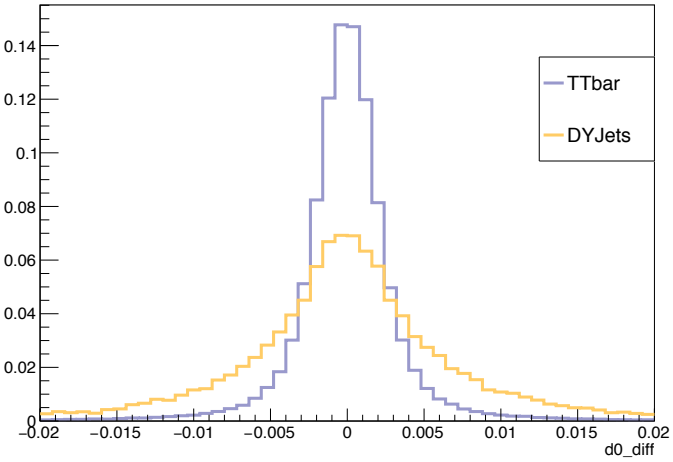
Impact Parameter calibration

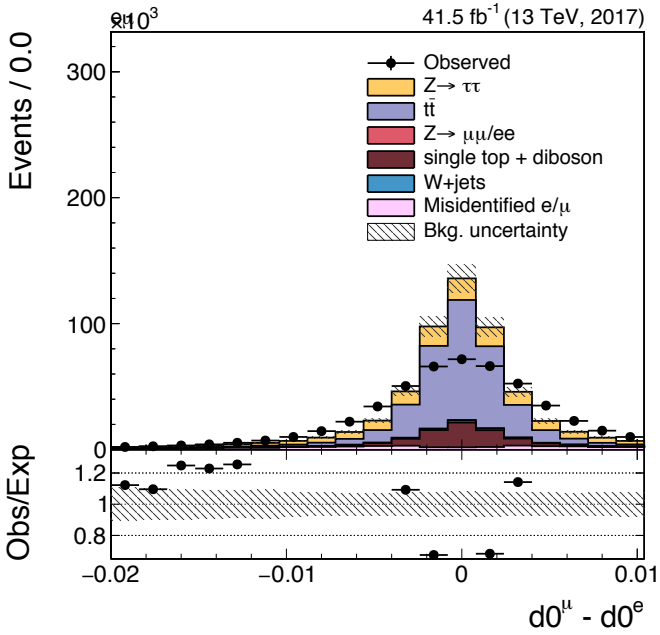
First look into 2016 legacy re-reco

DESY HTT meeting, Feb.5th 2017

IP calibration: idea

- **impact parameter variables:** high discrimination power between prompt leptons and leptons from τ lepton decays
- promising variables to be used in BDT to distinguish H->ττ signal events from background events
- variables poorly described by MC
- calibration of IP variables in Z->ee / μμ (prompt) and Z->ττ ->eμ events with quantile mapping technique
- use 2016 legacy re-reco data



