



# eFastOR Status

Hal Evans, Indiana University, for the eFastOR group  
(Argonne, Boğaziçi, Geneva, Indiana, PNPI, York)

## Outline

- 1) Introduction & Motivation (reminder)
- 2) Lab Measurements with Argon
- 3) Design Issues
- 4) Simulation
  - monopole timing, HT occupancy, athena
- 5) Project Management & Review

<http://hep.physics.indiana.edu/~hgevans/atlas/hardware/fastor/>

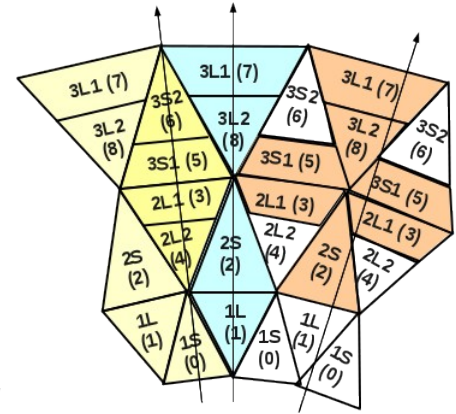


# Introduction & Motivation

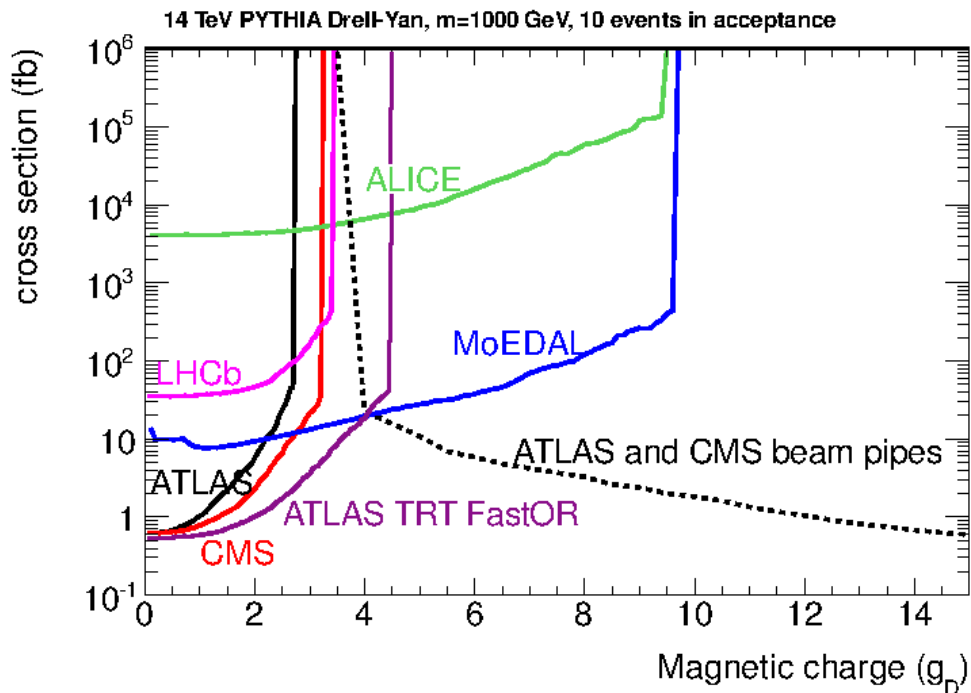


## Enhancement of existing FastOR functionality

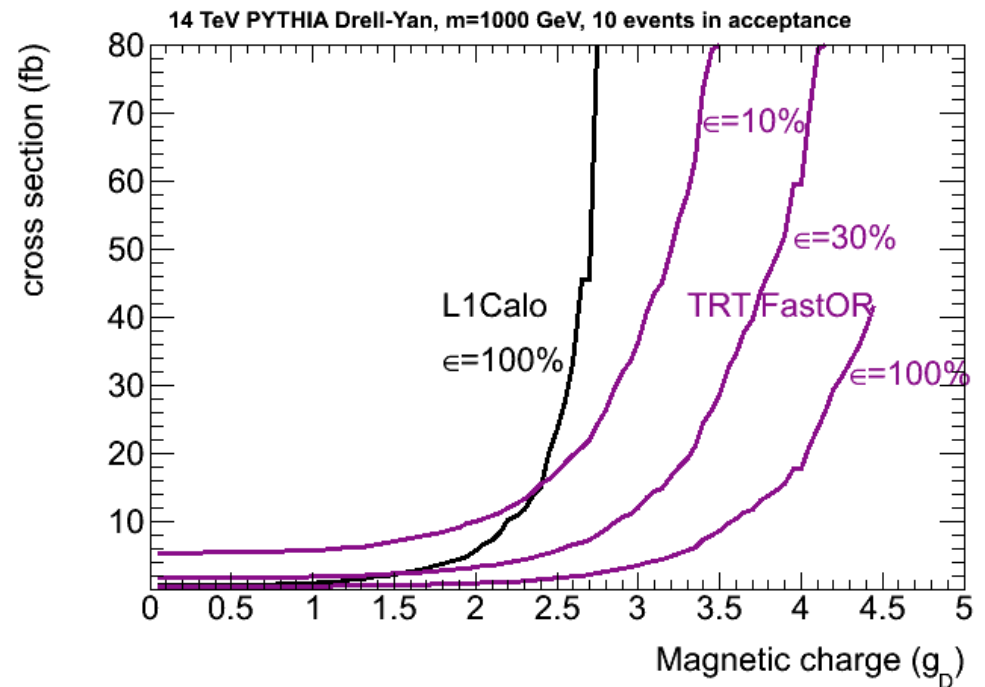
- allows L1 Trigger on Highly Ionizing Particles
- eFastOR uses fine time binned HT information
  - > Occupancy:  $n(\text{DTMROCs})$  with HT hits on an FEB
  - > Pattern: group of FEBs consistent with an HIP track
  - > Timing: valid pattern, continuously active for time  $> T_{\text{trig}}$



