ATLAS High Level Trigger System

Alexander Palmer
The University of Texas at Dallas
Outline

- Trigger System Overview
- Level 1 Trigger
- Regions of Interest
- Level 2 Trigger
- Level 2 Seeding
- Event Filter
- Streaming
- Releases and Validation
- AthenaMT/PT
- Validation Scripts
Outline

- Trigger System Overview
- Level 1 Trigger
- Regions of Interest
- Level 2 Trigger
- Level 2 Seeding

- Event Filter
- Streaming
- Releases and Validation
- AthenaMT/PT
- Validation Scripts
Trigger System Overview

- 40 MHz bunch crossing rate
- Event write out ~100Hz
- High rejection, high sensitivity
Level 1 Trigger

- Hardware-oriented
- 2.5 microsecond latency
- 256 parallel trigger items
- Level 1 Menu/CTPID
- 40 MHz → 75 kHz
Regions of Interest

- ROI Builder
- Region in $\eta$ and $\phi$
- Single data structure
- Level 1/Level 2 Boundary
Level 2 Trigger

- Software-oriented
- 40 ms latency
- 8 bit Trigger Type
- Chains and Sequences
- Prescaling and Passthrough
- 75 kHz $\rightarrow$ $\sim$ 1 kHz
Level 2 Seeding

- L1 Item and RoI
- Random Chain
- Unseeded Chains
- Trigger Type Seeding
Event Filter

- Software-oriented
- 1 second latency
- Offline Algorithms
- Event Builder
- 1 to 1 with Level 2
- 1 kHz $\rightarrow$ 100 Hz
Streaming

- Groups of HLTs
- Duplicate events
- Stream Classification in EF
Releases and Validation

- Reconstruction Algorithms
- Level 1 Menu
- HLT Steering
- Newer = Better?
AthenaMT/PT

- Athena Framework
- Online Emulation
- MT = Level 2
- PT = Event Filter
Validation Scripts

- Test Release Setup
- Package Checkout
- AthenaMT/PT
- Streaming Check
- Signature Acceptance

CosmicsAllTeTRTxCB_TRTTrkHypo
30 / 98:
(121416, 335544357)
(121416, 1207959811)
(121416, 83886110)
(121416, 2432696606)
(121416, 2566914067)
(121416, 301989914)
(121416, 922747154)
(121416, 335544588)
(121416, 335544371)
Acknowledgements

Dr. Alessandro Cerri
Dr. Wojtek Fedorko

Dr. Homer Neal
Dr. Jean Krisch
Dr. Myron Campbell
Jeremy Herr