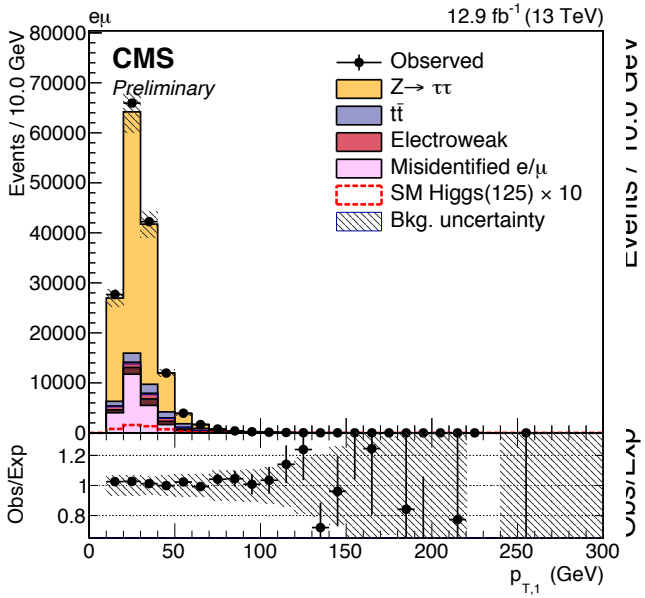


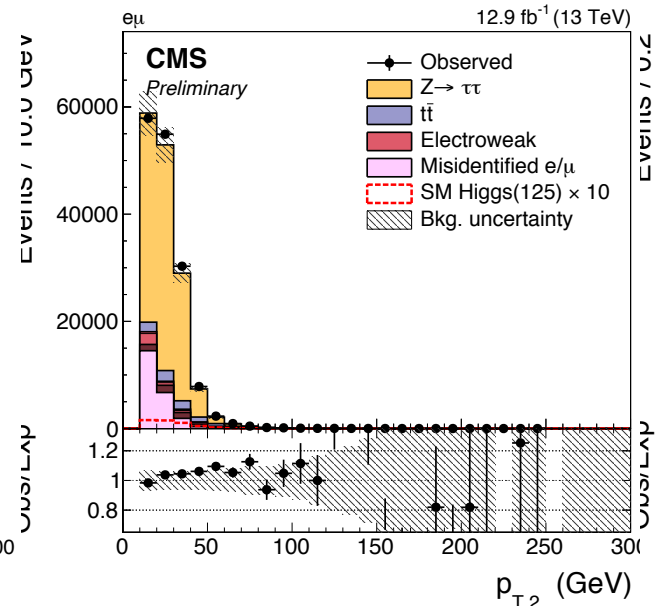
Selection: Z->ττ ->eμ

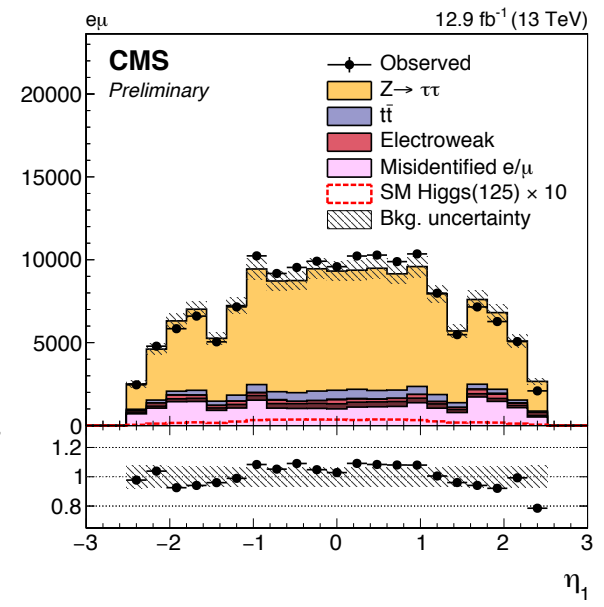
- HLT_**Mu8/23**_TrkIsoVVL_**Ele23/12**_CaloIdL_TrackIdL_IsoVL**(_DZ)**
- one muon - electron pair, veto additional leptons
  - medium muon: isolated, p_T > 10 GeV/ 24 GeV, |η|< 2.4
  - electron: isolated, p_T > 13 GeV/ 24 GeV, |η|<2.5, MVA Id
  - ΔR (μ,e) > 0.3, opposite sign
- veto events with b-tagged jets
- dζ > 35 GeV
- 30 GeV < m(eμ) < 80 GeV

