

# Table of Contents

<b>Preliminary results on the performance of the Track-Based Muon Alignment in 2017.....</b>	<b>1</b>
See also: CMS DP-2017/046.....	1
Introduction.....	1
Dimuon width.....	1
Dimuon mean.....	2

# Preliminary results on the performance of the Track-Based Muon Alignment in 2017

The performance of Track-Based muon alignment algorithm was studied with a subset of 2017 data. The DT and CSC geometries have been derived with early 2017 data. Also, Alignment Position Error have been estimated.

Link to the DP: <http://cds.cern.ch/record/2290516?ln=en>

## See also: CMS DP-2017/046

## Introduction

These plots quantify the reconstruction improvement due to the Track Based muon alignment performed with 2017 early data.

We reconstruct muons using 2 different geometries:

- Geometry obtained using 2016 data

- Geometry obtained using 2017 data

We analyzed the 2017B dataset, produced between June and July 2017 ( $L_{int}=3.7 \text{ fb}^{-1}$ ), looking for  $\mu$  and  $Z \rightarrow \mu\mu$  decays.

- Basic set of requirements on  $p_T(\mu) > 30 \text{ GeV}$ ,  $N_{hits} \geq 2$ , num. of hits

- One  $\mu$  is reconstructed using only tracker information and the other using both the tracker and the muon system information (randomly).

- The mass resolution is shown as a function of  $p_T$  /  $\eta$  of the STA muon

The performance are expected to be similar at low  $p_T$ , since the position of the Drift Tubes is similar between 2016 and 2017, while at high  $p_T$  a substantial improvement is expected, as a consequence that the CMS detector has been opened and closed.

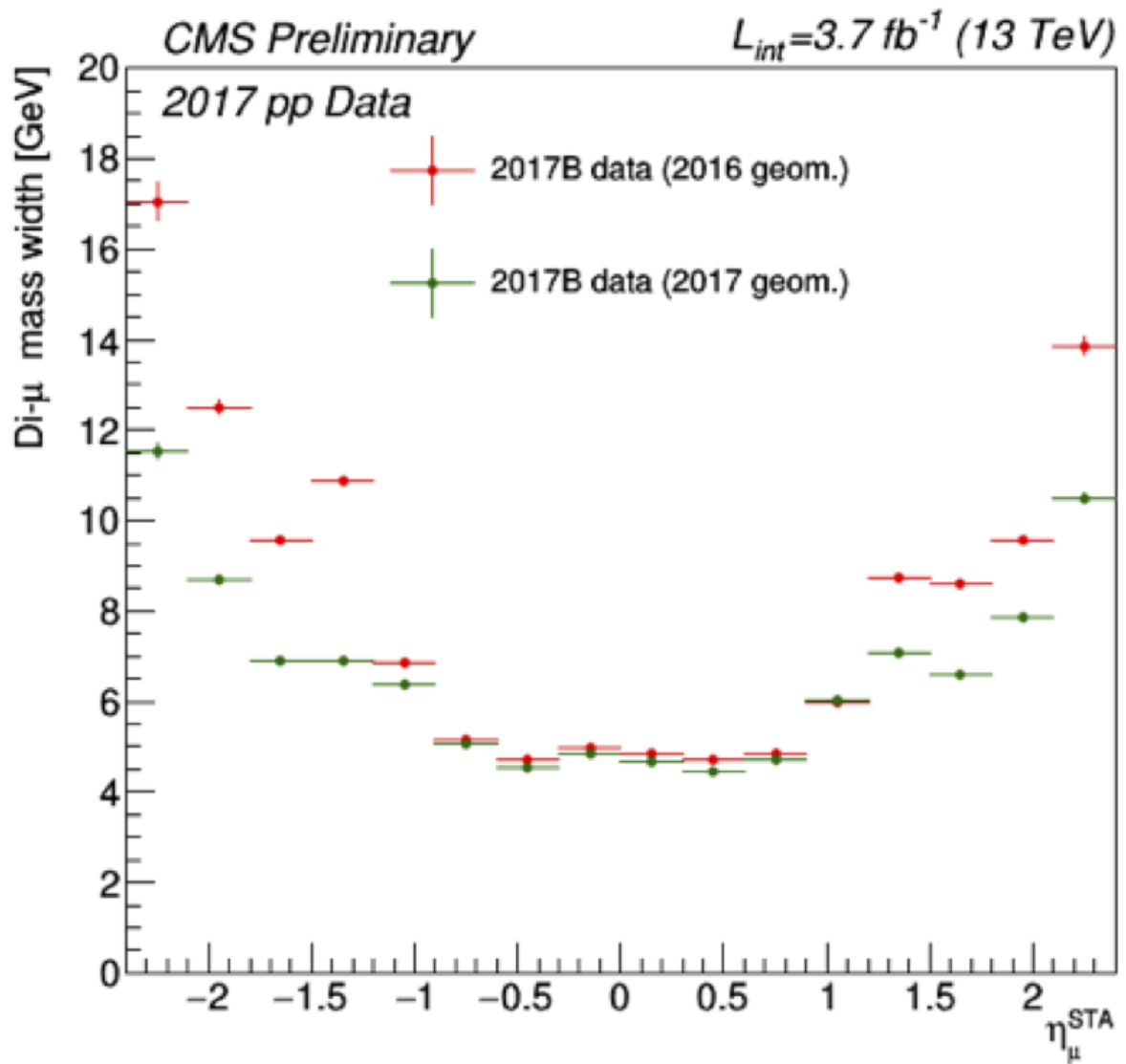
## Dimuon width

The invariant mass of dimuon pairs is computed by reconstructing one muon using only tracker information (standalone) and the other using both the tracker and the muon system information (global).