## X-Sections for 10 evts in accept w/ 20 fb<sup>-1</sup>



## Sensitivity vs eFastOR Trigger Efficiency

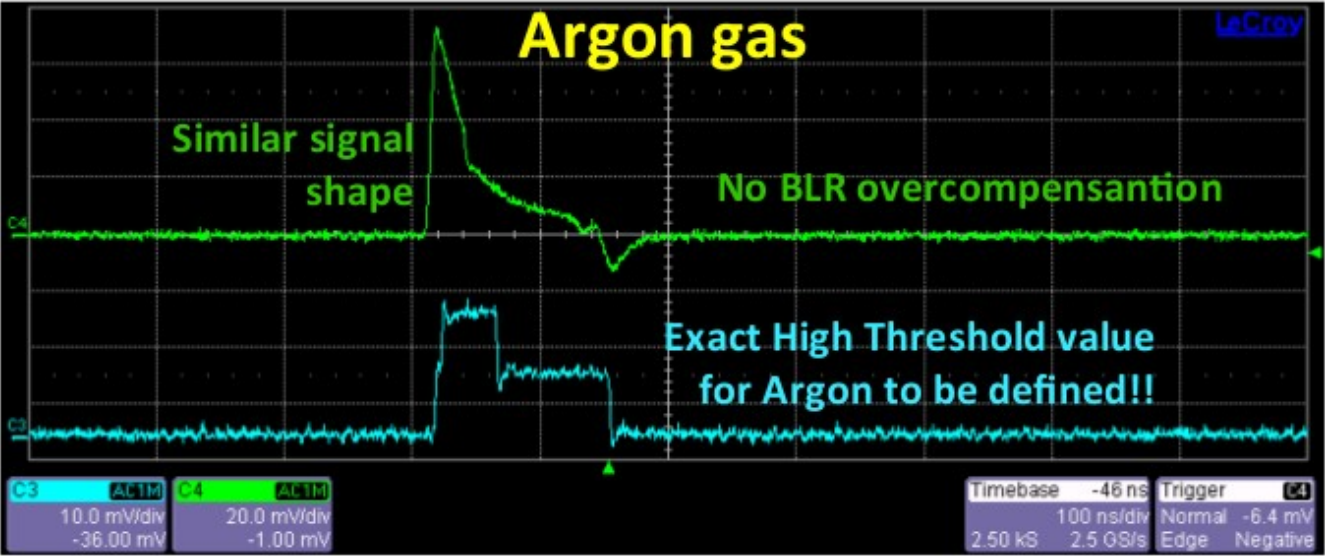
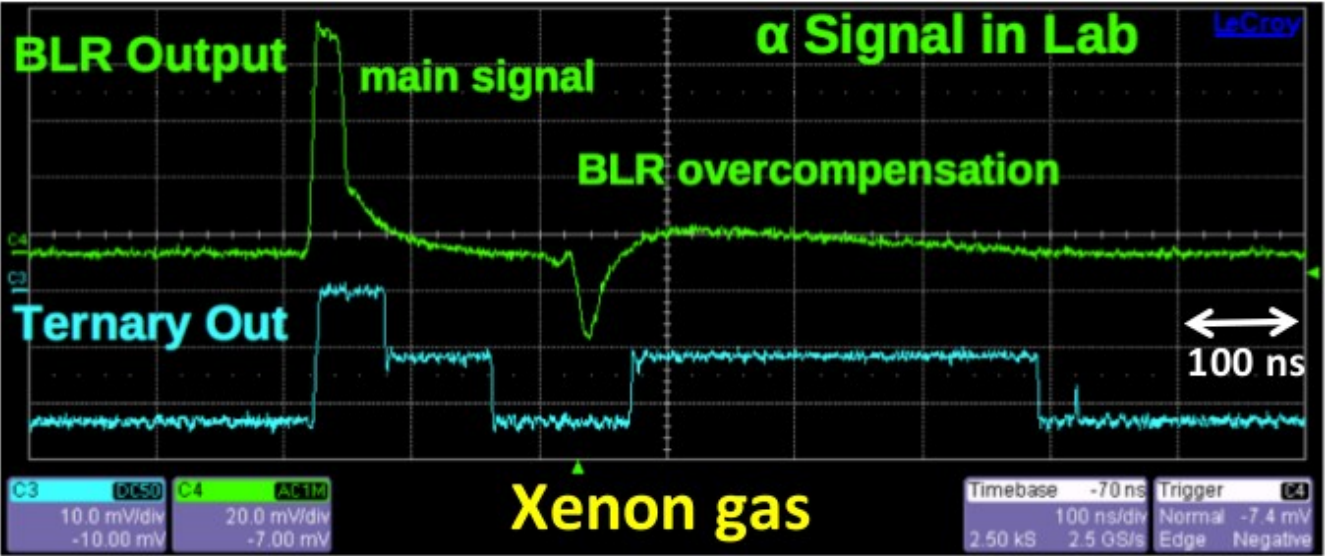




