

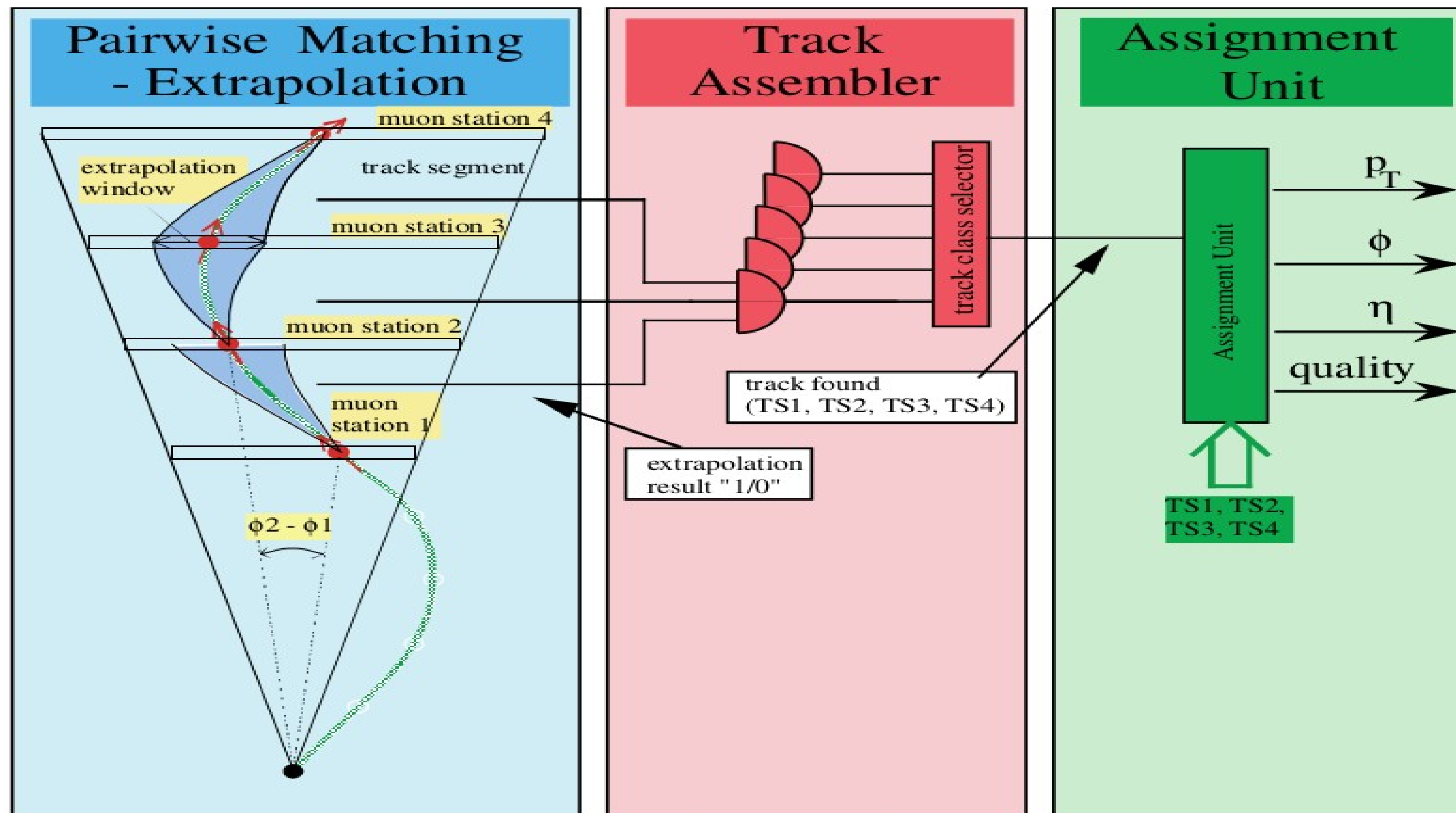
Introduction

The Level-1 Trigger (L1) of Compact Muon Solenoid (CMS) reduces the event rate from the bunch crossing rate of 40 MHz to 100 kHz. The increase in LHC luminosity has necessitated an upgrade to both the calorimeter and muon L1 trigger systems. Track finder architecture was changed from detector-oriented to region-oriented, dividing CMS in three distinct regions: barrel, overlap and endcaps. In the CMS barrel ($|\eta| < 0.8$) L1 muons are found by the **Barrel Muon Track Finder (BMTF)**. BMTF is organized in 12 wedges of 30° in ϕ dimension, and each wedge is divided in 5 sectors along the beam line.