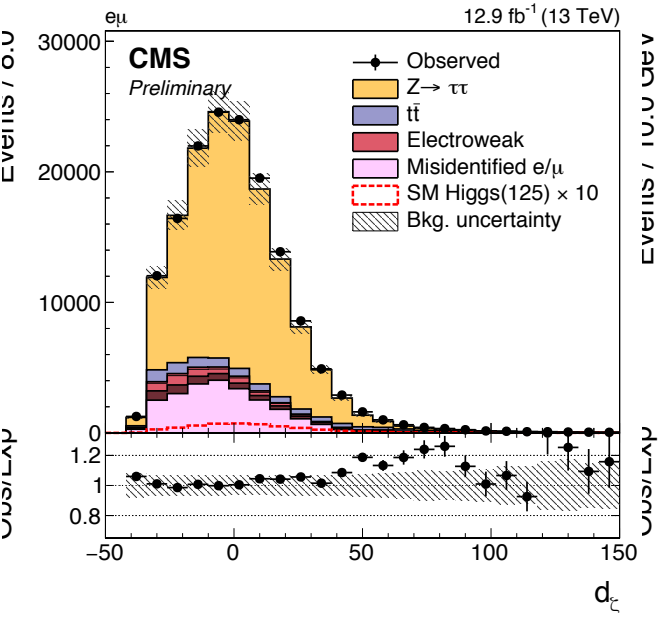
applied corrections: met filters, PU & top p_T re-weighting, Z p_T and mass re-weighting, lepton Id, iso and trigger SF, met recoil corrections, tracking SF

