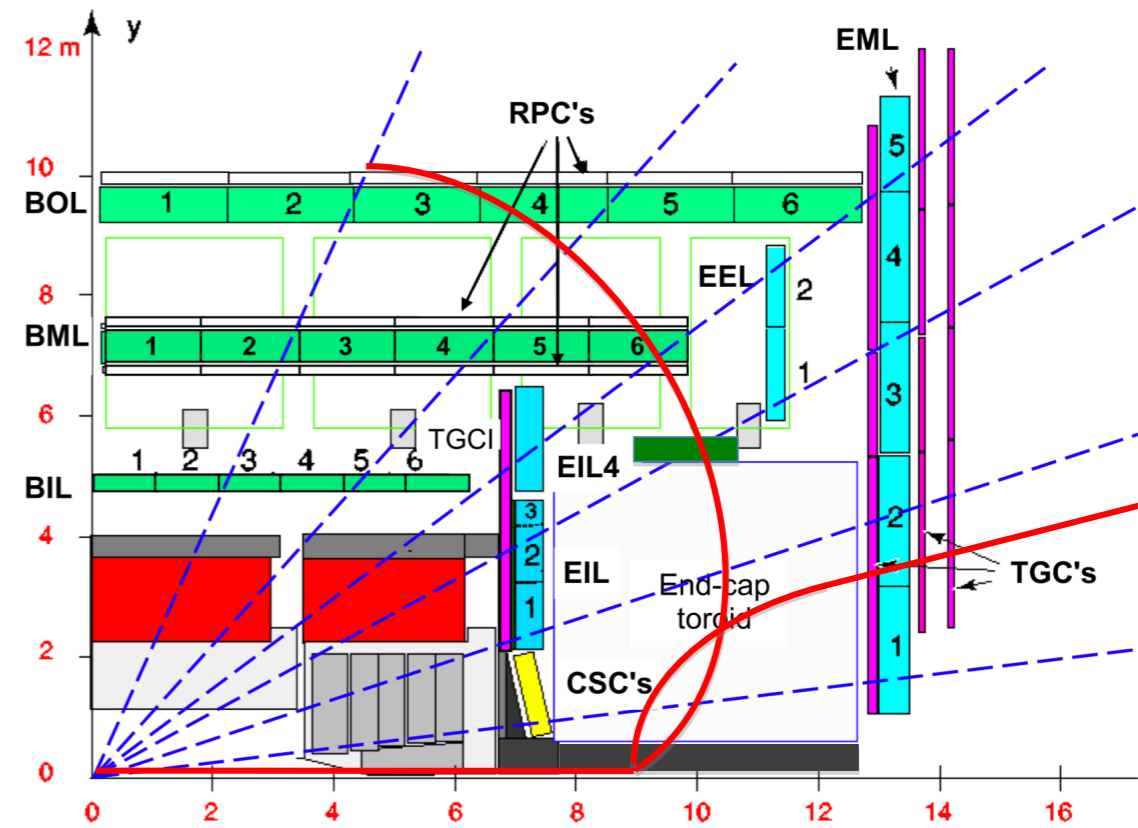
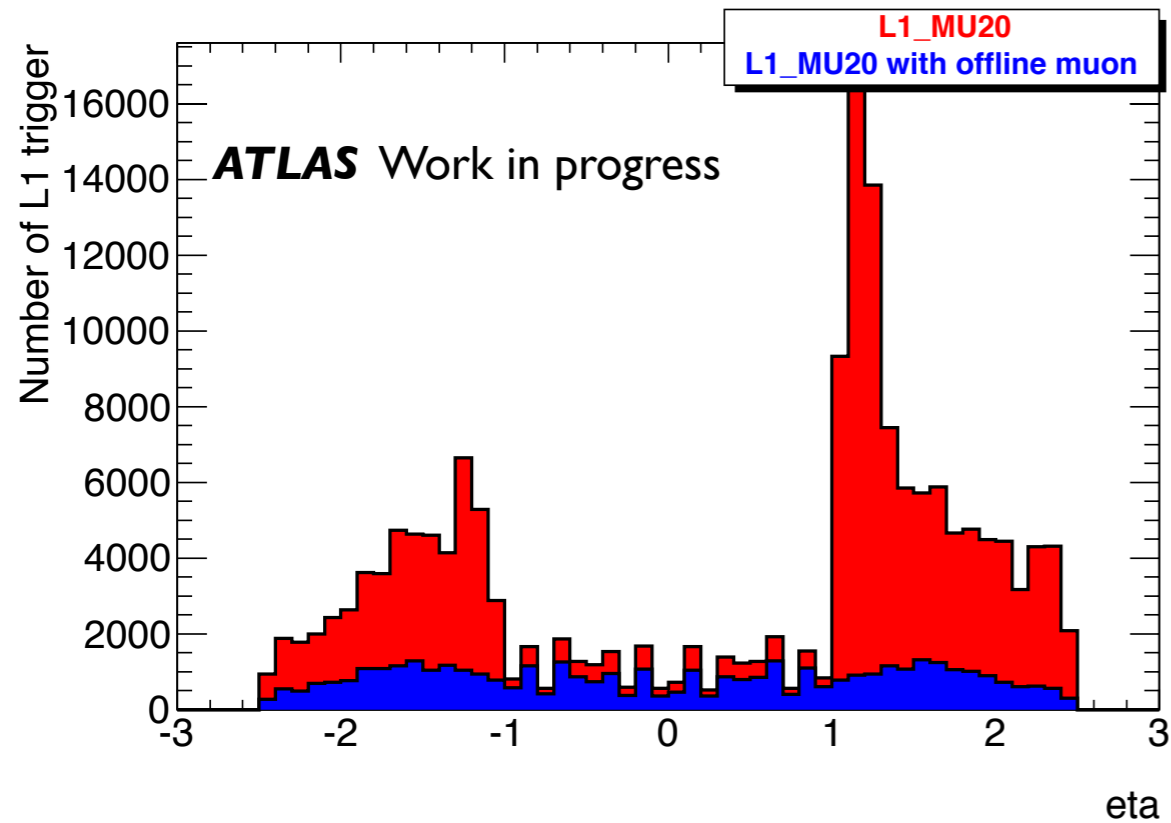