# Lab Measurements with Argon



Streamers in Argon ==> similar HT response to Xenon



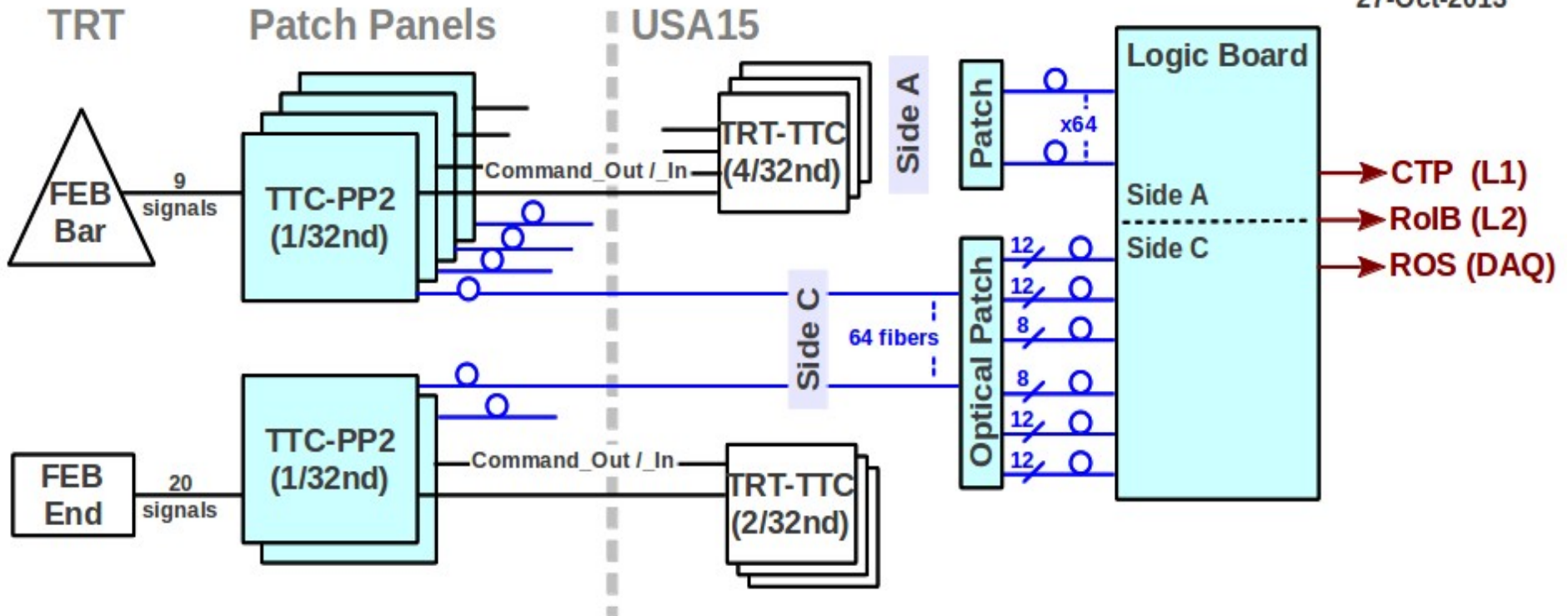
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# Hardware



27-Oct-2013



## Recent Work

- TTC-PP2 real estate: necessary components should fit on new board
