



# Upgrade of the ATLAS Muon Trigger for the SLHC

J. Dubbert, O. Kortner, S. Kortner, H. Kroha, J. von Loeben, R. Richter

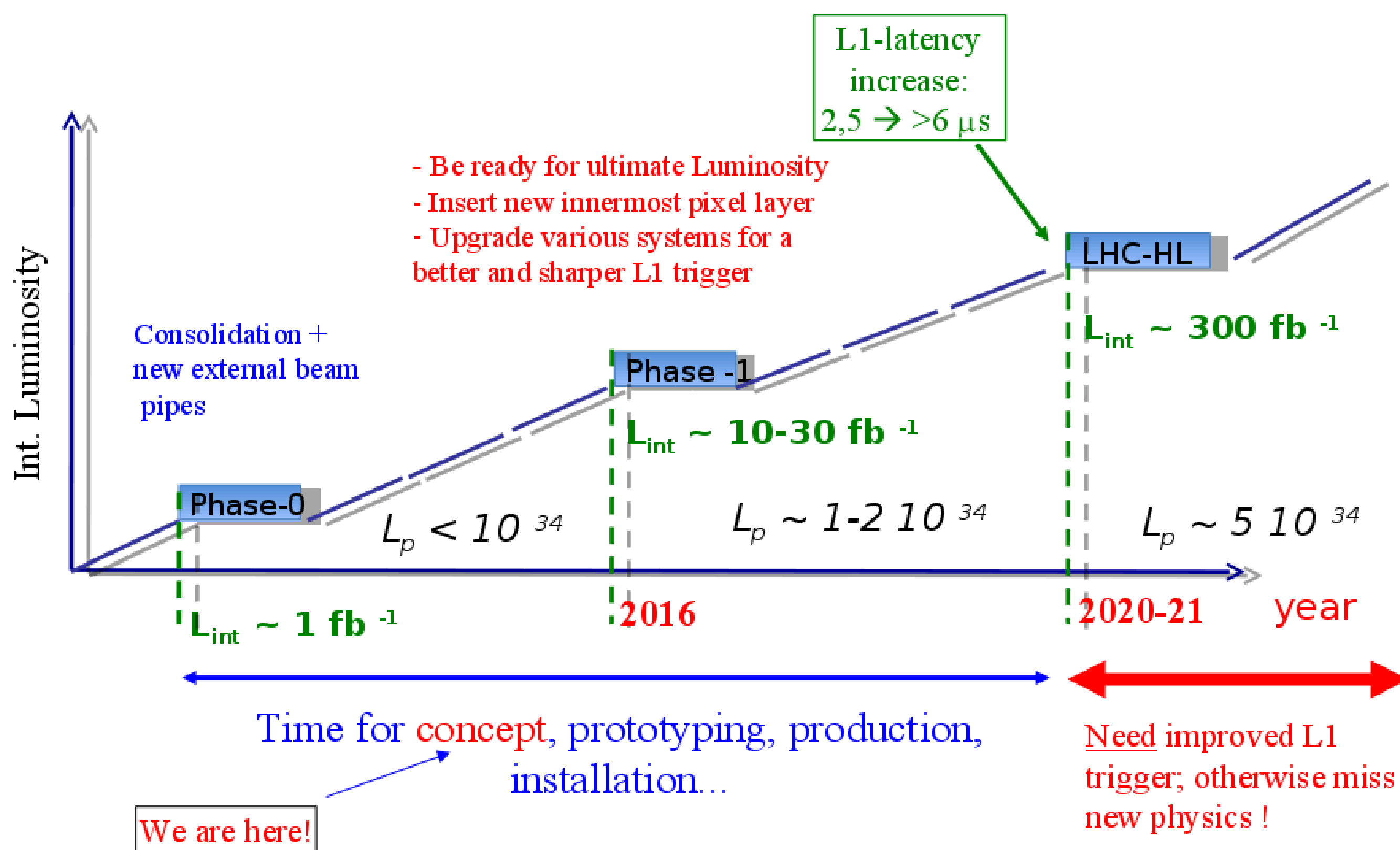
Max-Planck-Institut für Physik, Föhringer Ring 6, D-80805 München, Germany



