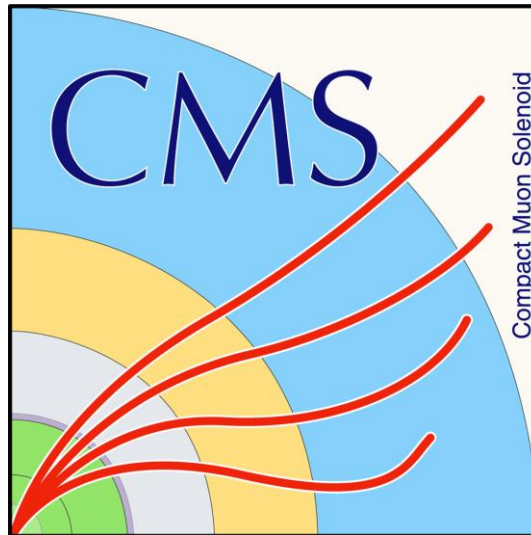


# PR documentation: *L3MuonCandidateProducerFromMuons*

SANTIAGO FOLGUERAS GÓMEZ, ALEJANDRO SOTO RODRÍGUEZ, CLARA RAMÓN ÁLVAREZ - UNIVERSITY OF OVIEDO



Universidad de Oviedo  
*Universidá d'Uviéu*  
*University of Oviedo*



# Overview

---

- **Contents:**

- Problem found in the module `L3MuonCandidateProducerFromMuons` when used for displaced muons.
- Solution proposed.
- Comparison before and after the change (efficiencies and momentum resolution).

# Problem

---

- To build the recoChargedCandidate the innerTrack is selected by default if its available.

```
for (unsigned int i = 0; i < muons->size(); i++) {  
    // avoids crashing in case the muon is SA only.
```

```
    TrackRef tkref = ((*muons)[i].innerTrack().isNonnull()) ? (*muons)[i].innerTrack() : (*muons)[i].muonBestTrack();
```

- The innerTrack gives better momentum estimation for prompt muons than the globalTrack. But for displaced muons, this is not the case (slide 5).
- We have seen a degradation in efficiency and resolution for displaced muons when the inner track is used.

# Solution

---

- To not interfere with the current implementation, we propose to add a flag `m_displacedReco` (false by default) to switch to the displaced reconstruction.
- We will save the `globalTrack` always when its present, and the `bestTrack` in the rest of the cases.

```
TrackRef tkref;  
if (m_displacedReco) {  
    if ((*muons)[i].isGlobalMuon() == 1) {  
        tkref = (*muons)[i].globalTrack();  
    } else {  
        tkref = (*muons)[i].muonBestTrack();  
    }  
} else {  
    tkref = ((*muons)[i].innerTrack().isNonnull()) ? (*muons)[i].innerTrack() : (*muons)[i].muonBestTrack();  
}
```

# Efficiencies and resolution

- **Legend:**
  - **Green:** muons with the momentum estimated from the global track.
  - **Red:** muons with the momentum estimated from the inner track.
- Better efficiency and  $p_T$  resolution at high displacement.