Input

BMTF inputs: Trigger Primitives from TwinMUX (TM). The TMs receive Trigger Primitives from the Drift Tubes and from Resistive Plate Chambers, and combine them, to form Super Primitives. The Super Primitives are sent to the BMTF and include information about ϕ or η coordinate, bending angle and the quality of the measurement.

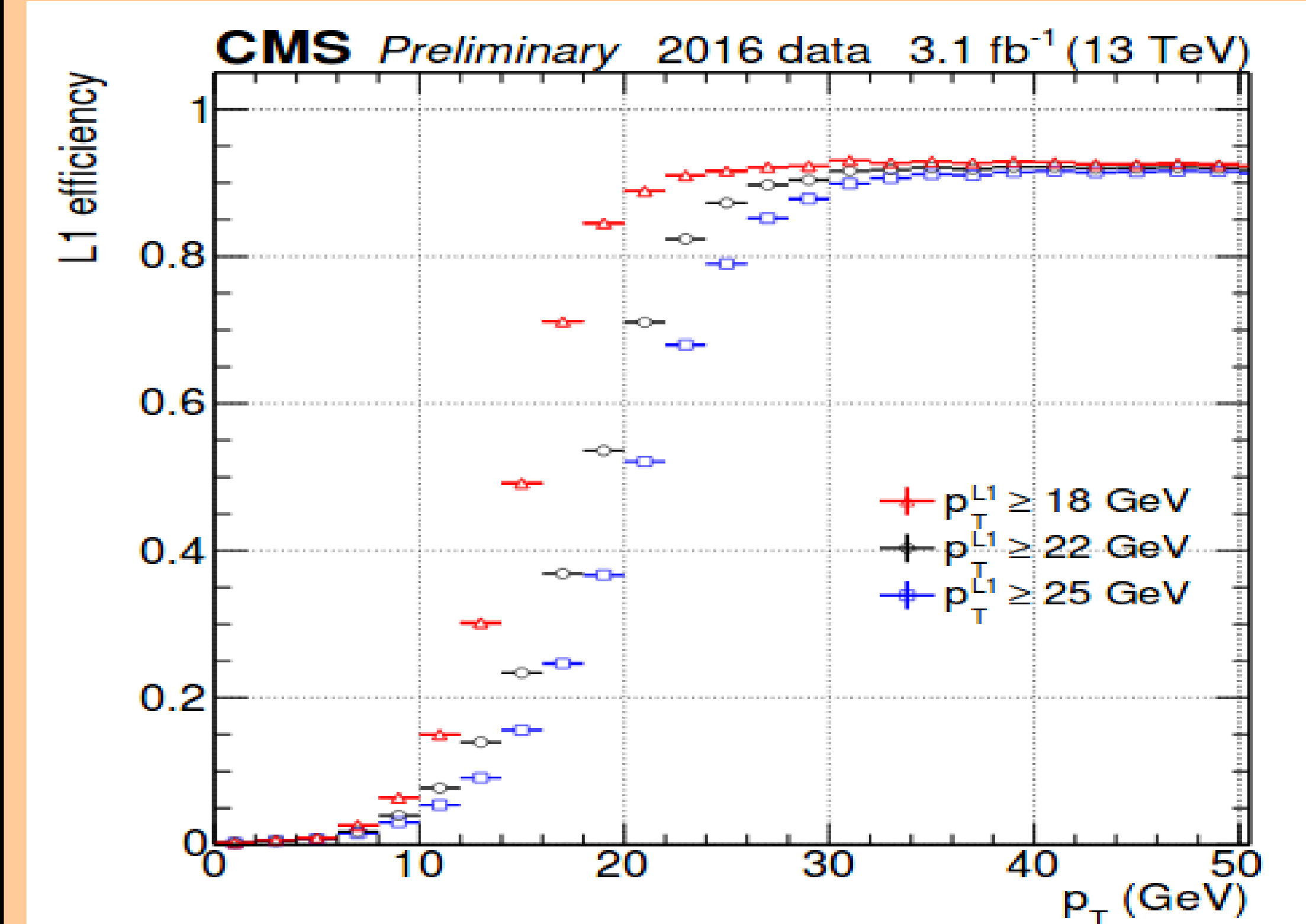
3-step muon reconstruction:



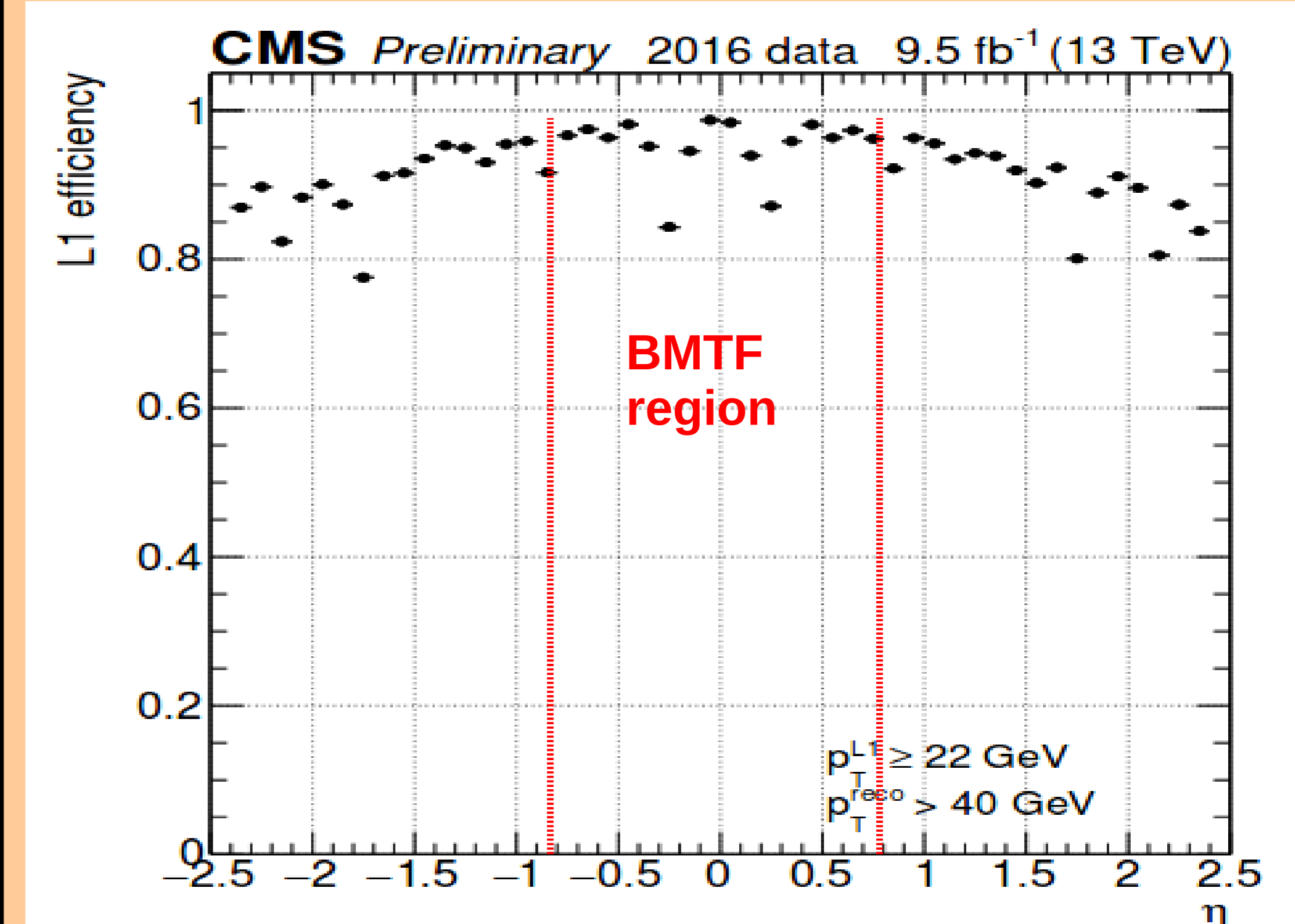
Results

Efficiency results from data, using the Tag-and-Probe method. Offline criteria/matching used for an unbiased measurement.

Efficiency in P_T :



Efficiency in η :



1

Extrapolator Unit

Inputs from different stations are combined using Look-Up Tables (LUT). LUT use ϕ , bending angle and the quality bit of the Super Primitives of one station, to form a window of acceptance to the next station. If there is a Super Primitive inside the window, the two Primitives form a pair. Each Extrapolator Unit receives primitives from one sector and the two neighbors.

2

Track Assembler Unit

Receives the paired Super Primitives for all stations and combines them, in order to reconstruct the track. At the end, a quality bit is assigned in every track based on its length.

3

Assignment Unit

Uses LUT to assign P_T , ϕ and η in a track. For P_T there are two available methods based on $\Delta\phi$ of two stations or bending in ϕ of one station. The latter method can be used only in high quality primitives.