## ABSTRACT

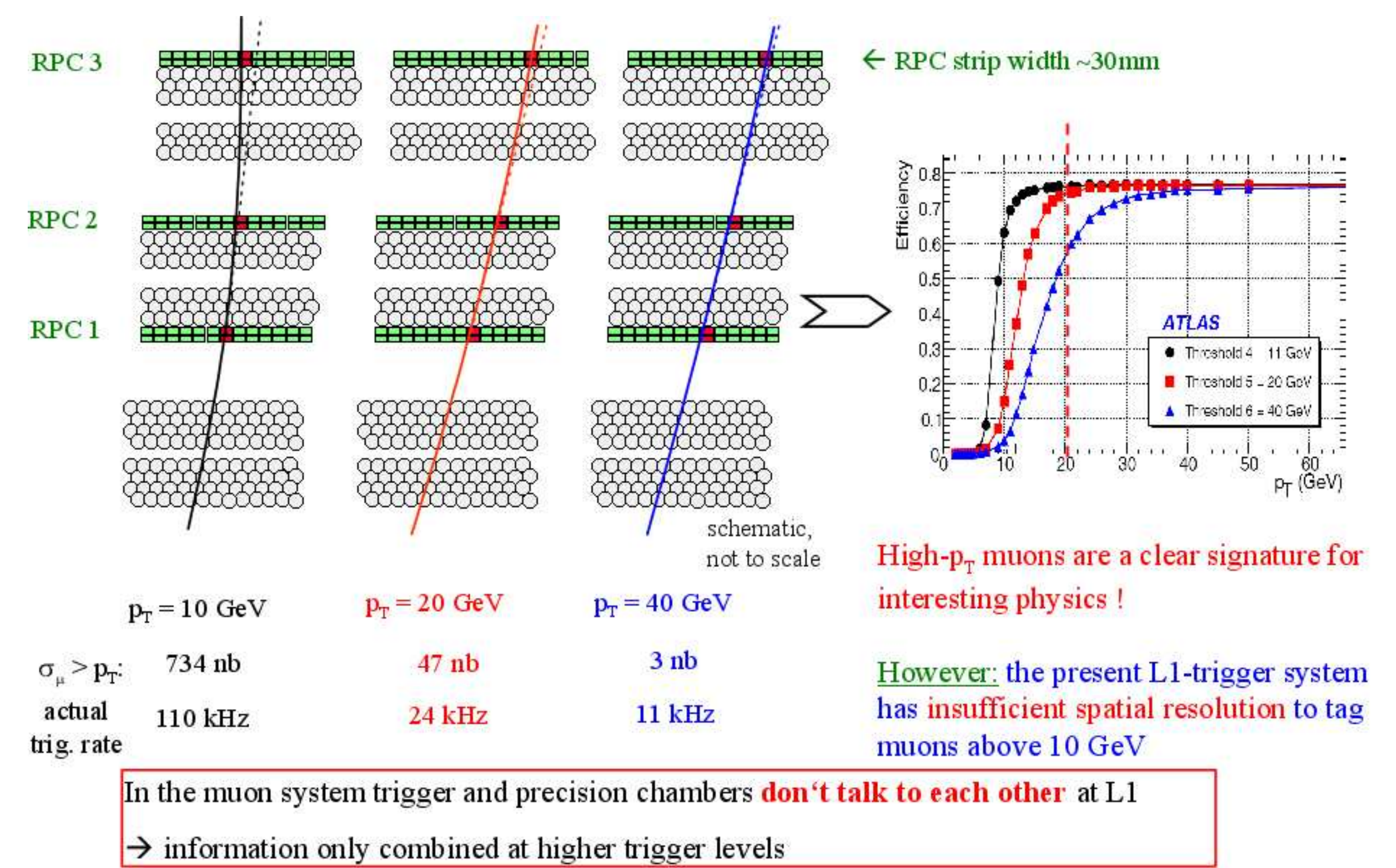
The upgrade of the LHC towards luminosity beyond the design value requires improved level 1 (L1) trigger selectivity in order to keep the maximum total trigger rate at 100 kHz. In the ATLAS L1 muon trigger system this necessitates an increase of the  $p_T$ -threshold for single muons. Due to the limited spatial resolution of the trigger chambers, however, the selectivity for tracks above  $\sim 20$  GeV/c is insufficient for an effective reduction of the L1 rate. We propose to use the precise track coordinates of the Monitored Drift Tube (MDT) chambers of the ATLAS muon spectrometer for a decisive improvement of the  $p_T$ -determination and thus of the selectivity of the L1 muon trigger.

