
  - Stores information on file and dataset processing and location
    - Project name
    - AMI tag (what processing occurred)…
  - Sources: AMI, Tier0 …

- 'COMA' (COnditions MetadatA) tables
  - Conditions of data taking
    - Trigger and DAQ conditions
    - Beam conditions
    - Data Quality …
  - Sources:

  Conditions DB, files (log, xml, txt), email…



Documentation and Links

These are the components of the COMA project

- **COMA tables – the relational DB tables**
- **RunBrowser Package**
  - **runBrowser – the Browser interface for COMA**
  - **runBrowserReport – the Report interface for COMA**

COMA Documentation

- COMA Schema
  http://www-pnp.physics.ox.ac.uk/~gallas/TAGs/Run_Metadata_ERD_1010.ppt
- COMA Tables
  https://gallas.web.cern.ch/gallas/COMA_Tables.html

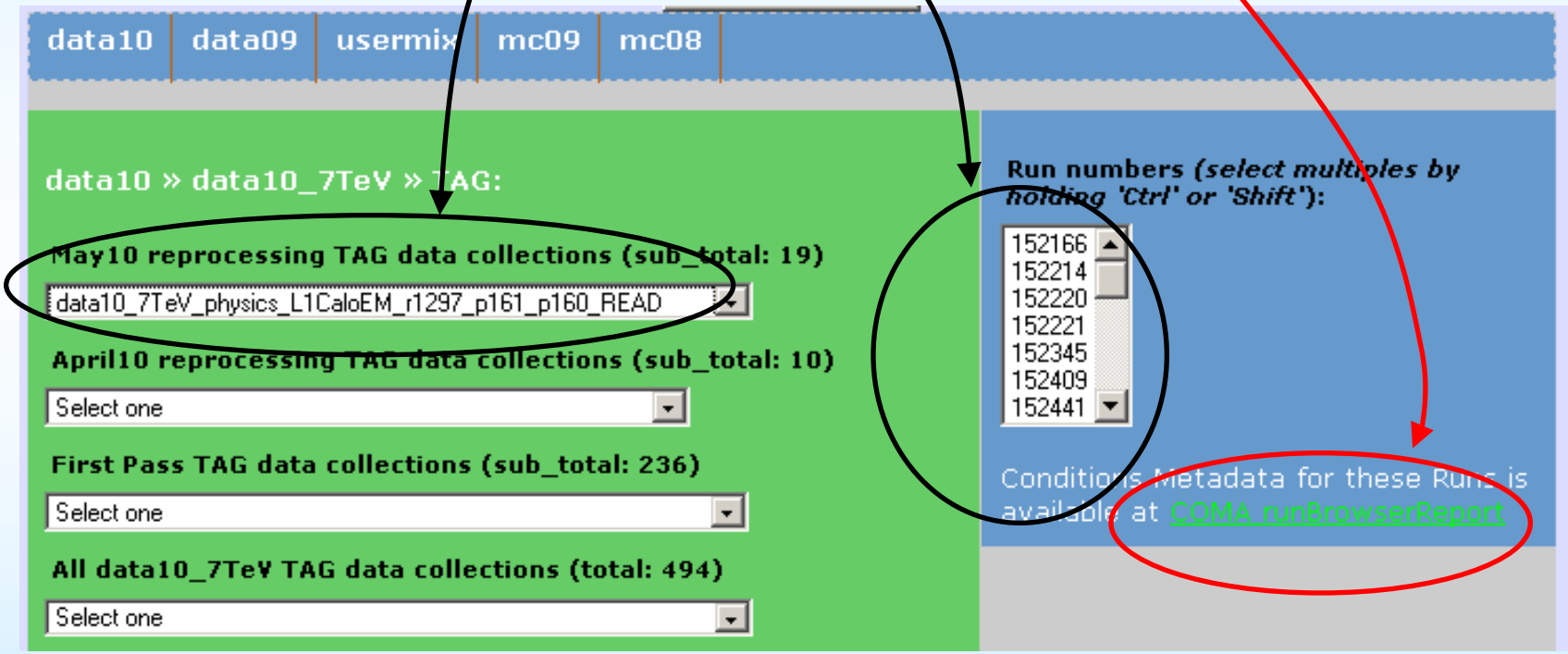
RunBrowser Interface Links

- Direct links to stand-alone interfaces from TAG Services portal:
  https://atlas-tagservices.cern.ch/
  (click on the latest version of RunBrowser package)
- Links to RB interfaces now available in ELSSI
  - ELSSI: runBrowserReport link available after Collection selection
  - ELSSI: runBrowser launched from the “temporal” tab

Let’s take a tour …

ELSSI Link to runBrowserReport

- ELSSI contains a new link to runBrowserReports
  - User chooses the Collection Name
  - ELSSI shows Runs in the Collection
  - NEW: ELSSI displays link to pop-up runBrowserReport



Example runBrowserReport from ELSSI link:

COnditions MetadatA Runs Report

TAG Collection (coll) : data10_7TeV_physics_MinBias_r1297_p161_p160_READ

Run Number (runs) : 152166, 152214, 152220, 152221, 152345, 152409, 152441, 152777, 152844, 152845, 152878, 152933, 152994, 153030, 153136, 153159, 153200, 153565, 153599, 154810, 154813, 154815, 154817

Found 25 Runs with input criteria ...

RUN	FILENAME_TAG	START_TIME	DURATION	NLBN	TMK	PARTITION	EVENTS	PERIODS
154817	data10_7TeV	2010-MAY-09 07:19:48	37719 seconds (10:28:39)	325 [1-325]	788	ATLAS	11348226	B,B1
154815	data10_7TeV	2010-MAY-09 05:46:38	4624 seconds (1:17:04)	41 [1-41]	788	ATLAS	1347283	B,B1
154813	data10_7TeV	2010-MAY-08 22:58:03	23369 seconds (6:29:29)	195 [1-195]	788	ATLAS	5620746	B,B1
154810	data10_7TeV						2309	B,B1
153599	data10_7TeV						0563	B,B1
153565	data10_7TeV	17:06:54	(39:55:04)	[1-1202]			30467	B,B1
153200	data10_7TeV	2010-APR-18 21:31:30	20893 seconds (5:48:13)	183 [1-183]	770	ATLAS	1723618	A
153159	data10_7TeV	2010-APR-18 06:58:50	21345 seconds (5:55:45)	186 [1-186]	770	ATLAS	2453962	A
153136	data10_7TeV	2010-APR-17	30383 seconds	263	770	ATLAS	007721	A