- Single Logic Board with 1 Algorithm FPGA per side: simplifies design
  - > requires mini(micro)-POD receivers, Virtex-7 FPGA

## Current Focus: TTC-PP2 ==> Logic Board data transmission

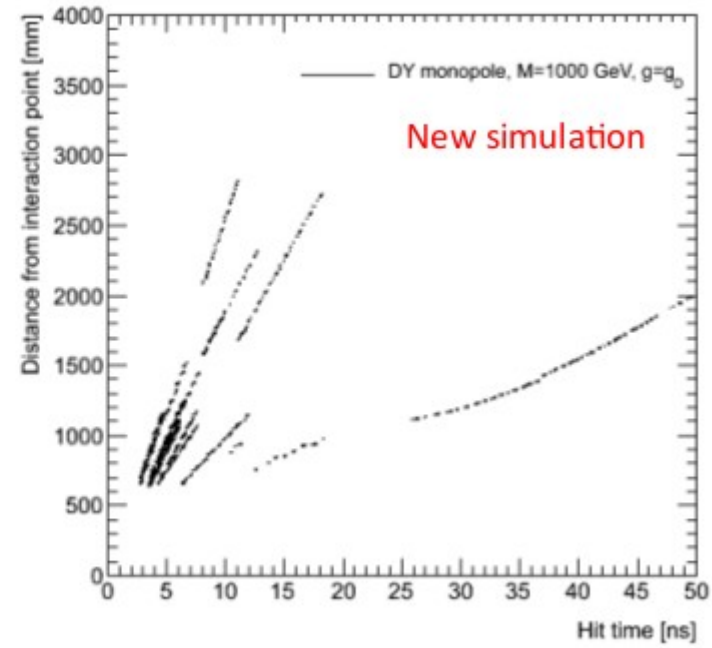
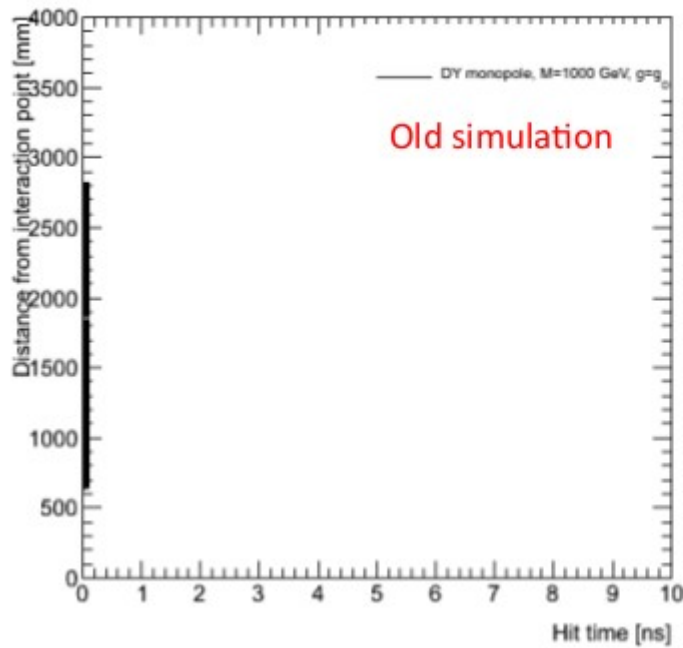
- format, synchronization, error detection, ....



