NOvA Simulations and DAQ

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1. NOvA Simulation Cheater Development
2. NOvA Data Logger DAQ Component

Cheater for Simulated NOvA Events

1) List of "hits" (basic detector readout cells with energy deposited) from generated and simulated MC particles

SimHit : Plane/Cell ID, View, E deposited, # particles (N), vectors of length N of a) MC Track ID, b) Particle ID, c) particle E deposit, d) Time

-> True reconstruction of Particles in the detector

-> Evaluations of purity and efficiency of reconstruction algorithms

2) List of True "reconstructable" objects in NOvA events

Tracks, Showers, Clusters, Prongs, Vertices, etc.

-> Comparison of True objects to those found by existing algorithms

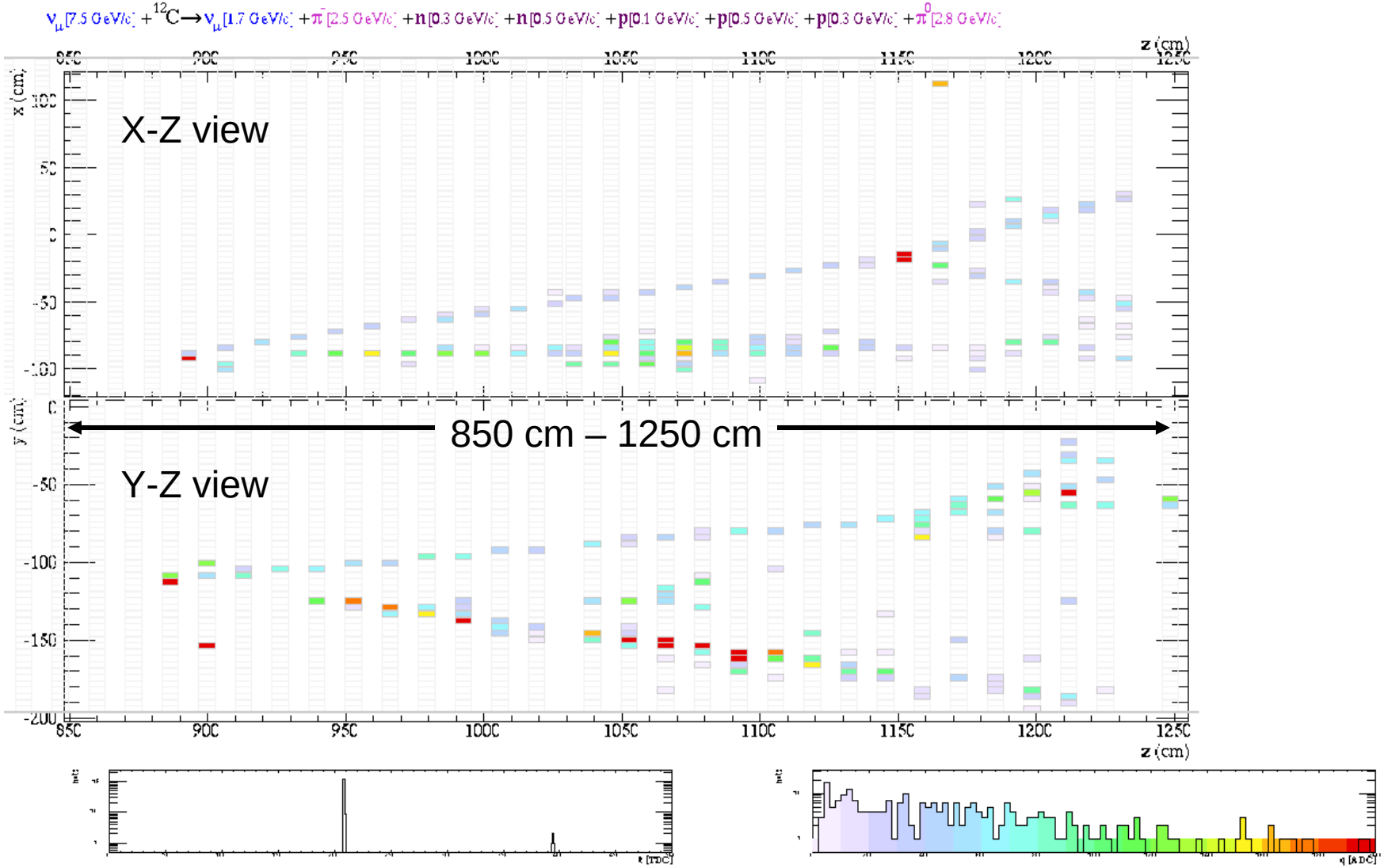
-> Definition of level of detail for NOvA reconstruction