## LONG TERM PLANNING FOR THE LHC

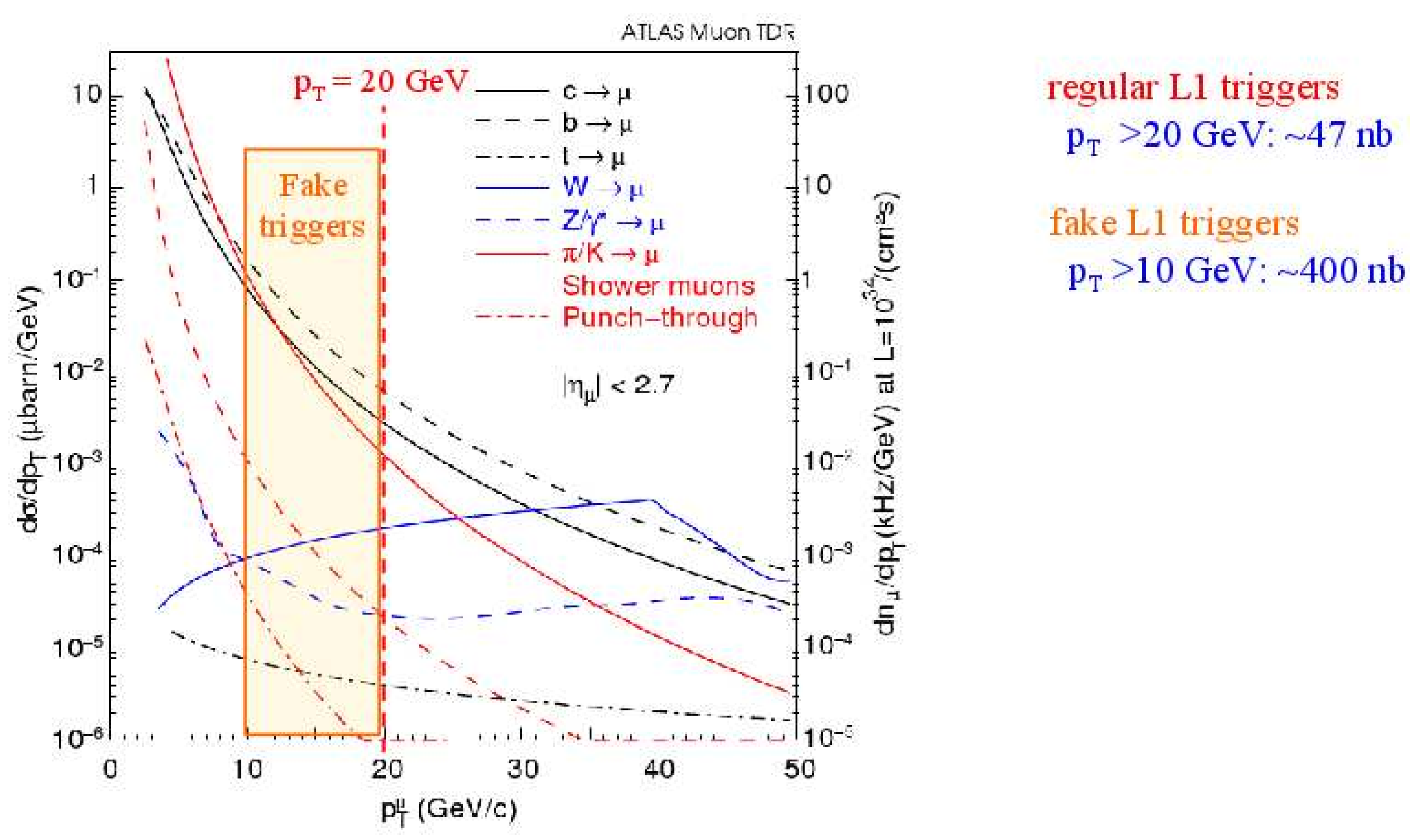


(M. Nessi, 19/08/2010)

