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Photon Energy Scale

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Introduction

◆ Extract the photon energy scale(PES) from $Z \rightarrow l\bar{l}\gamma$ events

[previous study : 2015 - 2017 data](#)

◆ Datasets :

Data : pp collision data taken at 13 TeV in 2018

MC : mc16e

data18_13TeV.00348885.physics_Main.deriv.DAOD_EGAM3.f937_m1972_p3948

mc16_13TeV366141.Sh_224_NN30NNLO_eegamma_LO_pty_15_35.deriv.DAOD_EGAM3.e7006_e5984_s3126_r10724_r10726_p3956

◆ Derivations :

EGAM3 for $Z \rightarrow ee\gamma$

EGAM4 for $Z \rightarrow \mu\mu\gamma$

Event Selection Criteria

- ◆ **Pass the good run list and trigger requirement.**
- ◆ **Primary vertex requirement :**
At least one primary vertex with two associated tracks.
- ◆ **Quality requirement :**
Every relevant detector component is operating correctly.
- ◆ **Object selection :**

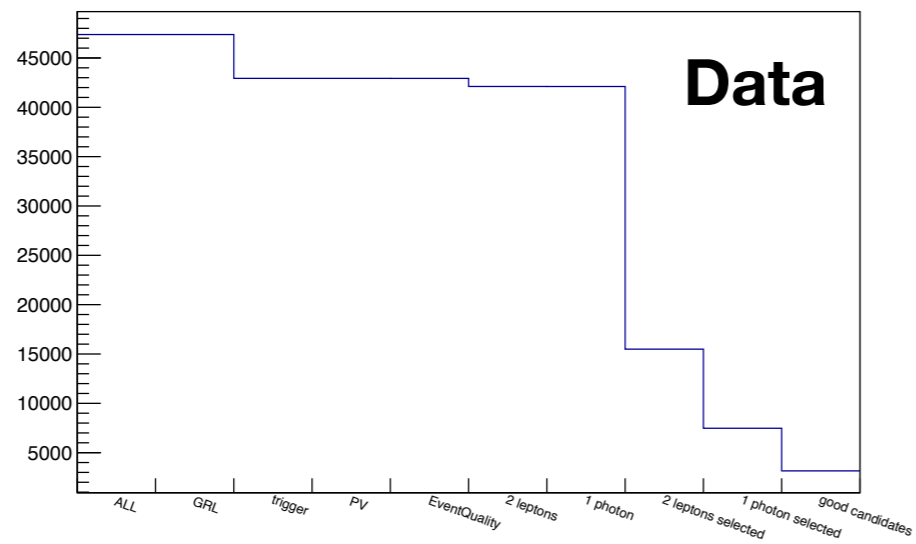
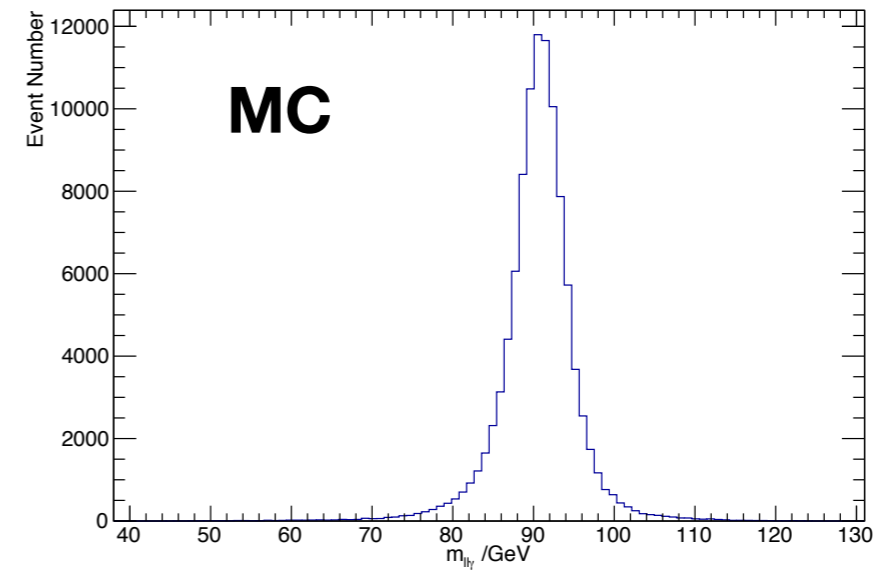
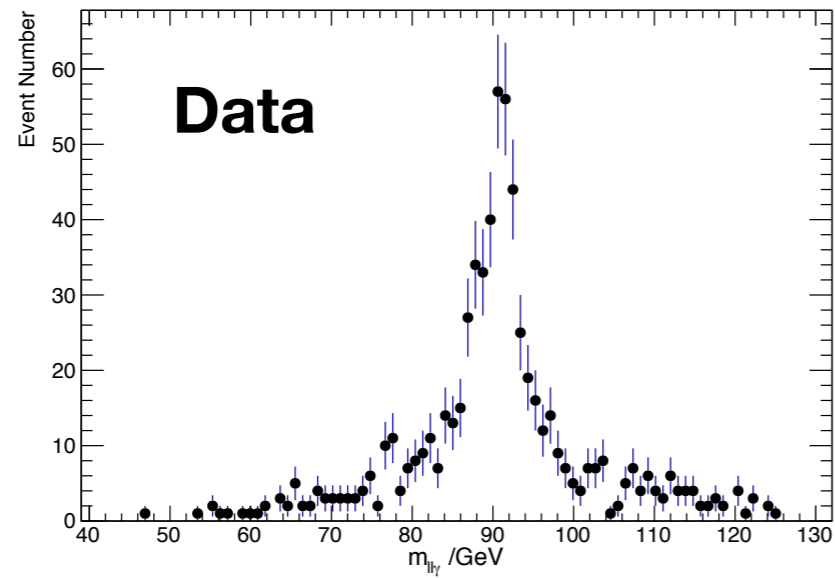
	Electron	Muon	Photon
Acceptance	$p_t > 18\text{GeV}$ $ \eta < 1.37, 1.52 < \eta < 2.47$ $d_0/\sigma_{d_0} < 10$ $ Z_{PV} < 10\text{mm}$	$p_t > 15\text{GeV}$ $ \eta < 2.5$ $d_0/\sigma_{d_0} < 10$ $ Z_{PV} < 10\text{mm}$	$E_t > 15\text{GeV}$ $ \eta < 1.37, 1.52 < \eta < 2.47$
ID	LHMedium	Medium	Tight
Isolation	Loose	Loose	Loose