-> Development of new reconstruction algorithms

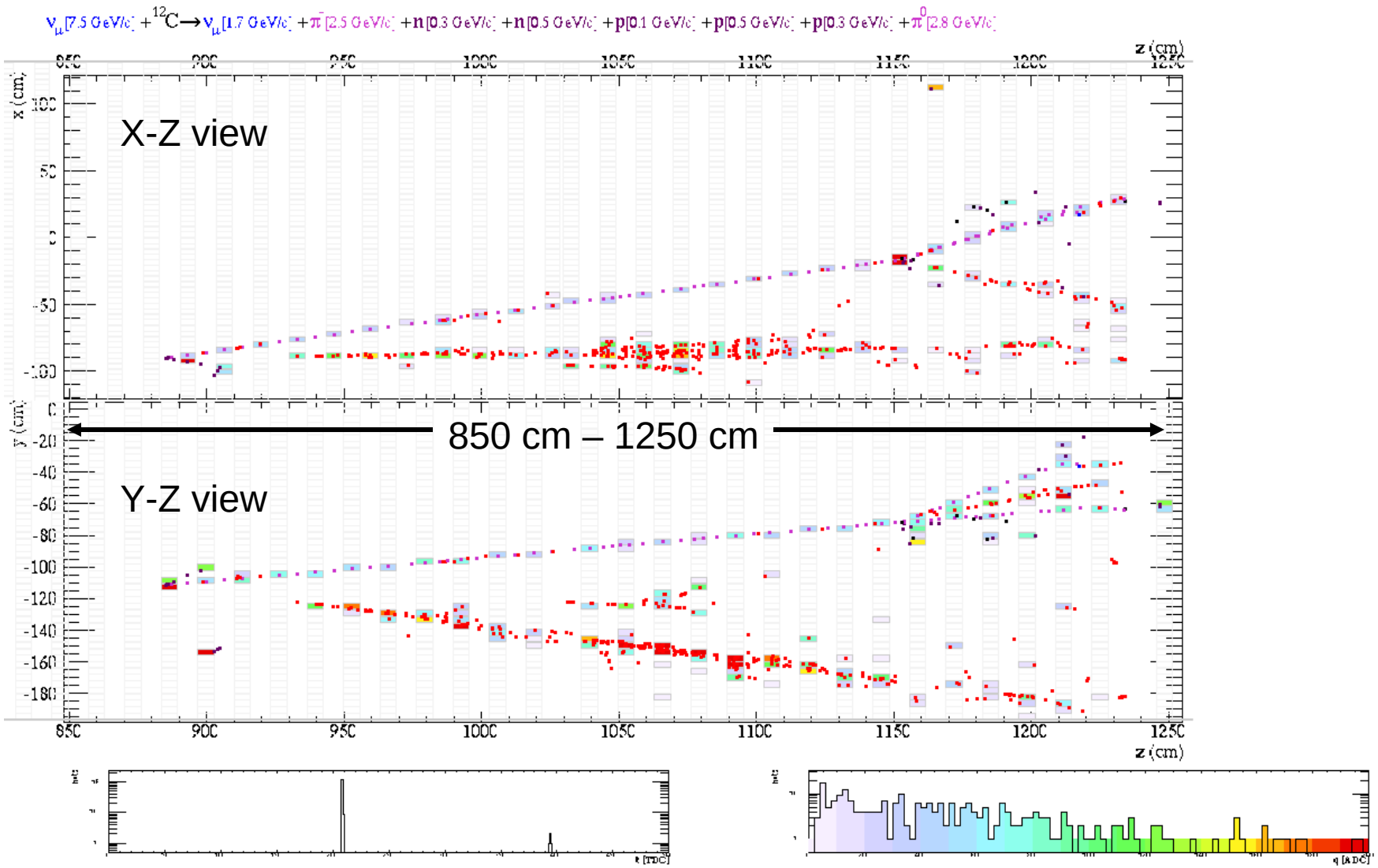
NOvA reconstruction starting point -> MINOS experience and algorithms :

MINOS :	NOvA :
1 inch Steel, 1 cm Scintillator unit cell	0.33 cm PVC, 6 cm Scintillator unit cell
~1.5 X_0 sampling →	~0.17 X_0 sampling !