# Monopole Simulation

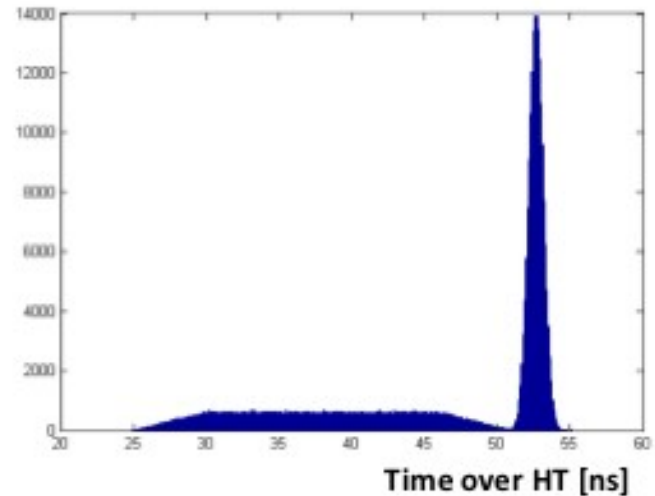


## Fixed Monopole timing bug in Geant4



Gabriel Palacino, Wendy Taylor

Added streamer signal timing to Athena digitization



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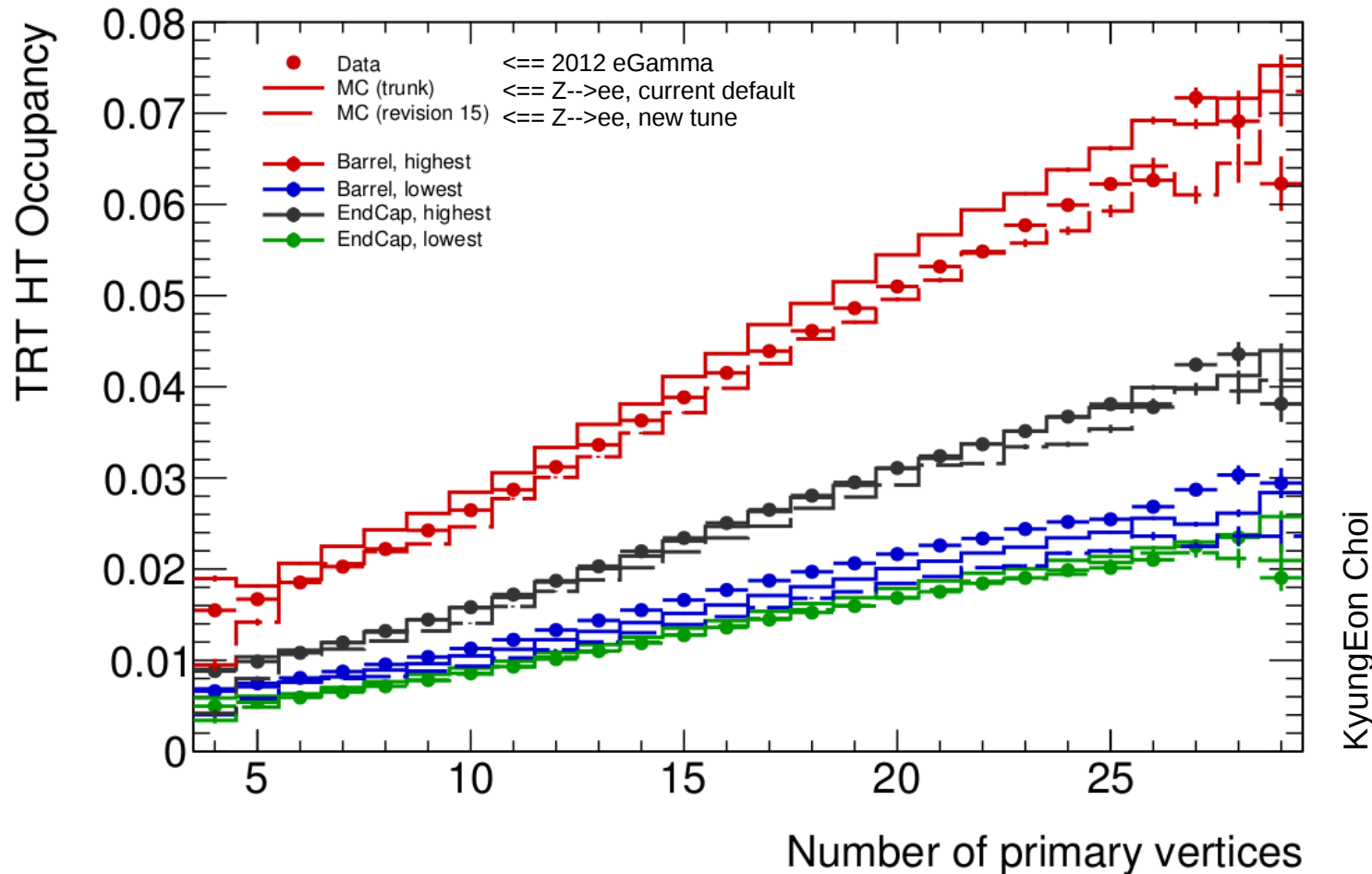


# HT Simulation



## Changes in Latest TRT Tune affecting HT

- $T_0$  (7 ns  $\Rightarrow$  1 ns), HL threshold (-10%), signal attenuation  $\Rightarrow$  Acceptable Data vs MC agreement





# eFastOR in Athena



## Implementation of eFastOR Algorithms in Athena (TRTFastORAlg)

- OR HT signals of all straws on DTMROC
- sum DTMROCs on FEB ==> n(DTMROC) in 3.125 ns bins
- signal pre-processing algorithm
- trigger logic (patterns) in each phi-slice
- output n(DTMROC) time array to ntuple for additional flexibility

## Changes included in recent TRT\_Digitization tags

- version for review studies to be finalized early next week

## Signal and Background samples

- Background ( $\mu = 30, 60, 80 @ 25 \text{ ns}$ ): 1M events each
  - > note: only need to run TRT digitization ==> use existing HITS files
- Signal (monopoles): few kEvs
- Geometry: ATLAS+IBL



