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Medium E_T Electron identification efficiency and scale-factors using DY electrons

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Abstract

We describe the measurement of electron identification efficiencies for medium E_T electrons ($8< E_T(\mathrm{GeV})<20$) using Drell Yan electrons and the present the scale-factors between data and Monte Carlo. Scale-factors are shown for various combinations of Gen 5 data (0d dataset), Gen 6 data (0h,0i datasets) and Gen 5 and Gen 6 Monte Carlo. These scale-factors will be used for the SUSY trilepton analyses([5]). We also measure scale-factors for E_T >20 GeV to compare our method/numbers with blessed results. The results presented here are preliminary. All quoted errors are statistical. Although no formal systematic error is assigned, we discuss some systematic checks.

1 Introduction

The electron identification scale-factor between data and Monte Carlo (MC) is a requisite measurement for the susy trilepton analyses. The signal signature for the trilepton analyses consists of three leptons and missing transverse energy ($\not\!\!E_T$). The lower we drop in electron E_T the more acceptance we gain for this analysis. Hence a low E_T efficiency study is vital to obtain a scale-factor between data and MC. This scale-factor will be essential to estimate the expected number of signal and background events in data.

We use unbiased electrons from the single-electron calibration dataset. The method of obtaining the unbiased sample is decribed in section 2. We measure the identification (ID) and isolation (Iso) scale-factors separately, and then combine the two measurements to obtain a total scale-factor between data and MC. Please note that no systematic studies have been done so far. All errors are statistical. Once the systematic studies are done, this note will be updated to reflect the change.

Note that a previous such study has been done by G. Manca *et al.*([1]).

Section 2 describes the data and Monte Carlo samples we use for this measurement, with Section 2.1.1 describing the procedure for selecting probe electrons. In Section 4 we present the ID/Iso scale factors for two different data samples with these run ranges :

1) $182843 \leq Run \leq 186598$

2) $190697 \leq Run \leq 212133$

We discuss some systematic studies in Section 5. Appendix A.1 shows results for the run range $141544 \leq Run \leq 186598$, Appendix A.2 shows result for the run range 2) above split into two parts. Appendix A.3 shows scale factors for comparing Gen 6 Data with Gen 5 Monte Carlo.

2 SAMPLES

2.1 DATA samples

We use DY events to measure the electron ID/Iso efficiency. To measure the efficiency we require a sample of unbiased electrons. For this we use electron calibration data sample. This sample is triggered on a single electron with $E_T > 8$ GeV, and $P_T > 8$ GeV.

The actual datasets we use are summarized in Table 1. We use good run list version 13.0 (configuration - [1,0,4,1]) to obtain good runs. We define a subset of the Gen 5 dataset, which is data with $182843 \leq \mathrm{RUN} \leq 186598$. This subset is of particular interest to us, since it will be included shortly in the dielectron+track SUSY analysis. We call this subset as 'subset of interest' everywhere in this note and show scale factors separately for entire Gen 5 dataset and for this subset.

Run-Range	Dataset Name	Period
141544 - 186598	blpc0d	upto Aug'04
190697 - 203799	blpc0h	Dec'04 - Sept'05
203819 - 212133	blpc0i	Sept'05 - Feb'06

Table 1: Datasets used to measure the ID/Iso efficiencies. blpc0d is a Gen 5 dataset. blpc0h and blpc0i are Gen 6 datasets.

Run-Range	MC dataset	$M_{ee}\ GeV/c^2$	Min. Bias	CDF Gen.
141544 - 179056	sexo9t	≥ 5	No	Gen 5
190753 - 203799	sexoat	≥ 5	Yes	Gen 5
143980 - 186598	zewk6d	≥ 20	Yes	Gen 5
190753 - 203799	zewk6d	≥ 20	Yes	Gen 6

Table 2: Datasets used to measure the ID/Iso efficiencies. sexo9t is used for Gen 5 data, and the Gen 5 zewk6d is used to crosscheck numbers. The Gen 6 zewk6d is used for Gen 6 data, while sexoat is used to compare Gen 6 data with Gen 5 MC. dataset. blpc0h and blpc0i are Gen 6 datasets.

The method to remove trigger bias due to this selection is described in following subsection.

2.1.1 Removing trigger bias for measuring efficiency

As mentioned above, we use single-electron triggered data to measure the electron ID efficiency in data. Hence removing trigger bias is an important step as this could lead to artificially high efficiencies for data electrons and an incorrect scale-factor.