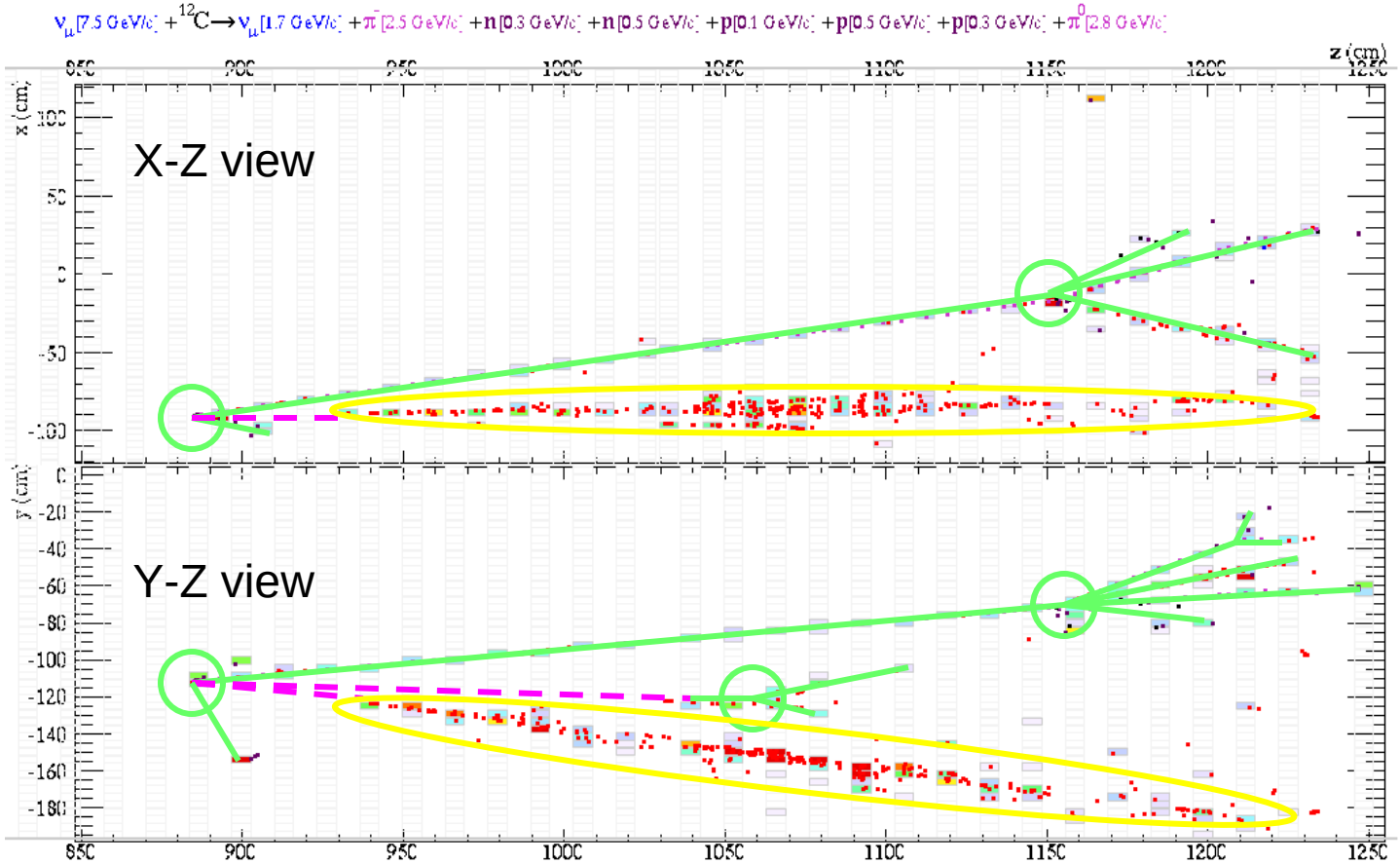
Simulated ν_μ NC NOvA Event – Near Detector Hits