# Athena vs Data-Based Sim

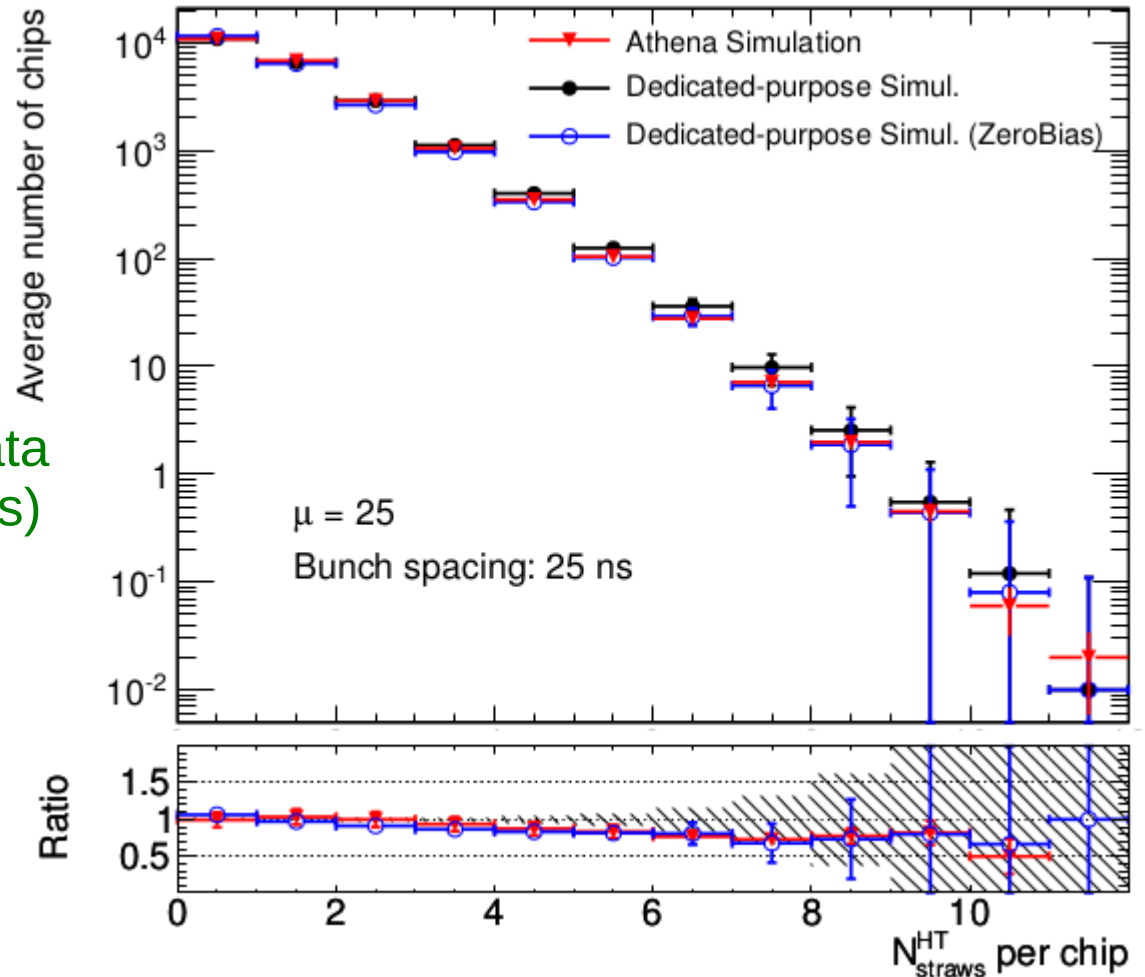


Compare new Athena simulation with dedicated (data-based) sim used for Apr 2013 Proposal

- overlap of  $\mu=25$  data from run 190728 (2011) to emulate 25 ns BC
- use EnhancedBias data reweighted to mimic ZeroBias HT occupancy
- repeated with ZeroBias data as a cross-check (low stats)

Good agreement for low-level quantities

- further studies ongoing



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# Management Issues



## eFastOR classified as a “Minor” Upgrade Project

- see Phil Allport's talk at the Marrakesh ATLAS week
- “small review team” evaluates proposal ==> report to Upgr Steering Com.
- USC/PO may recommend proposal to EB, request endorsement by CB
- MOUs prepared if approved

## Aiming for Project Review in December or January

- valuable external scrutiny of plans
- attract more groups (& funding) to an “approved” project

## Updated Proposal for the review being prepared

- updated/more detailed performance estimates
- latest system architecture/design
- more realistic schedule, effort, and costs