## THE PROBLEM OF RPC GRANULARITY AND SINGLE MUON L1 RATE

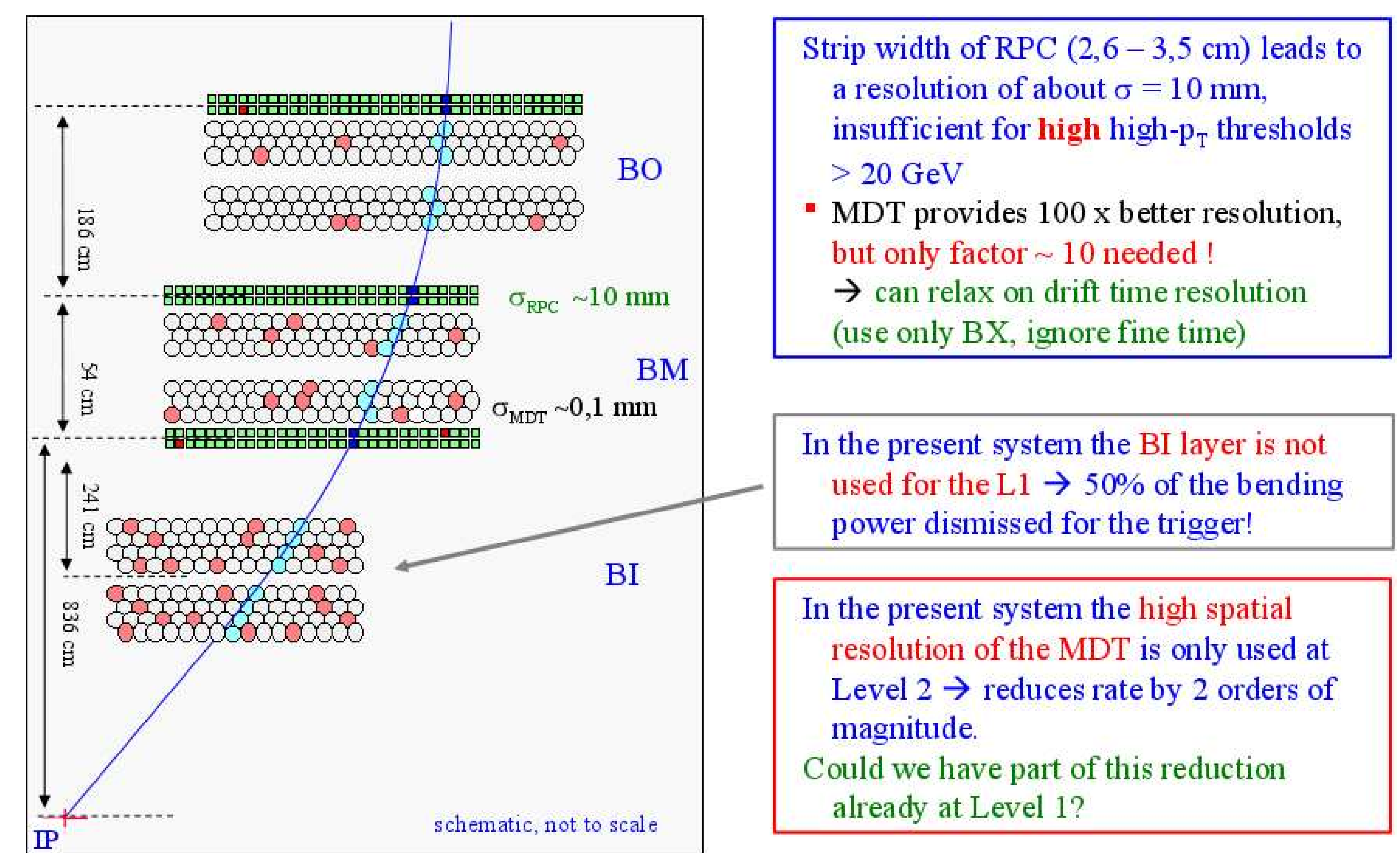


## THE INTERESTING PHYSICS IS MAINLY AT HIGH- $p_T$