Simulated ν_μ NC NOvA Event - with MC Info

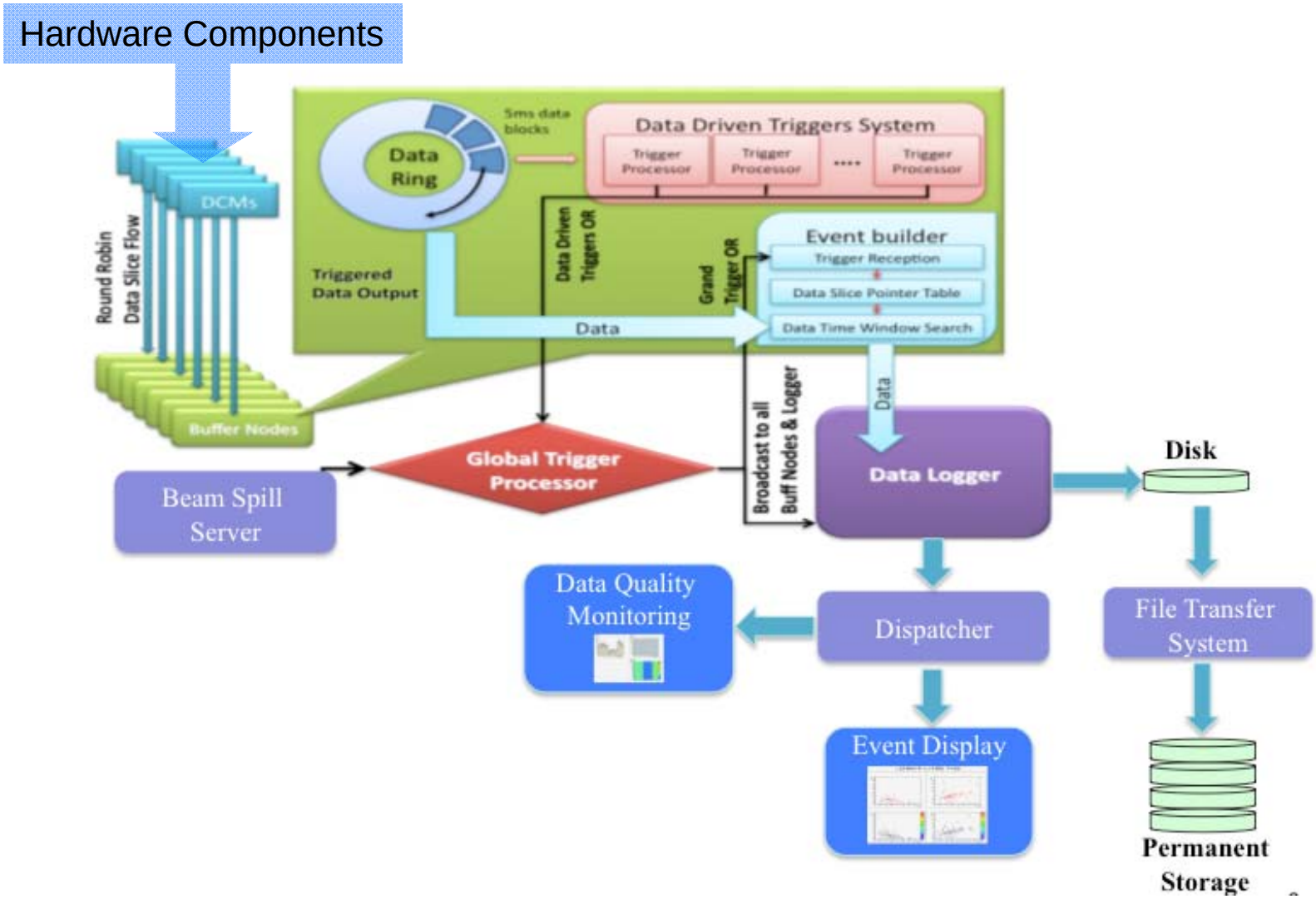


Cheated Objects – MC Info + Detector Hits



Vertex spacepoints (ν ints, $\pi^\pm$ ints/decays, π^0 decays, γ conversions)
Long-lived charged particle tracks (at least 3 planes crossed?)
Neutral particle gaps (ν, γ, π^0, n, K_L^0, etc.)
EM showers