Phase I LI muon trigger upgrade

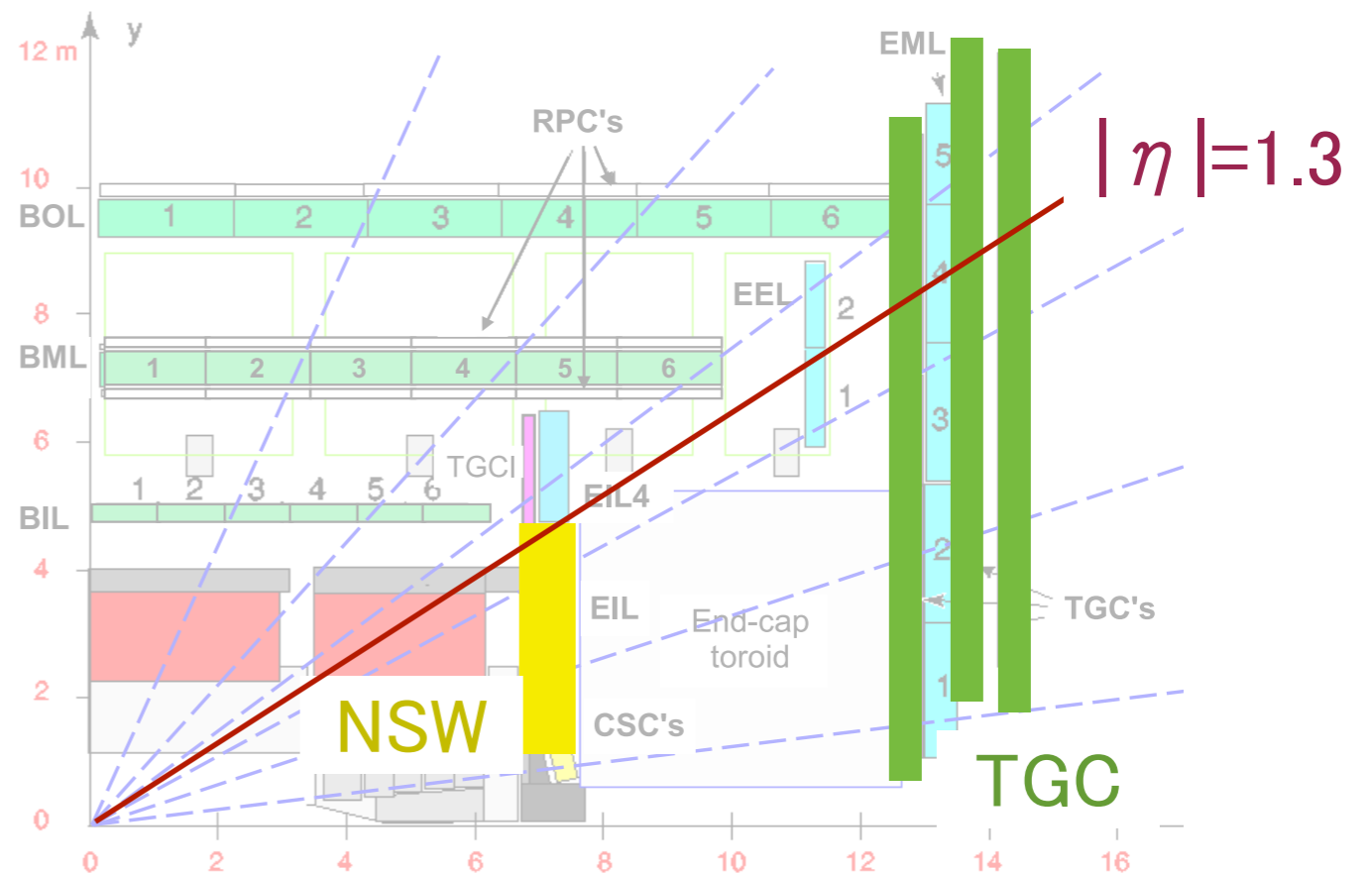