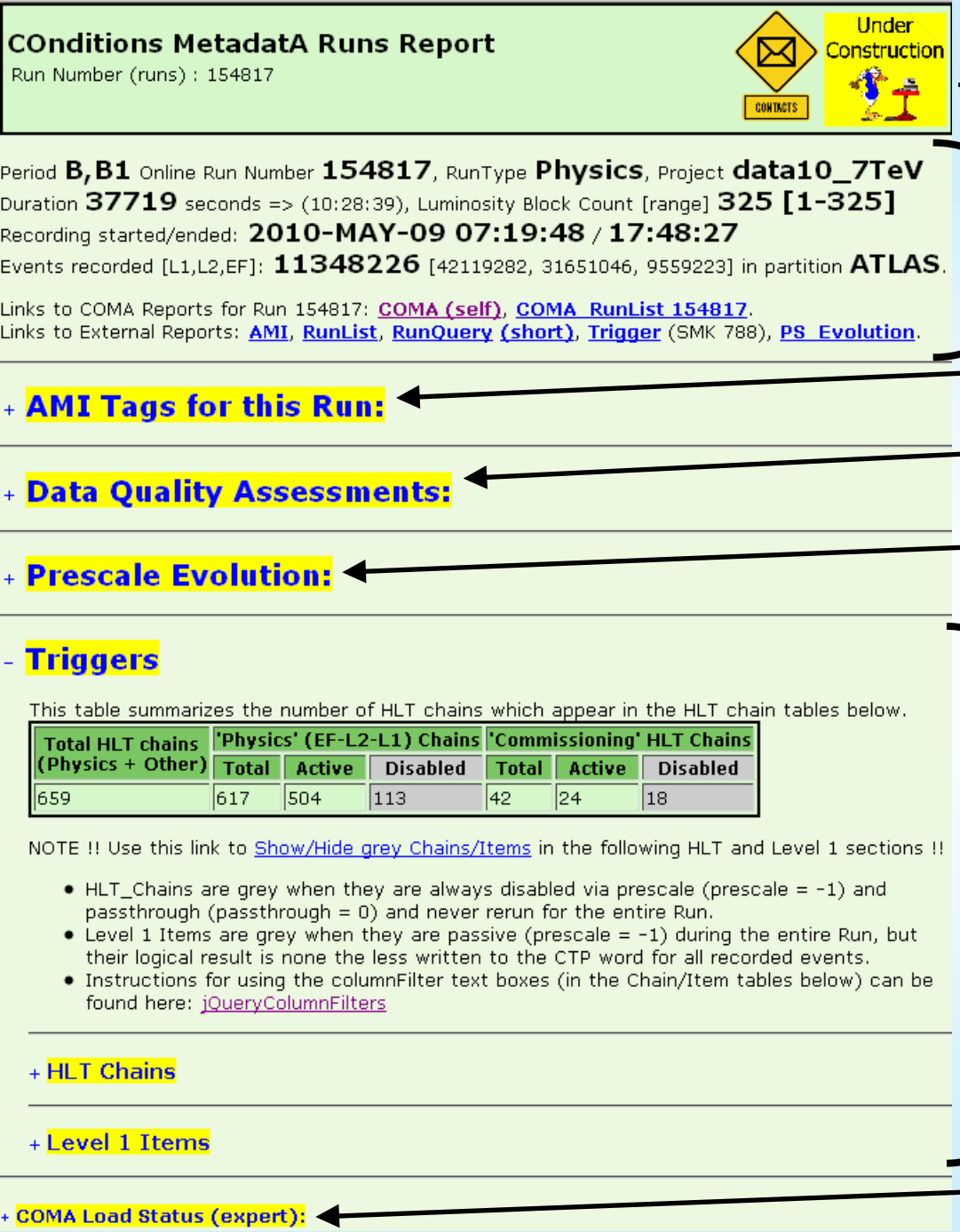
1. Click on link in ELSSI …

This report displays basic Run information for all Runs in the chosen collection (start time, LBs, period…)

2. Click on a specific Run link …

Will generate a rBR single Run report with more information about that Run

rBReport: single Run Overview

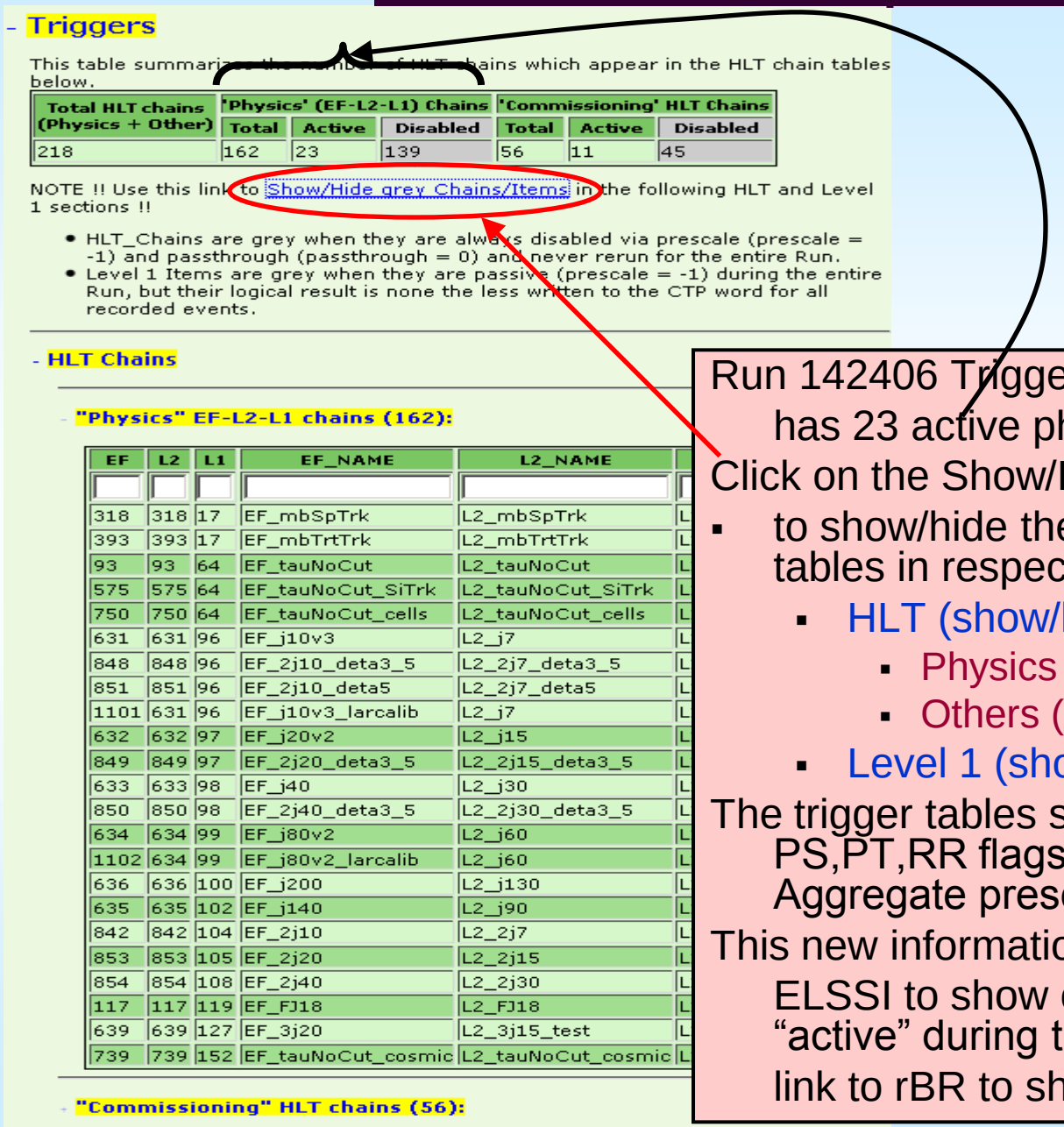


Each Yellow section expands … This report has 5 Primary sections, the Trigger section has subsections