NOVA DAQ Software Components

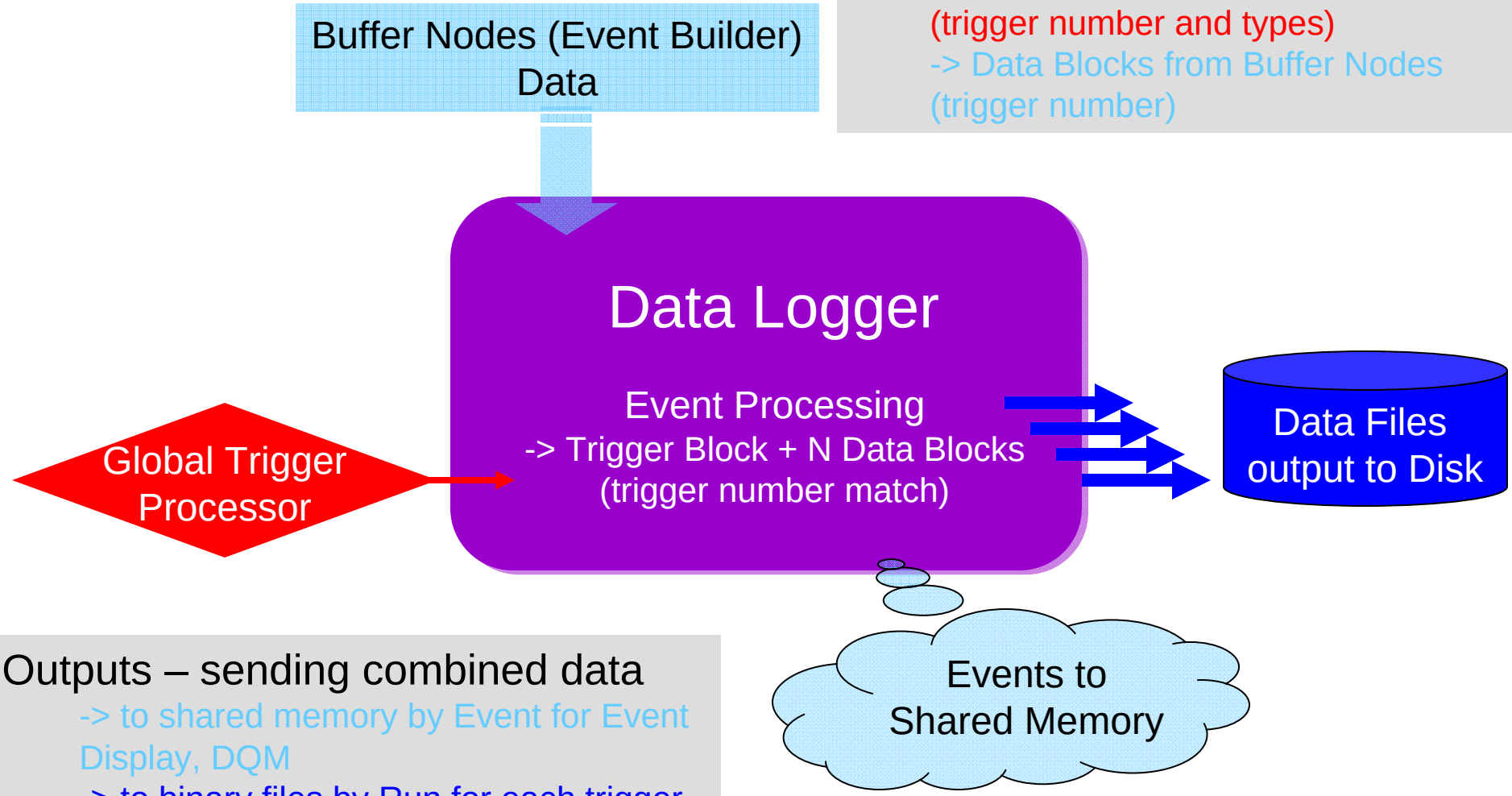


NOVA Data Logger

Inputs – managing connections

-> Trigger Blocks from Global Trigger (trigger number and types)

-> Data Blocks from Buffer Nodes (trigger number)



Outputs – sending combined data

-> to shared memory by Event for Event Display, DQM

-> to binary files by Run for each trigger type