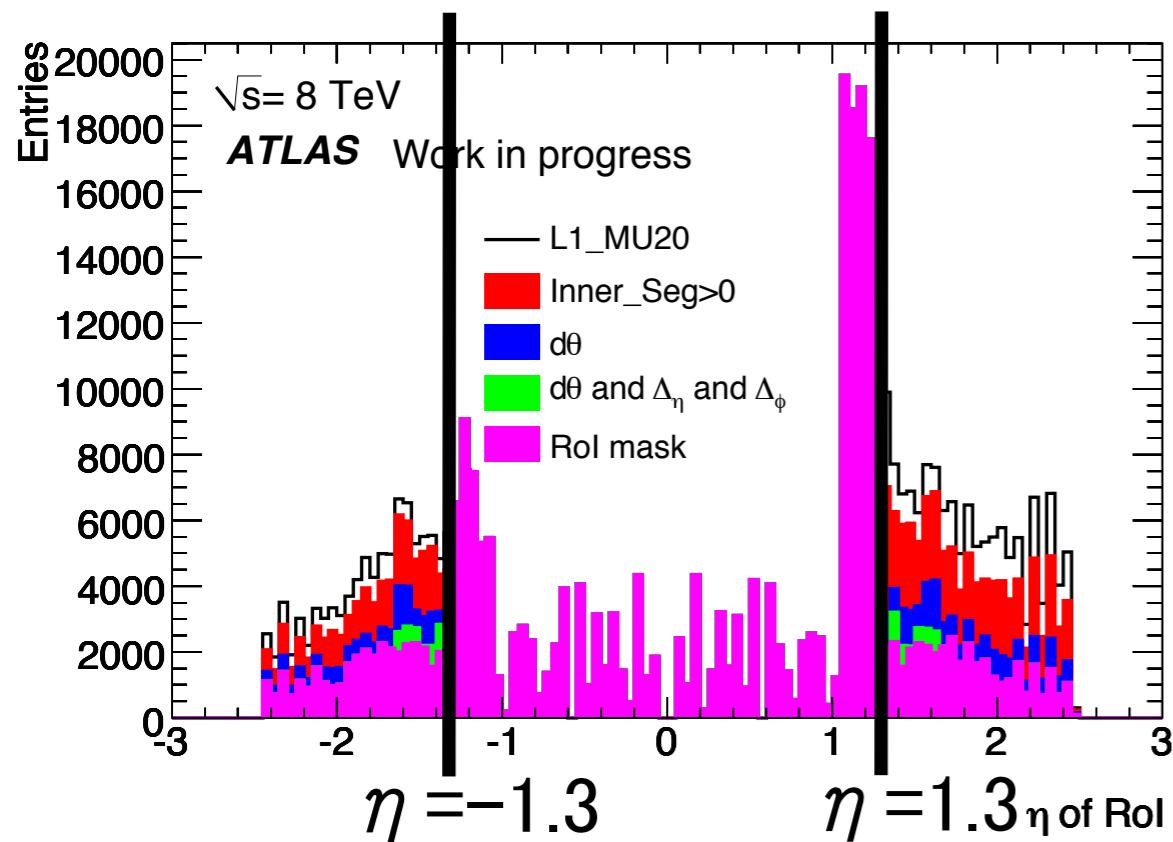
Takuya Tashiro
Kyoto Univ.