- General Run info
  - Period, LB range, Date …
  - Links to external reports
- AMI tags for this Run
  - In the TAG Catalog schema
- DQ LBSUMM assessments
  - COOL tagged/locked
- Prescale Evolution
  - How many times did prescales change during the Run
- Trigger section
  - Has an HLT summary
    - Counts of active/disabled
  - Has expanding subsections
    - HLT Chains (2 subsections)
      - Physics
      - Commissioning
    - Level 1 Items
- COMA Load Status

runBrowserReport : Trigger Section

Trigger Section of runBrowerReport for Run=142406



- Triggers

This table summarizes the number of HLT chains which appear in the HLT chain tables below.

Total HLT chains (Physics + Other)	'Physics' (EF-L2-L1) Chains			'Commissioning' HLT Chains		
	Total	Active	Disabled	Total	Active	Disabled
218	162	23	139	56	11	45

NOTE !! Use this link to Show/Hide grey Chains/Items in the following HLT and Level 1 sections !!

- HLT_Chains are grey when they are always disabled via prescale (prescale = -1) and passthrough (passthrough = 0) and never rerun for the entire Run.
- Level 1 Items are grey when they are passive (prescale = -1) during the entire Run, but their logical result is none the less written to the CTP word for all recorded events.

- HLT Chains

"Physics" EF-L2-L1 chains (162):

EF	L2	L1	EF_NAME	L2_NAME	L
318	318	17	EF_mbSpTrk	L2_mbSpTrk	L
393	393	17	EF_mbTrtTrk	L2_mbTrtTrk	L
93	93	64	EF_tauNoCut	L2_tauNoCut	L
575	575	64	EF_tauNoCut_SiTrk	L2_tauNoCut_SiTrk	L
750	750	64	EF_tauNoCut_cells	L2_tauNoCut_cells	L
631	631	96	EF_j10v3	L2_j7	L
848	848	96	EF_2j10_deta3_5	L2_2j7_deta3_5	L
851	851	96	EF_2j10_deta5	L2_2j7_deta5	L
1101	631	96	EF_j10v3_larcalib	L2_j7	L
632	632	97	EF_j20v2	L2_j15	L
849	849	97	EF_2j20_deta3_5	L2_2j15_deta3_5	L
633	633	98	EF_j40	L2_j30	L
850	850	98	EF_2j40_deta3_5	L2_2j30_deta3_5	L
634	634	99	EF_j80v2	L2_j60	L
1102	634	99	EF_j80v2_larcalib	L2_j60	L
636	636	100	EF_j200	L2_j130	L
635	635	102	EF_j140	L2_j90	L
842	842	104	EF_2j10	L2_2j7	L
853	853	105	EF_2j20	L2_2j15	L
854	854	108	EF_2j40	L2_2j30	L
117	117	119	EF_FJ18	L2_FJ18	L
639	639	127	EF_3j20	L2_3j15_test	L
739	739	152	EF_tauNoCut_cosmic	L2_tauNoCut_cosmic	L

"Commissioning" HLT chains (56):

Run 142406 Trigger Summary shows:

has 23 active physics chains (of 162)

Click on the Show/Hide link

- to show/hide the grey rows of chain/items tables in respective subsections:
  - HLT (show/hide disabled chains)
    - Physics (complete EF-L2-L1 chains)
    - Others (commissioning chains)
  - Level 1 (show/hide passive items)

The trigger tables show the prescale range and PS,PT,RR flags of the new derived “Run Aggregate prescale” COMA tables

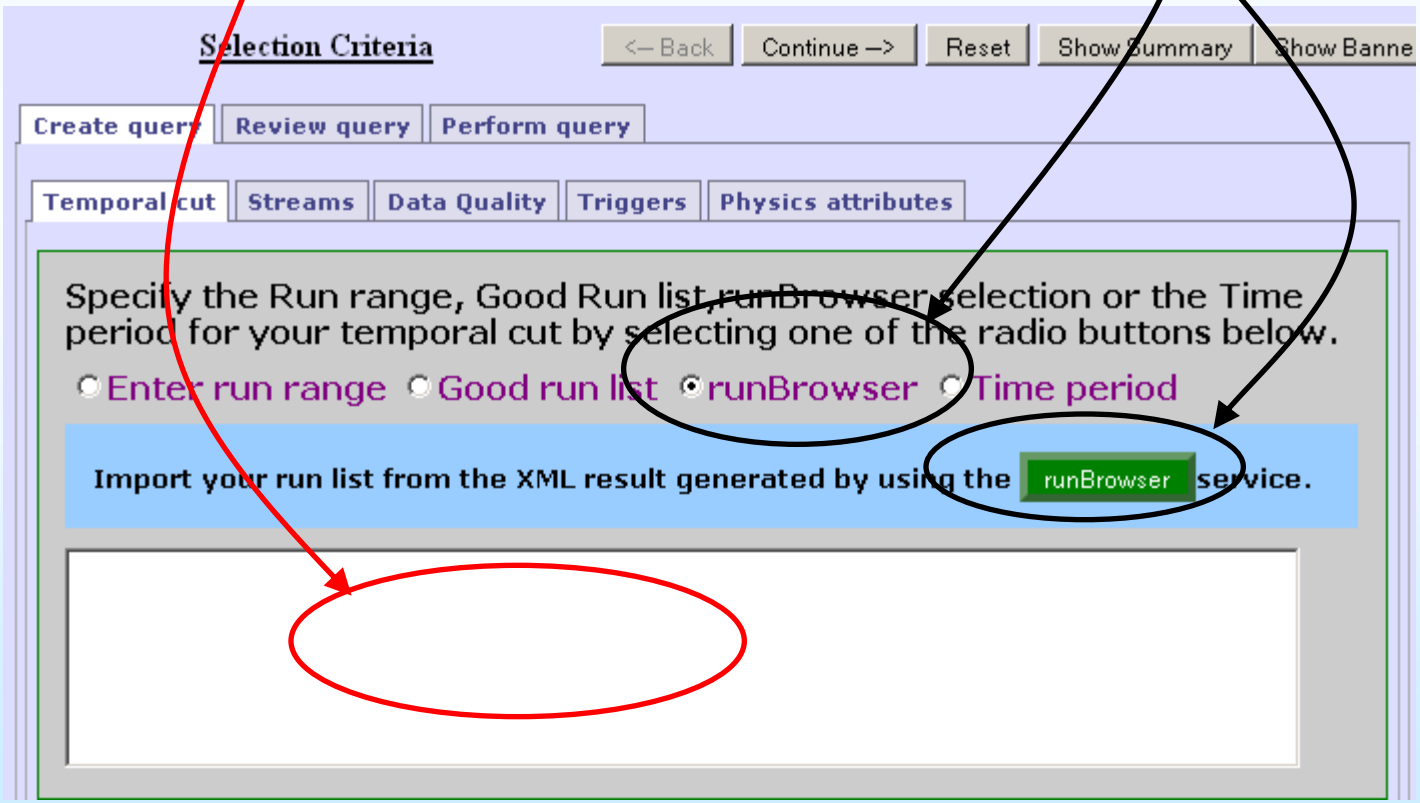
This new information allows:

ELSSI to show only chains which are “active” during the Run

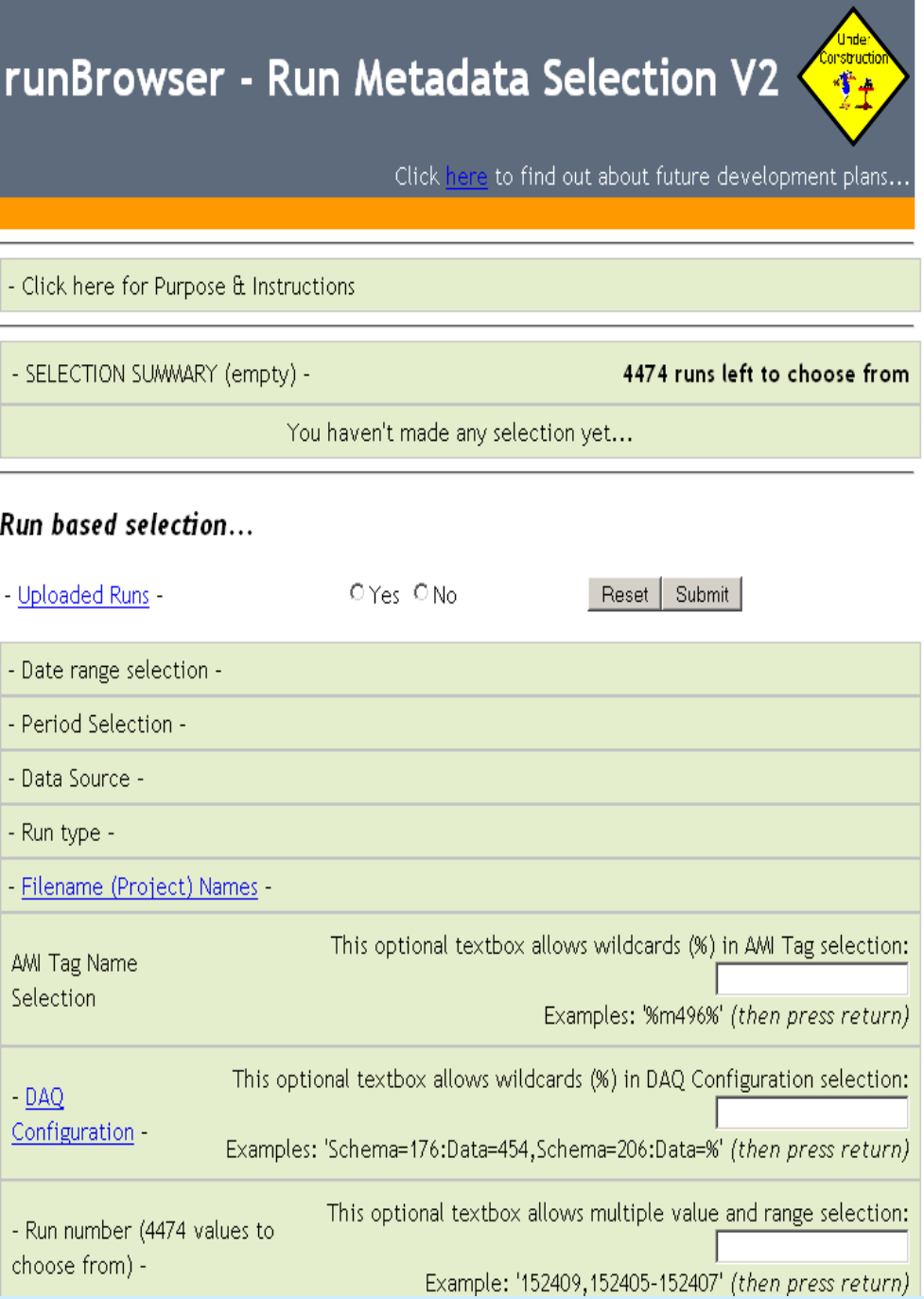
link to rBR to show all chains.

ELSSI can now launch runBrowser

- ELSSI can launch runBrowser on the “temporal”
  - Choose the runBrowser radio button
  - Click on the green runBrowser button
    - launches runBrowser in new window
    - After Run/LB selection, click on FINISH, click on ELSSI button
    - RunLB xml result is returned into the text area below



