## **MFT-MUON Matching**

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#### Matching Parameters at AO2D Level

- Parameters to characterize the reconstructed track, x, y,  $q/p_T$ ,  $\lambda$ , and  $\phi$  are used for the matching
- The parameters used for matching are based on the deviation between MFT track and MCH track on the matching plane
  - Position:  $\Delta X = X_{MFT} X_{MCH}$ ,  $\Delta Y = Y_{MFT} Y_{MCH}$
  - Angle:  $\Delta \lambda = \lambda_{MFT} \lambda_{MCH}$ ,  $\Delta \varphi = \varphi_{MFT} \varphi_{MCH}$
  - Momentum:  $\Delta q/p_T = q/p_{T MFT} q/p_{T MCH}$
- MFT tracking  $\chi^2$ /ndf can be used to remove electron track
- MFT and MCH standalone parameters are used as ML input
- Need sample that distinguishes between signal and background is necessary to make some ML models

#### **Matching Parameter Distribution**

• All combination contains both signal + background





#### Extract Background (Wrong-Matching) Sample from Data

• Background sample can be extracted by event mixing method







### Signal (Correct-Matching) Sample from Data

- Tag-and-Probe (T&P) method is used to get signal sample
- T&P Procedure
  - Calculate the invariant mass of oppositely charged muon pairs
  - Select pairs within the J/ $\psi$  mass window
  - Choose the muon with higher momentum as the Tag muon
  - Check whether the Tag muon passes the "tight" matching criteria
  - If the Tag muon passes, pairs of the best-matched MFT track associated with the other muon (the Probe muon) is considered as a signal sample



# Extract Signal (Correct-Matching) Sample from Data

• Not tuned "Tag" muon selection is applied, but signal sample already can be extracted