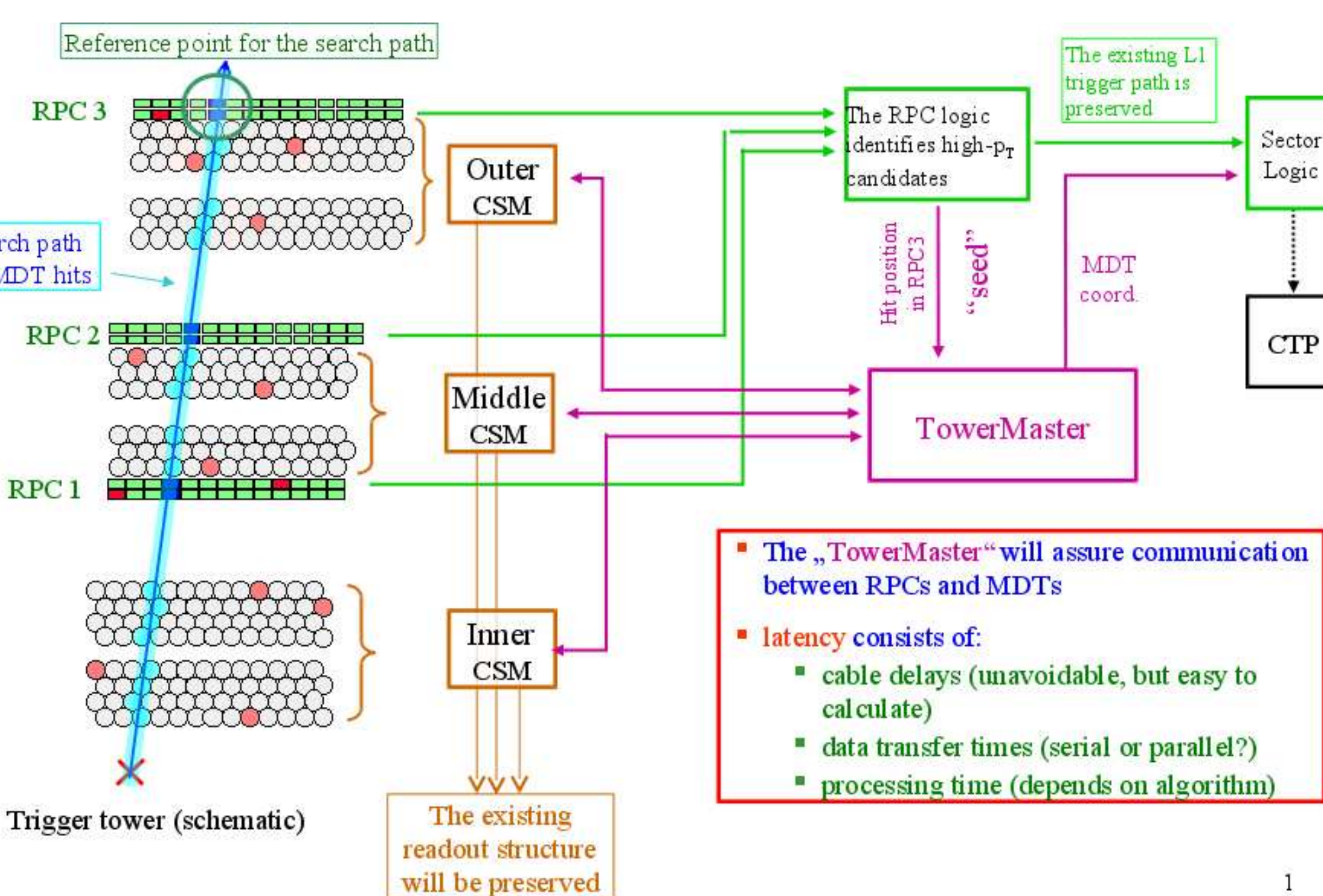


The steep slope of the  $p_T$  spectrum combined with the width of the  $p_T$  resol. curve leads to high fake trigger rates.