L1 muon trigger



- L1 muon trigger is dominated by background.
We must upgrade the trigger to reduce the background.
 - 2015–2018 : Phase-0 Upgrade
 - * Use TGC EI/FI to reduce the background.
 - 2018 : Phase-1 Upgrade
 - * Use new Inner Chambers to reduce the background.

phase-I upgrade

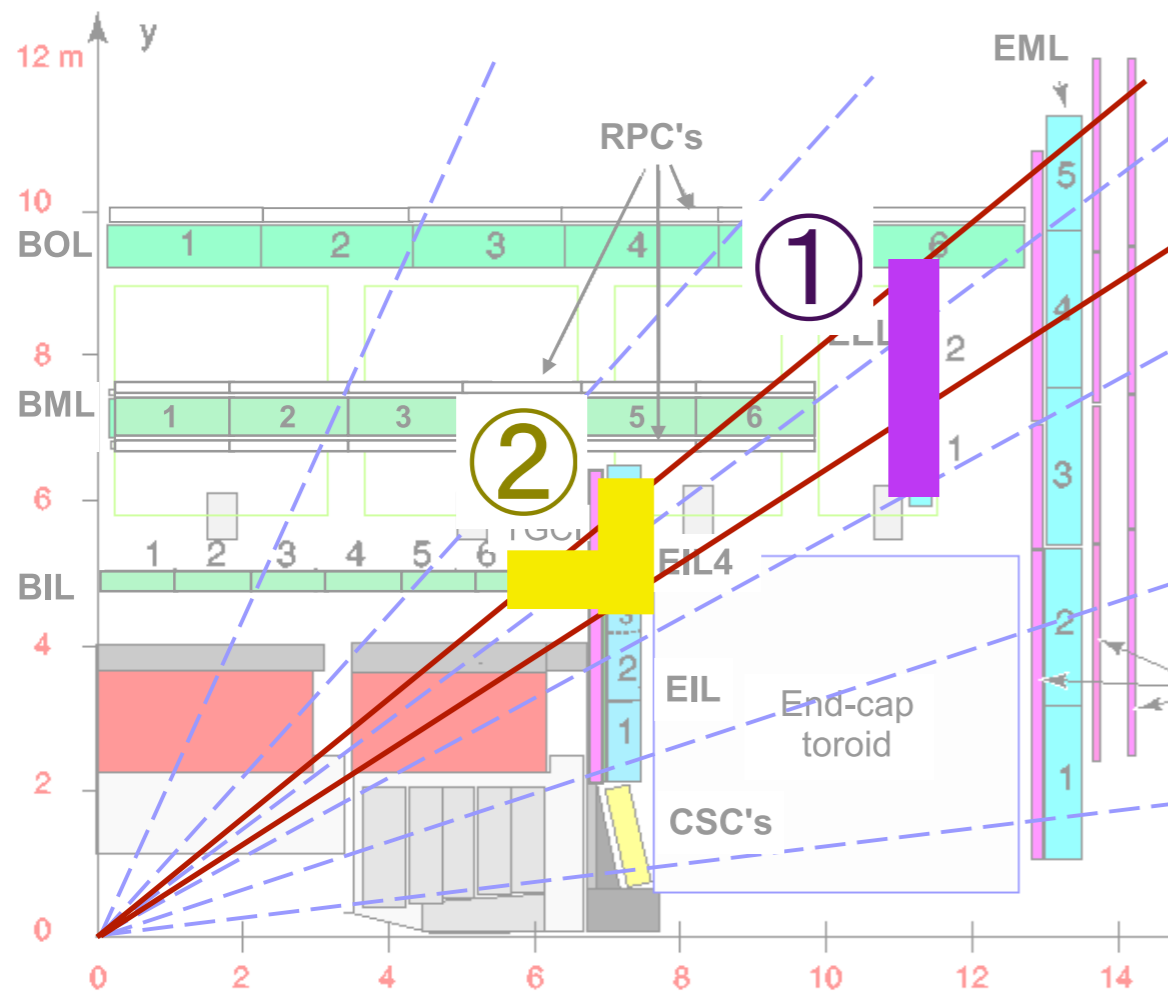


The background is suppressed with NSW(New Small Wheel).
But NSW covers only $|\eta| > 1.3$ region.