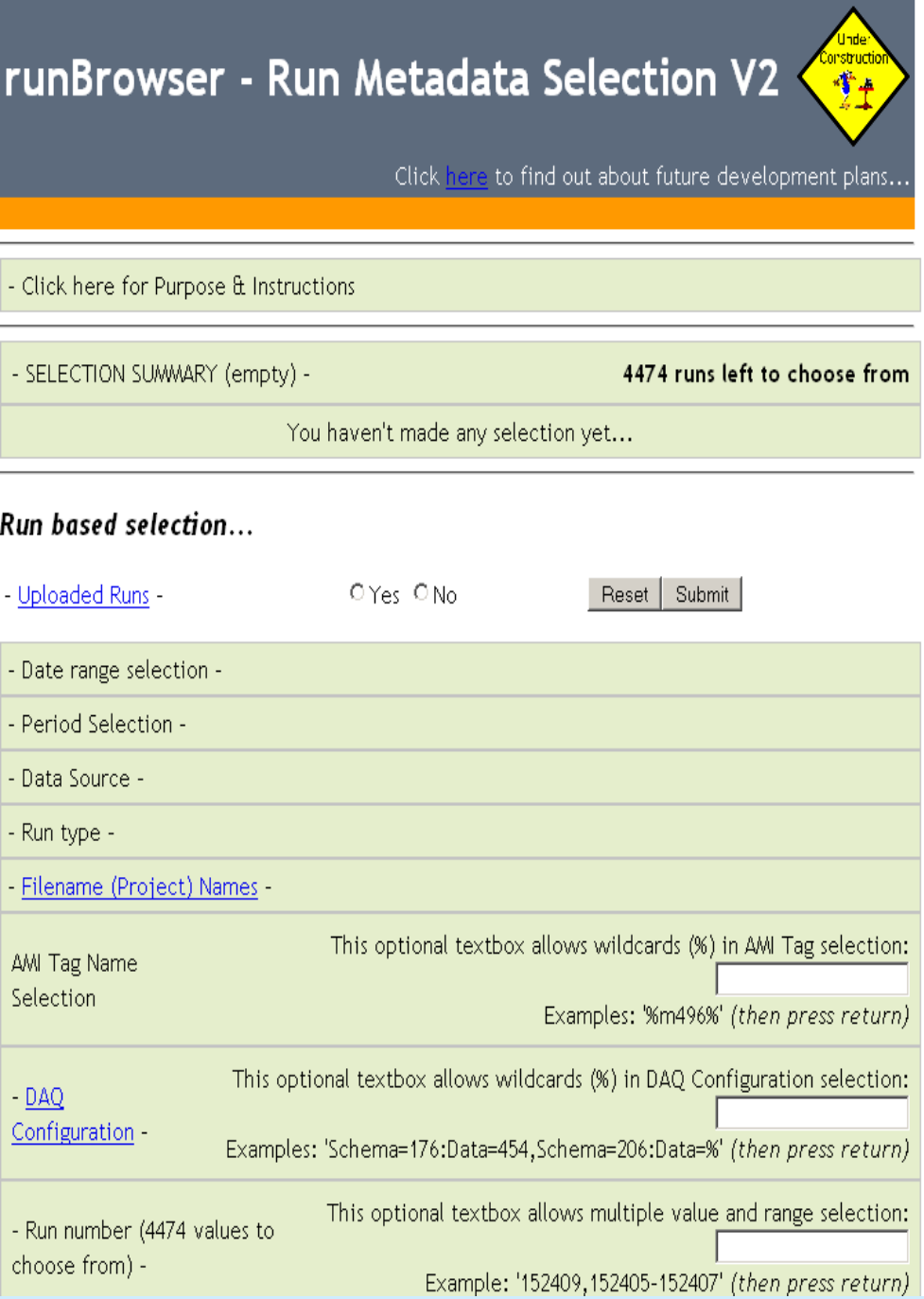
runBrowser Overview



- Note: “Under Construction”!
- Each section expands/collapses showing the available values
- Blue links:
  - pop up documentation
- Choose ANY criteria, ANY order, click SUBMIT
  - runBrowser now tells you what is left … iterate until you are happy
- Selection Sections

  → see next slide
- Click on FINISH button
  - when you are finished making selections

  → Shown after next slide

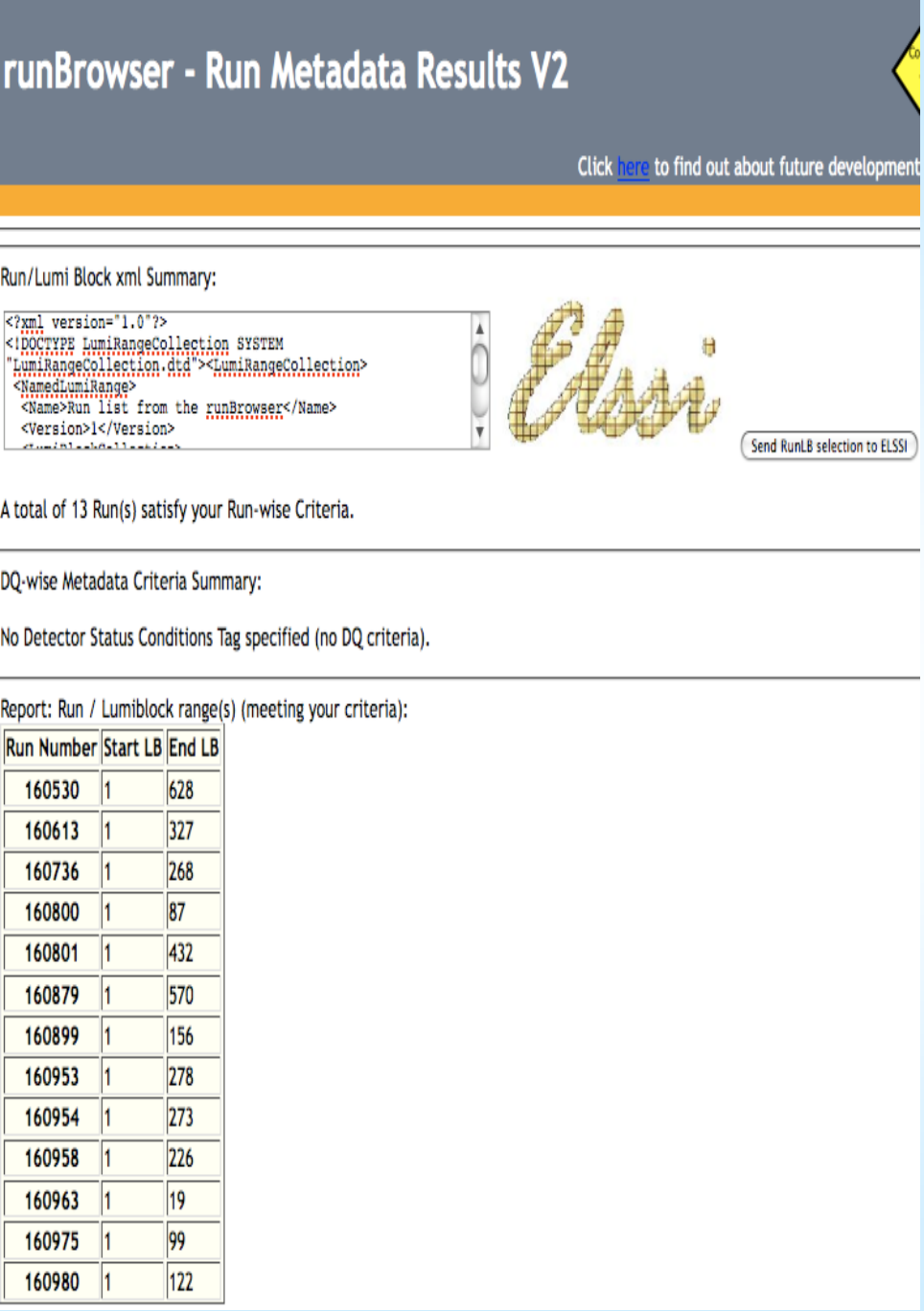


rB Selection Criteria

Sections

1. Purpose / Instructions
2. Selection Summary
   - → Starts out empty (stand-alone)
   - → Starts with Collection (ELSSI)
3. Selection Criteria
   - A. Uploaded Runs
   - B. Temporal Selection
   - C. Data Periods
   - D. Data Source (data or MC)
   - E. Run Type
   - F. Project Name (FilenameTag)
   - G. DAQ Configuration
   - H. Run Number
   - I. Stable Beams (*)
   - J. Ready Status Flag (*)
   - K. Trigger Master Key
     - LVL1/HLT PS Key
   - L. Data Quality

rB Finish Button



Run Number	Start LB	End LB
160530	1	628
160613	1	327
160736	1	268
160800	1	87
160801	1	432
160879	1	570
160899	1	156
160953	1	278
160954	1	273
160958	1	226
160963	1	19
160975	1	99
160980	1	122

Output:

- GOOD RUNS LIST xml
  - w/link to send to ELSSI
- A humanly readable report…
  - Table of Run LB Ranges
  - List of criteria
  - Report of why particular LB ranges failed DQ criteria

-- This is a first release of "runBrowser"
But the data content and functionality is **still in development.**–
This version should give people an idea of what the system will be able to do…
Ideas and feedback is very welcome!