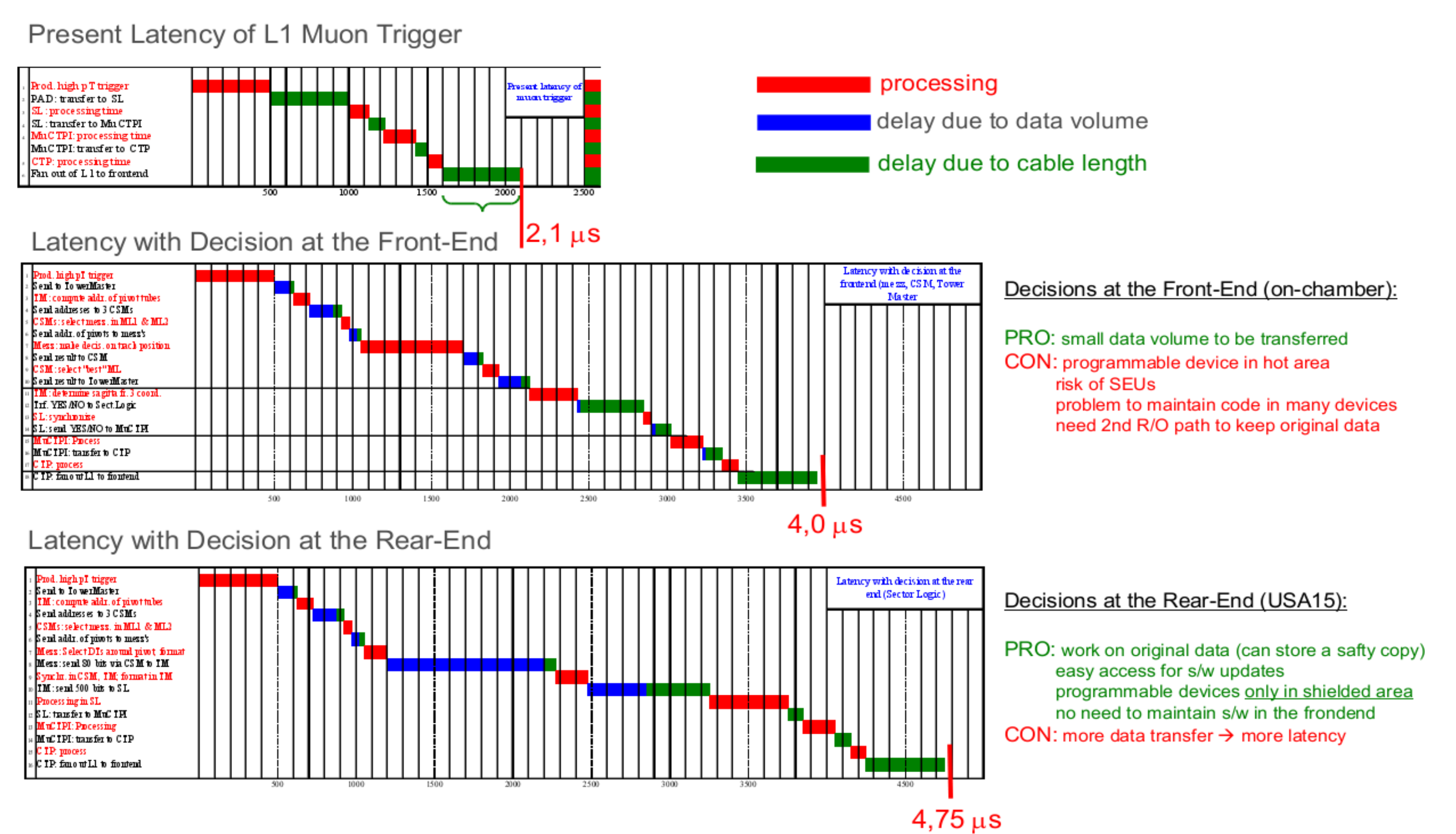
## WHAT CAN THE MDT DO FOR THE L1 TRIGGER?



## TECHNICAL REALISATION



## INCREASE IN LATENCY



## CONCLUSIONS

- ▶ MDT precision can be used for L1 sharpening.
  - ▶ Need only extra latency of  $\sim 2\mu s$ .
- ⇒ Wait for 2020.

### Benefits:

- ▶ No additional trigger chambers required.
- ▶ No interference with "normal" readout.

### Required Hardware Developments:

- ▶ New front-end boards (mezzanine and CSM).
- ▶ Architecture of "TowerMaster"
- ▶ Interface to RPC readout