How do we suppress the background in $|\eta| < 1.3$?

2 solutions

We have 2 ways to suppress the background in the $|\eta| < 1.3$ region.



① : Put trigger chambers in the place of EEL and EES.

② : Put trigger chambers in the place of EIL4, BIS7, and BIS8.

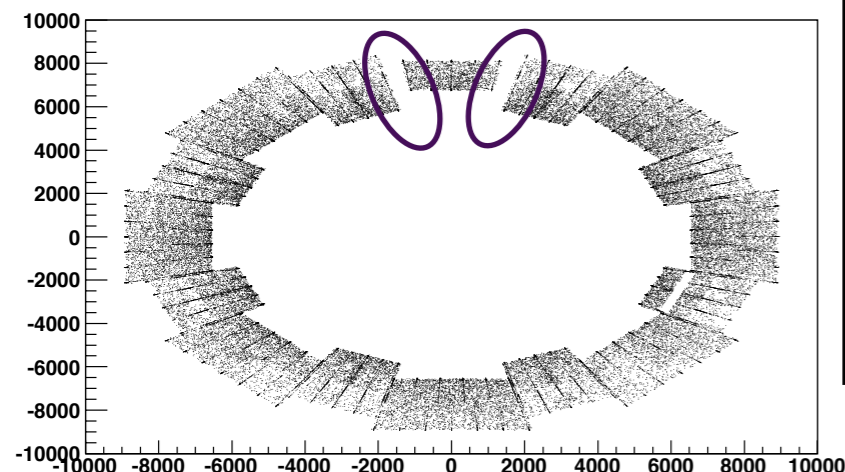
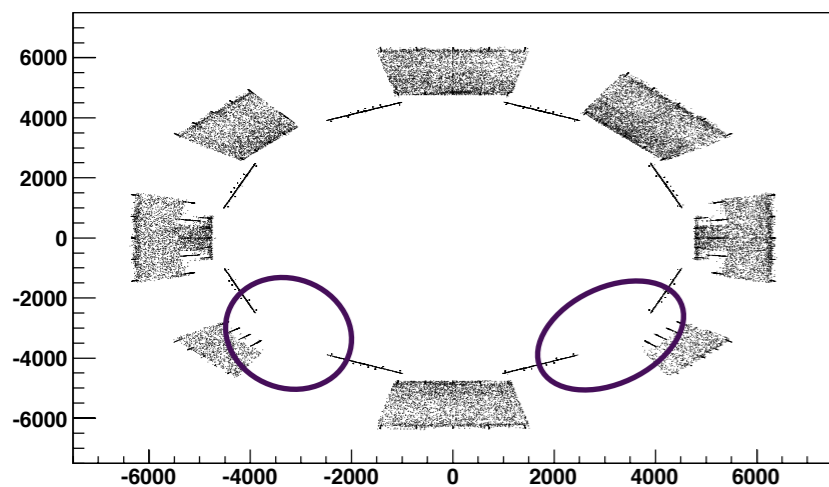
Which solution should be chosen?

I compared expected trigger rate and efficiency.