COMA Summary

This is an evolving system … current information in the system is growing based on information available and use cases

- → Adding more dimensions to the Conditions data
  - → With suitable relationships to facilitate queries
- → Making that criteria available in a dynamic useable interface

We want to insure the Metadata is

- → complete enough to satisfy use cases while
- → reflecting accurately its limitations

Interfaces are being constructed to use selection syntax, criteria, and communication in common use in ATLAS

i.e. runQuery, GoodRunList xml …

This facilitates cross checks with other systems

Continuous process: talking with various experts to ensure

data integrity, completeness, compatibility w/other systems

… We've had very positive informal feedback from physics and commissioning people so far …

Summary and Conclusions

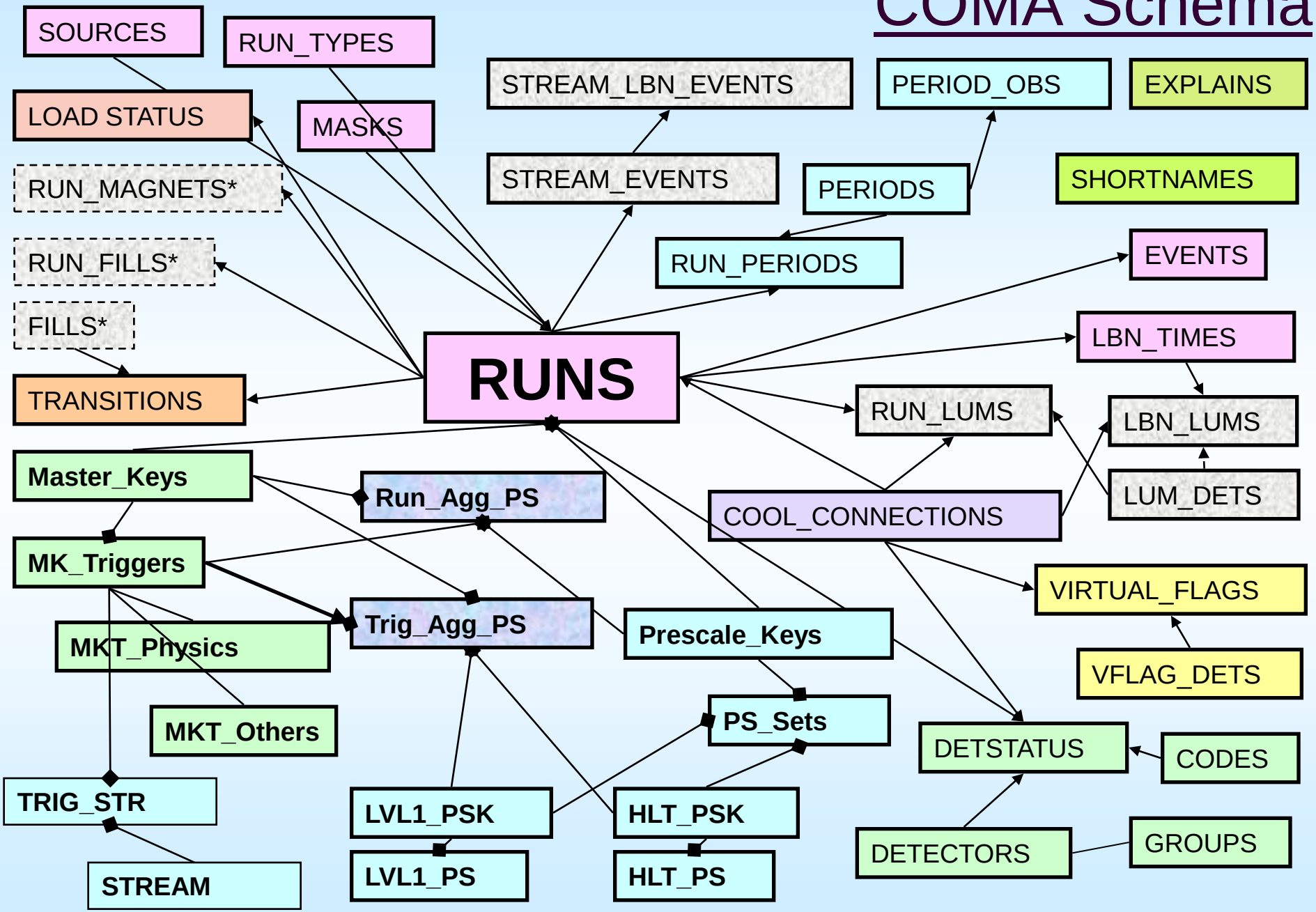
- The ATLAS Conditions DB infrastructure
  - Is well suited to store Luminosity/Beam related “Conditions”
  - Provides many/diverse clients with Luminosity and Beam conditions data they need

- Metadata collected at the Event, Run, LB, Dataset levels
  - These collections are a valuable resource for
    - Quickly finding the data we need
    - Facilitating access to that data for further analysis
    - Insuring results can be traced back to lum/beam conditions !

- Systems described today not possible without the excellent work and coordination from many people in many areas (Database, Luminosity, Subdetectors, DQ, Trigger, DAQ, TAG, PAT …)
  - It is very exciting to collaborate with so many great people who have contributed components of each of these systems
  - Thanks to very many !!