The width of the dimuon invariant mass distribution is shown in bins of the standalone muon  $p_T$ .

The red distribution refers to muons reconstructed using the muon system geometry computed in 2016, while the green distribution refers to muons reconstructed using the geometry computed with early 2017 data.

The performance are similar at low  $p_T$ , since the position of the Drift Tubes is similar in 2016 and 2017, while at high  $p_T$  a substantial improvement is observed, as a consequence that the CMS detector has been opened and closed.



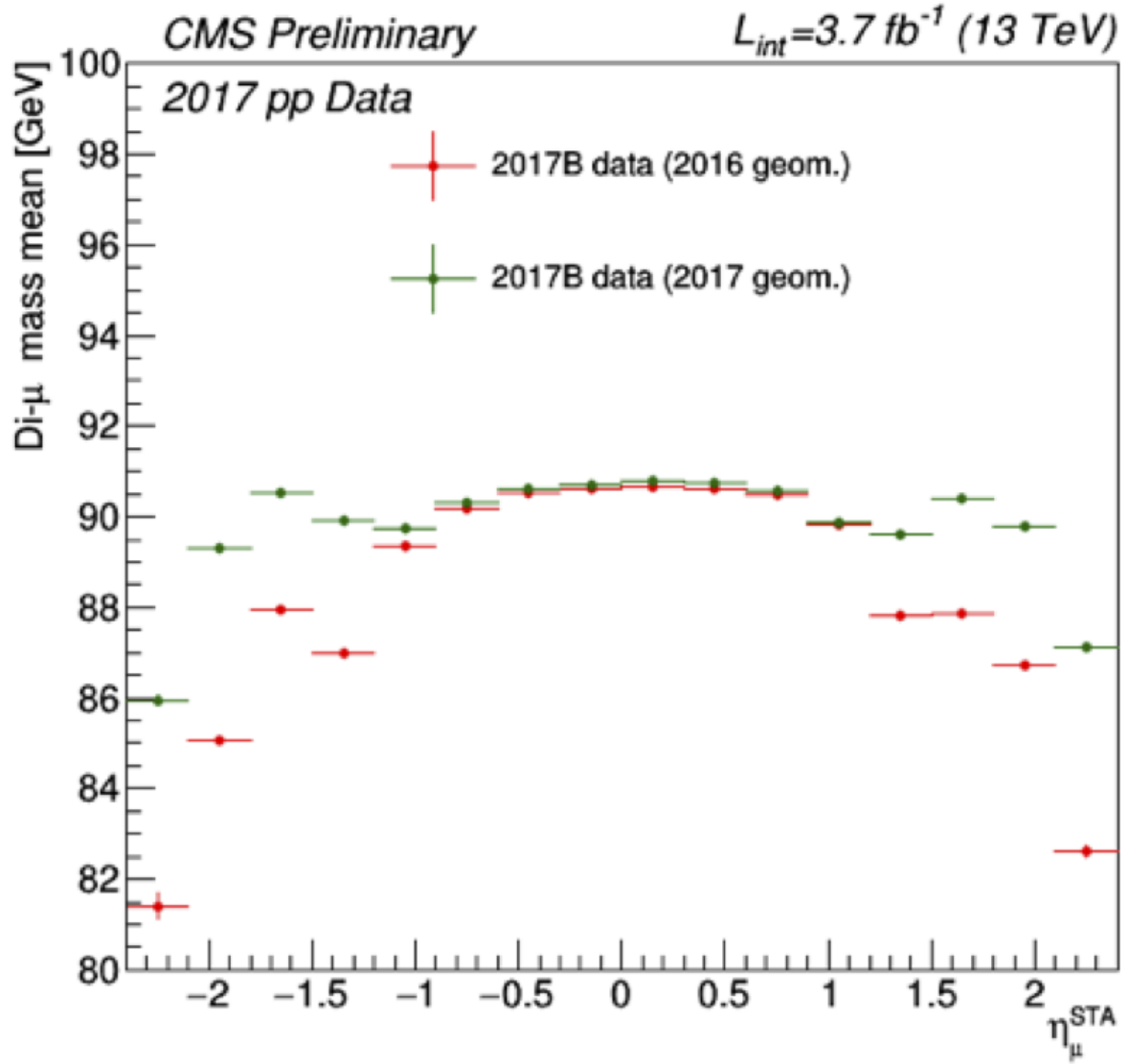
## Dimuon mean

The invariant mass of dimuon pairs is computed by reconstructing one muon using only tracker information (standalone) and the other using both the tracker and the muon system information (global).

The mean of the dimuon invariant mass distribution is shown in bins of the standalone muon  $\eta_{\mu}^{\text{STA}}$ .

The red distribution refers to muons reconstructed using the muon system geometry computed in 2016, while the green distribution refers to muons reconstructed using the geometry computed with early 2017 data.

The performance are similar at low  $\eta_{\mu}^{\text{STA}}$ , since the position of the Drift Tubes is similar in 2016 and 2017, while at high  $\eta_{\mu}^{\text{STA}}$  a substantial improvement is observed, as a consequence that the CMS detector has been opened and closed.



-- LucaPernie - 2017-12-04

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