Extra cut and correction

Extra cut

When trigger candidate is found at (η_{ROI}, Φ_{ROI}) , require track segment in the inner chamber.
– if track segment is **not** found at $(\eta_{Inner}, \Phi_{Inner})$ such that $dR < dR_{threshold}$...
→ the trigger candidate is killed.

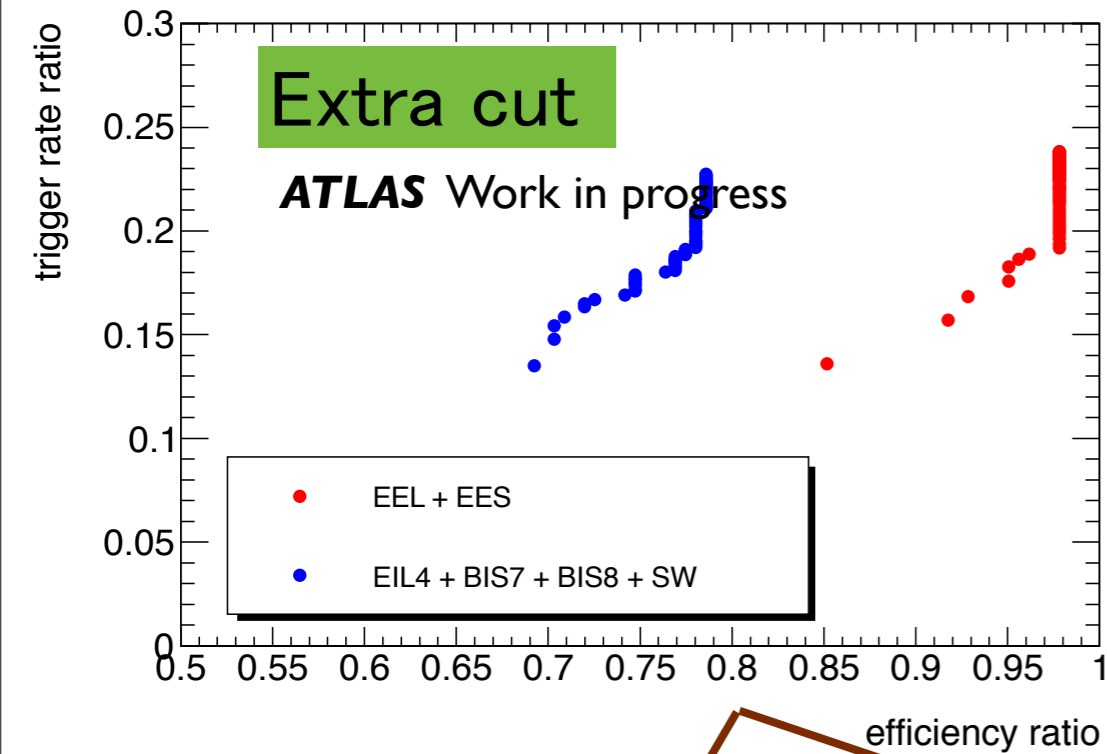


Efficiency correction

In the region not covered by inner chambers, the Extra cut makes the trigger efficiency very low.

In the region $efficiency < efficiency_{threshold}$, the new cut is not used.
(Track candidate on inner chamber is not required.)

Suppress background



Calculated efficiency v.s. trigger rate with various $dR_{\text{threshold}}$ using 25ns BC data.