Backup

COMA Schema


SOURCES
RUN_TYPES
STREAM_LBN_EVENTS
PERIOD_OBS
EXPLAINS
LOAD STATUS
MASKS
STREAM_EVENTS
PERIODS
SHORTNAMES
RUN_MAGNETS*
RUN_PERIODS
EVENTS
RUN_FILLS*
FILLS*
LBN_TIMES
RUNS
TRANSITIONS
RUN_LUMS
LBN_LUMS
Master_Keys
Run_Agg_PS
LUM_DETS
COOL_CONNECTIONS
MK_Triggers
VIRTUAL_FLAGS
Trig_Agg_PS
Prescale_Keys
MKT_Physics
VFLAG_DETS
PS_Sets
MKT_Others
DETSTATUS
CODES
TRIG_STR
LVL1_PSK
HLT_PSK
DETECTORS
GROUPS
LVL1_PS
HLT_PS
STREAM

General Design Principles (1)

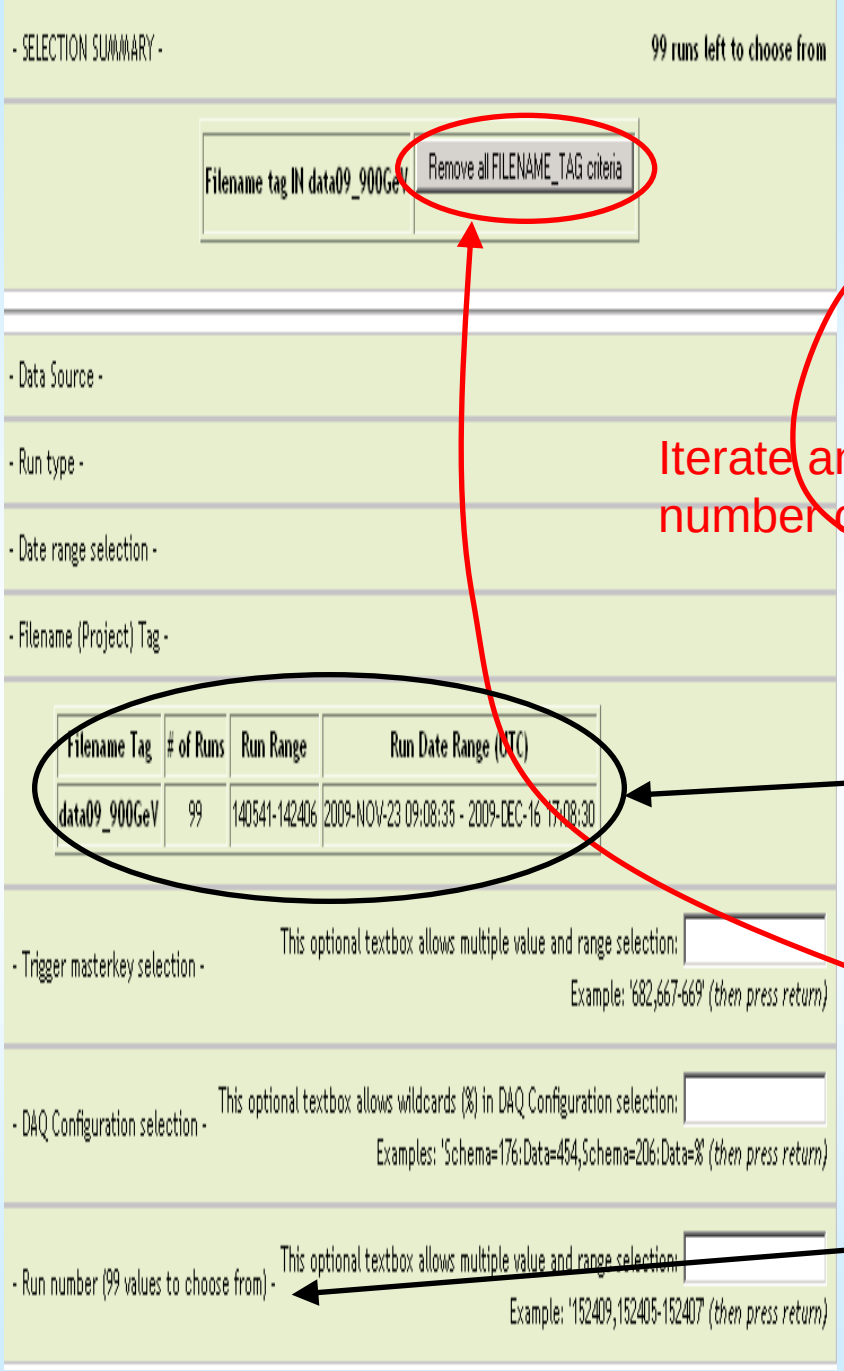
The fundamental components are

1. The COMA Relational Database tables
2. The runBroswerReport – the report interface for the COMA Tables
3. The runBrowser – the interface for RunLB selection using COMA Tables

1. **COMA Tables**:
   - Must provide information ELSSI needs to decode TAG attributes
   - Include information for both Online and MC Runs
     - TAGs for Online/MC have the same attributes (no MC truth)
     - Catalogue for Online/MC reflects similar processing workflows
   - Overall system must handle gracefully missing information
   - Upload select conditions for Runs of 'analysis interest'
     - Note: NOT all Runs and not all Conditions
     - Only upload Conditions in LOCKED COOL tags (w/cross checks)
   - Refine/Correct/Derive conditions to form more effective criteria
2. **runBrowserReport** = web report interface to COMA Tables
   - Intended to display what COMA knows about each Run
   - Provides links to information in other systems
     - runQuery, AMI, Trigger, Data Quality …or reports using COOLCherryPy
   - Links from ELSSI & runBrowser to provide more information

General Design Principles (2)

3. **runBrowser** = interface for RunLB selection using COMA Tables
   - Purpose: Make conditions metadata available as selection criteria in advance of analysis … Envisioned as the Run-level browser for ELSSI … current implementation makes it also available stand-alone.
     - Intermediate results may be what the user is looking for
       I.E. show me the Runs taken on this date, during aData Period, or w/this DQ tag.
     - Final output (clicking on "Finish" button):
       LB level criteria is applied at the final "Finish" stage.
       Output: A report showing the Run/LBs passing final criteria
       Output: An xml file (GoodRunList) which can be used by ELSSI etc.
   - runBrowser IS NOT runQuery (browser to all online Runs in COOL)
   - Enables not only Run selection by conditions criteria but also displays the possible values of remaining criteria and its relationship to other criteria
   - Criteria can be imposed in any order …
     - some choices open selection to deeper criteria
   - Where appropriate:
     - Allows radio, checkbox, or text (command line) entry of criteria
     - Allow list and/or ranges of values, wildcards, case insensitivity ...
   - Incorporate features to customize rows displayed and other tricks to improve performance