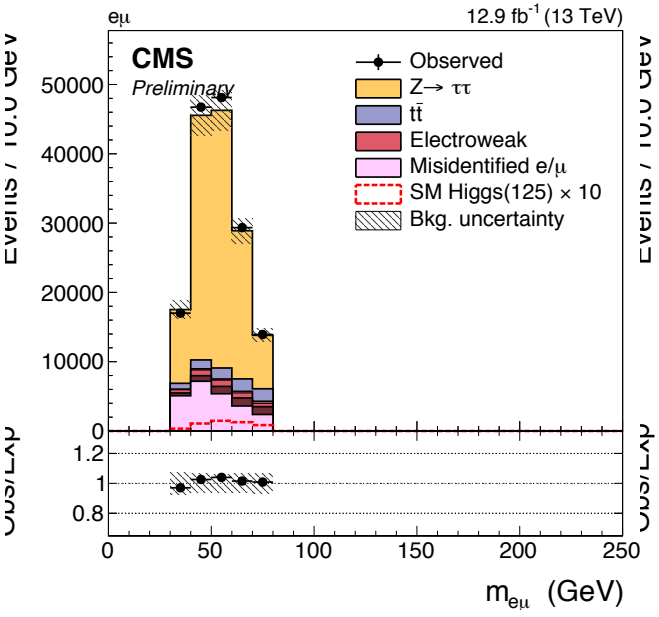
Control plots

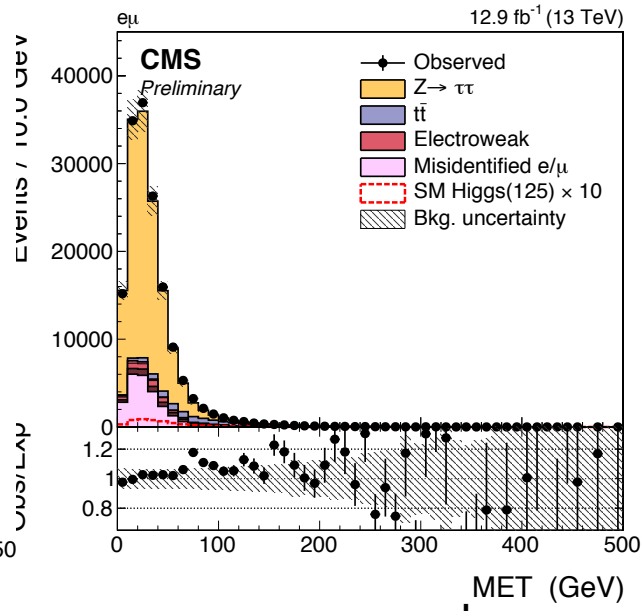




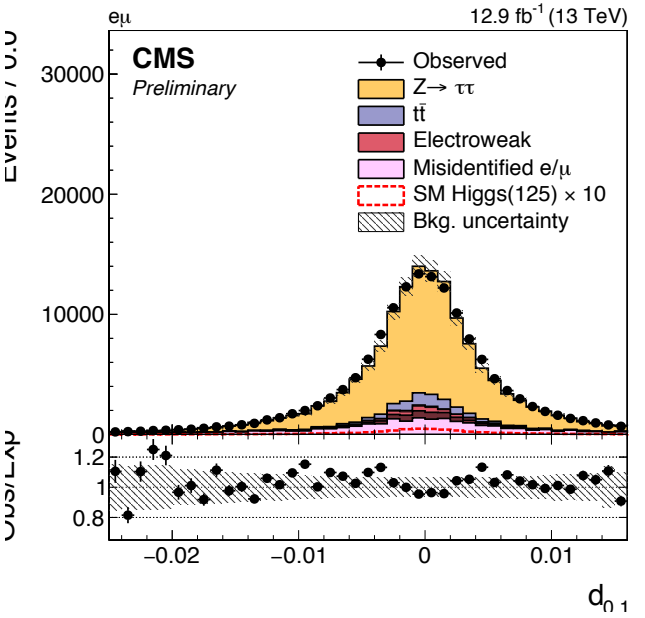


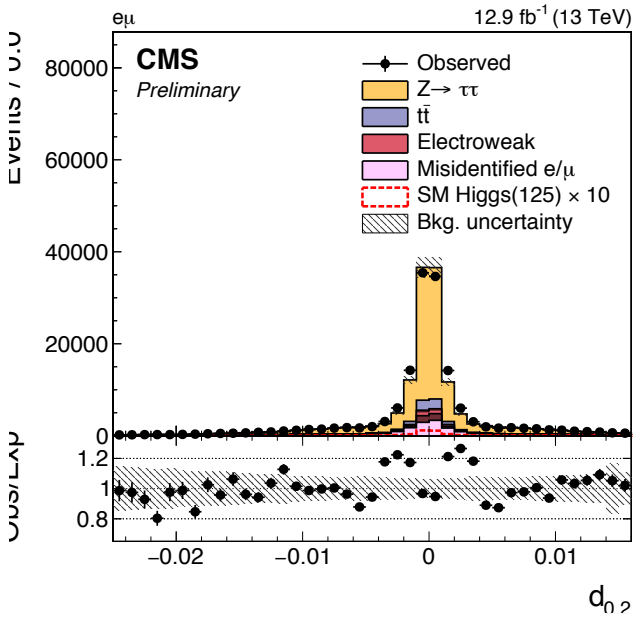


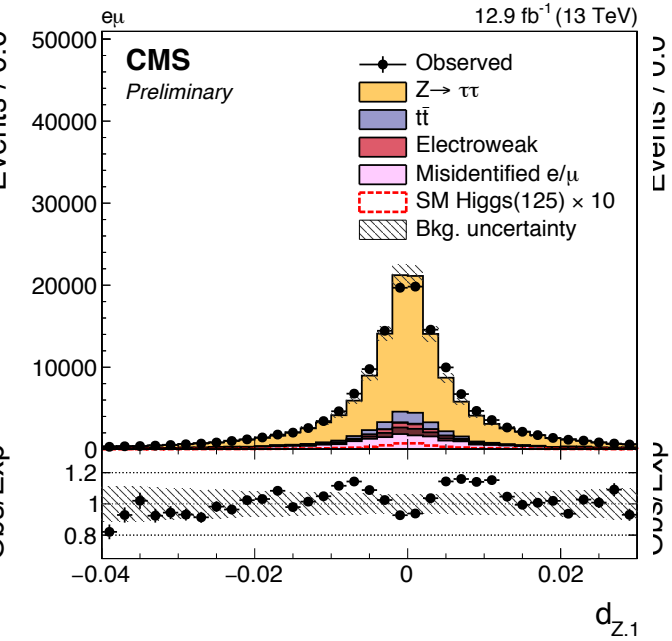


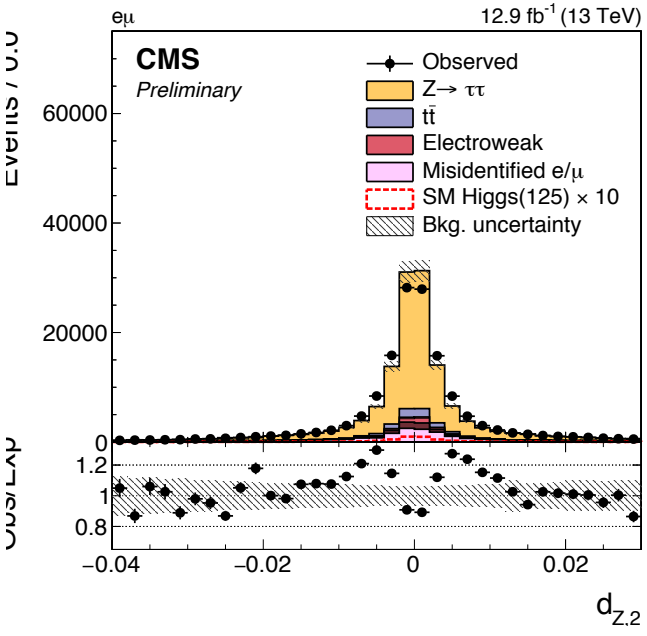


Impact parameters









- better description in 2016 legacy re-reco than in previous 2016 re-reco data