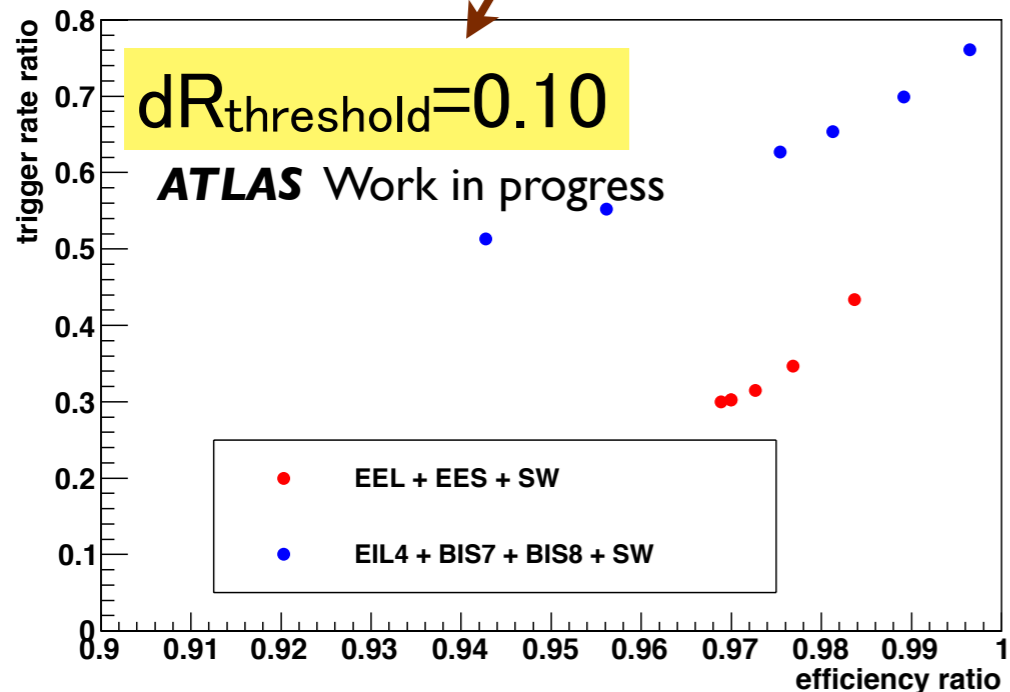
efficiency ratio

$$\frac{\text{L1_MU20 after Extra cut with reconstructed high pT muon}}{\text{L1_MU20 with high pT muon reconstructed}}$$

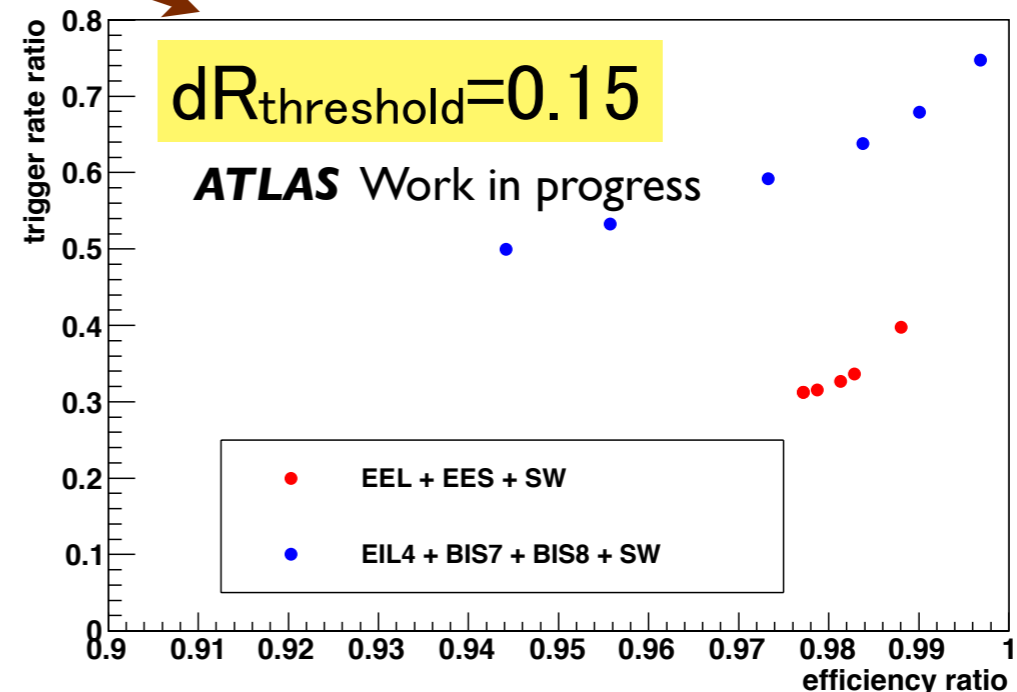
trigger rate ratio

$$\frac{\text{L1_MU20 after Extra cut}}{\text{L1_MU20}}$$

efficiency correction



efficiency correction



Summary