Iterate any number of times

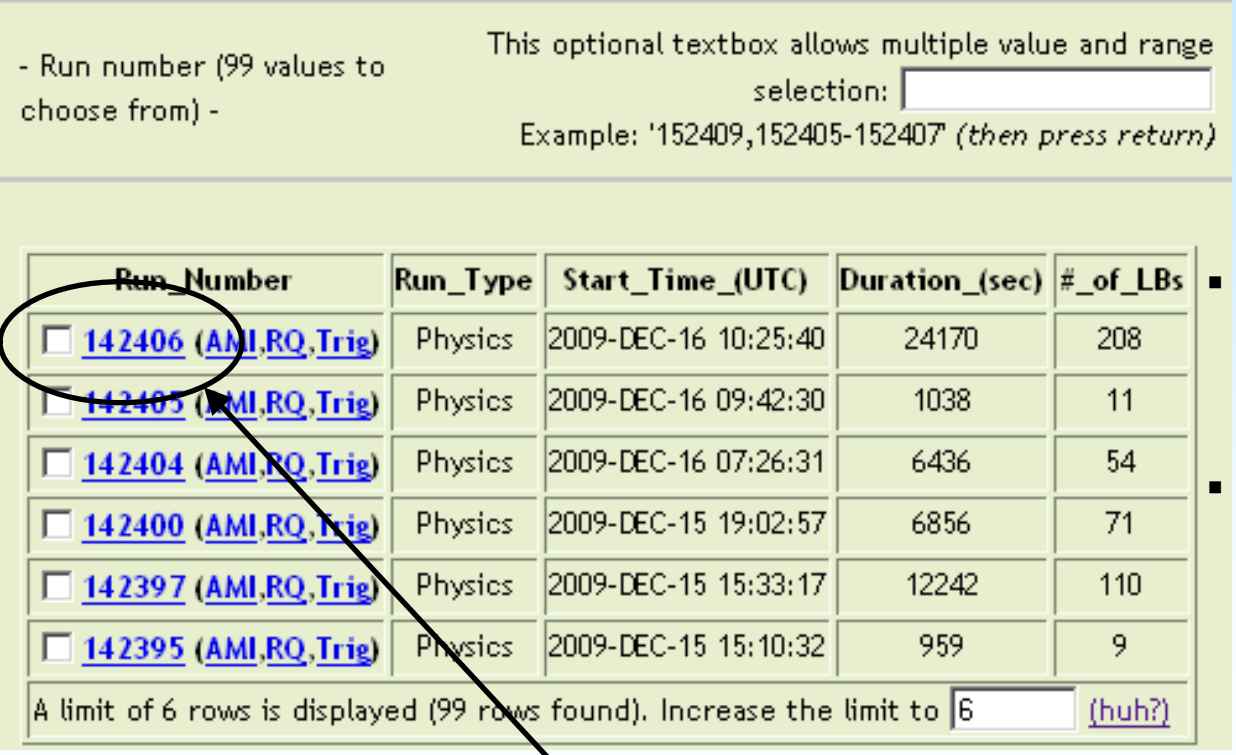
Example demonstrates General Principles:

- There is no prescribed order of selection or mandatory selections
- Expand section of interest, make selection:
  - available radio/checkbox or use the textbox to type a list or range of values
  - Click Submit

I chose Project "data09_900GeV", then

- I see there are 99 Runs left
- I see their run and date range
- I see the criteria has appeared in the selection summary
  - I could remove it with button click
- I see ALL the other sections have changed to reflect this criteria !
  - Look at the remaining 99 runs .. (next slide)

runBrowser
Run Number Section



- Click on the Run Section to open it … the run numbers appear
- Run selection is NOT mandatory … you can go onto FINISH without any Run explicitly selected

The Run Section includes links to other systems

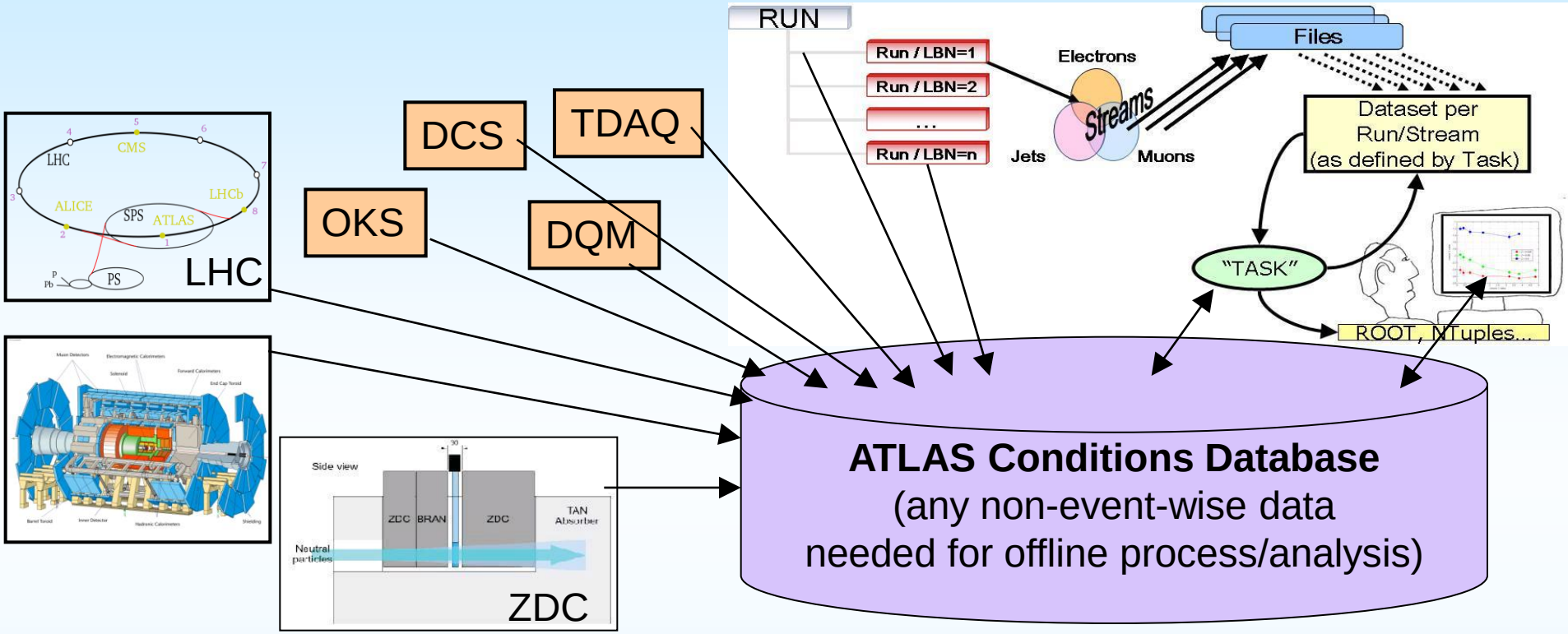
- Click on the Run Number → generates the runBrowserReport
- Other links are to AMI, RunList, and Trigger Reports for that Run number

Other related selections to be added to runBrowser2:

1. Run Duration
2. Number of LB
3. Number of Events Recorded

Next slide:
runBrowserReport
for Run number 142406

“Conditions” in ATLAS



“Conditions” – general term for information which is not ‘event-wise’ reflecting the conditions or states of a system – conditions are valid for an interval ranging from very short to infinity.

Any conditions data needed for offline processing and/or analysis must be stored in the

ATLAS Conditions Database (“CondDB”)