- but still large disagreements

Next steps

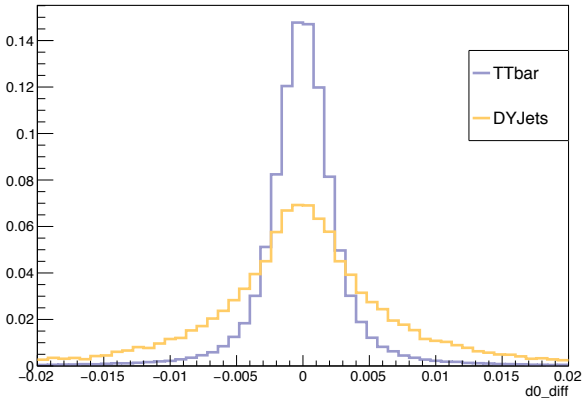
- study Z->ee events in 2016 legacy re-reco
  - N-tuples almost done

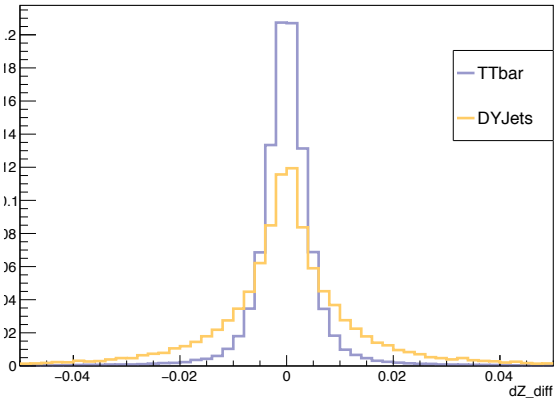
- calibration of IP variables in Z->ee / μμ (prompt) and Z->ττ ->eμ events with quantile mapping technique