- ◆ **$Z \rightarrow l\bar{l}\gamma$ selection :**

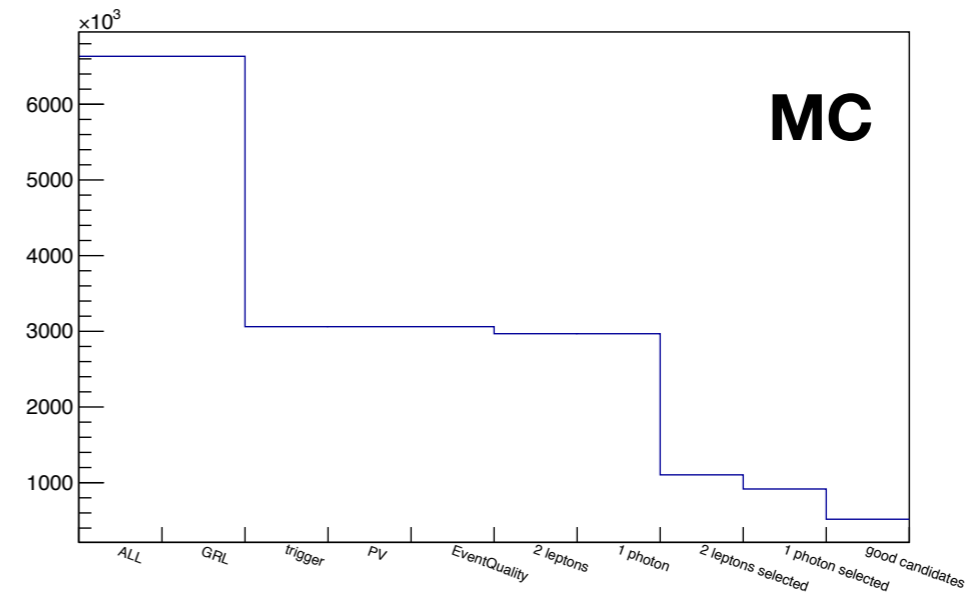
$$40 < m_{l\bar{l}} < 80 \text{ GeV}, \Delta R_{l\bar{l}\gamma, \min} > 0.4$$

If there are more than one candidates for an event, the one with $|m_{l\bar{l}\gamma} - Z_{PDG}|$ is retained.

Some distribution



Cutflow



Cutflow

Next to do

- ◆ **Run the full 2018 data**
- ◆ **Get the scale factor with template method**