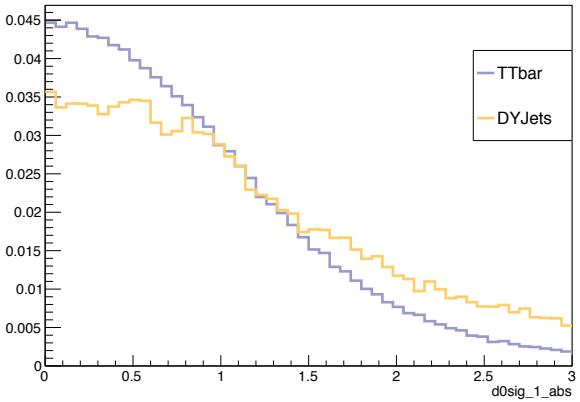
Backup

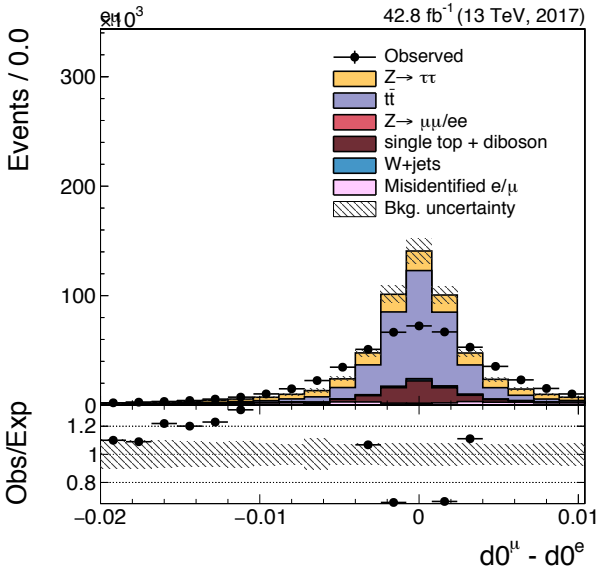
BDT studies

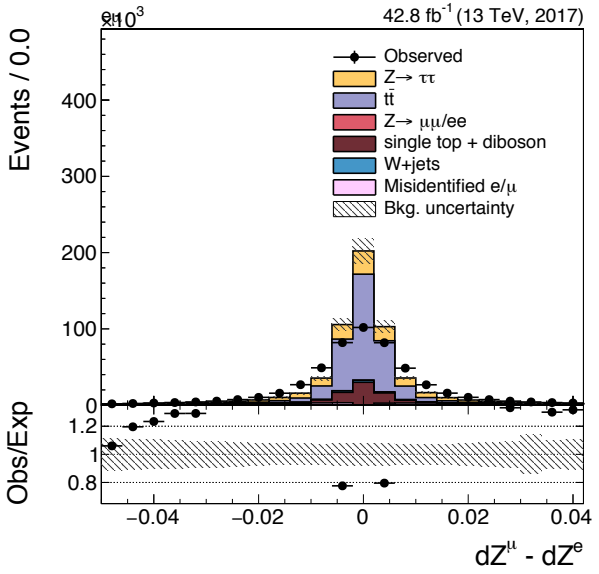
Further idea: exploit tau decay length information

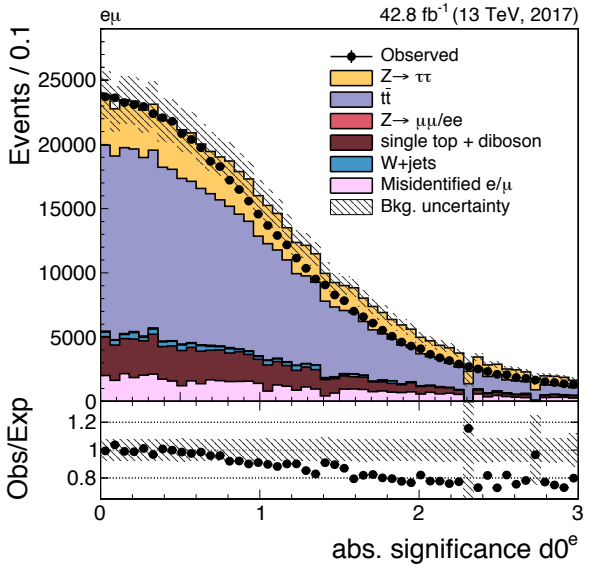












- calibration of impact parameter variables needed