The trigger has an 8 GeV requirement on electron E_T and P_T. We require every event to have one electron with $E_T \geq 8$ GeV and $P_T \geq 8$ GeV, passing all requirements in Table 3 and isolation requirements(Table 5). If such an electron is found, it is called as trigger electron and the 'other' electron in the event (as defined by conditions in Table 4) is called probe electron. The 'other' electron is required to pass the baseline cuts in Table 3.

Base cuts
$E_T \geq$ 4GeV
$P_T \geq$ 2GeV
trk $\|Z_0\| \leq 60cm$
CES Fiducial Ele

ID variables
EoverP $\leq$ 2.0
HadEm $\leq$(0.055 + 0.00045$\times E_T$)
-3.0 cm$\leq$ CES Signed $\triangle$x $\leq$1.5 cm
CES $\|\triangle z\| \leq$ 3 cm
CES $\chi^2_{strip} \leq$ 10
Lshr $\leq$ 0.2
Axial Seg(5 hits) $\geq$ 3
Stereo Seg(5 hits) $\geq$ 2

Table 3: The left table shows the baseline cuts. The right table shows the ID variables for which we measure efficiency.

Thus if an event has two electrons which are trigger electrons, then their partners are probe electrons, and thus this event has two probe electrons. If there is only one trigger electron in the event, then its partner is a probe electron. In addition, the requirements in Table 4 are also enforced.

2.2 MONTE-CARLO samples

We use the Drell Yan MC samples sexo9t and sexoat to measure the ID/Iso efficiency for MC electrons. In addition, we cross-check using the EWK Z$\rightarrow$ee sample zewk6d. The EWK sample has two parts corresponding to two different run-ranges. The details of the MC samples are summarized in Table 2.

3 Method

We measure the electron ID efficiency/scale-factor and isolation efficiency/scale-factor separately and then multiply the two to obtain the total scale-factor. We do this by measuring the ID and isolation cut efficiency as 'all-but-one' efficiencies - for the ID efficiency we apply our isolation cut while forming our denominator and then apply ID to obtain the numerator. Thus the ID efficiency we measure is with respect to the isolation.

We repeat the same to measure isolation efficiency viz. we apply ID variables and obtain denominator and then apply isolation and obtain numerator and thus the efficiency.

We use Drell Yan (DY) electrons ($\triangle\Phi_{ee} > 160$ degrees) to do the measurement. We estimate the background using same-sign electrons. The background thus estimated is about 20% for data electrons with $8 \leq \mathrm{E_T}(\mathrm{GeV}) \leq 20$ and about 2% for MC electrons. By doing the 'all-but-one' procedure, we are able to control the background much better.

The scale-factor for electrons with $\mathrm{E_T} > 20$ GeV can also be measured using the Z resonance. Since this method is used for obtaining blessed numbers([2, 4, 6], we follow the same method for electrons with $\mathrm{E_T} > 20$ GeV. We select events with invariant mass (M_{ee}) in the window 76-106 GeV/c^2. We use these electrons to measure the ID/Iso efficiencies in data and MC. We estimate the background using same-sign events. For electrons with $\mathrm{E_T} \geq 20$ GeV, the background is less than 1% for both data and MC electrons.

It should be noted that there is an implicit cut $E^{HAD}/E^{EM} \leq 0.125$ while reconstructing a CDF EM object. Thus the efficiency we measure is over and above this E^{HAD}/E^{EM} cut.

Drell Yan Selection
$\triangle\Phi_{trig-prob} \geq 160$ degrees
Invariant Mass $M_{trig-prob} \geq 20\ GeV/c^2$

Table 4: Selection criteria for Drell Yan electrons. The invariant mass requirement is imposed to remove J/Ψ, Υ resonances.

Electron $\mathrm{E_T}$	Isolation Requirement
$\mathrm{E_T} \leq 20$ GeV	Electron $E^{isol} \leq 2$ GeV
$\mathrm{E_T} \geq 20$ GeV	Electron $\frac{E^{isol}}{\mathrm{E_T}} \leq 0.1$

Table 5: Isolation Requirements on the electron. E^{isol} is defined as energy deposited around the calorimeter in a cone of 0.4 steradians.

4 Results

We select trigger and probe electrons as described in Section 2.1.1. The event is also required to pass the selections listed in Table 4. In addition both trigger and probe electron are required to be isolated. The isolation requirement can be found in Table 5. This forms our denominator. We then require the probe electron to pass all requirements in Table 3. This forms our numerator.

Figure 1 shows the invariant mass and $\triangle\Phi$ distributions of the trigger and probe electrons for the subset of interest of the Gen 5 dataset. Figure 3 shows the probe electron $\mathrm{E_T}$ distribution before and after ID requirements. Figures 2 is the corresponding figure for the entire Gen 6 run range ($190697 \leq RUN \leq 212133$).

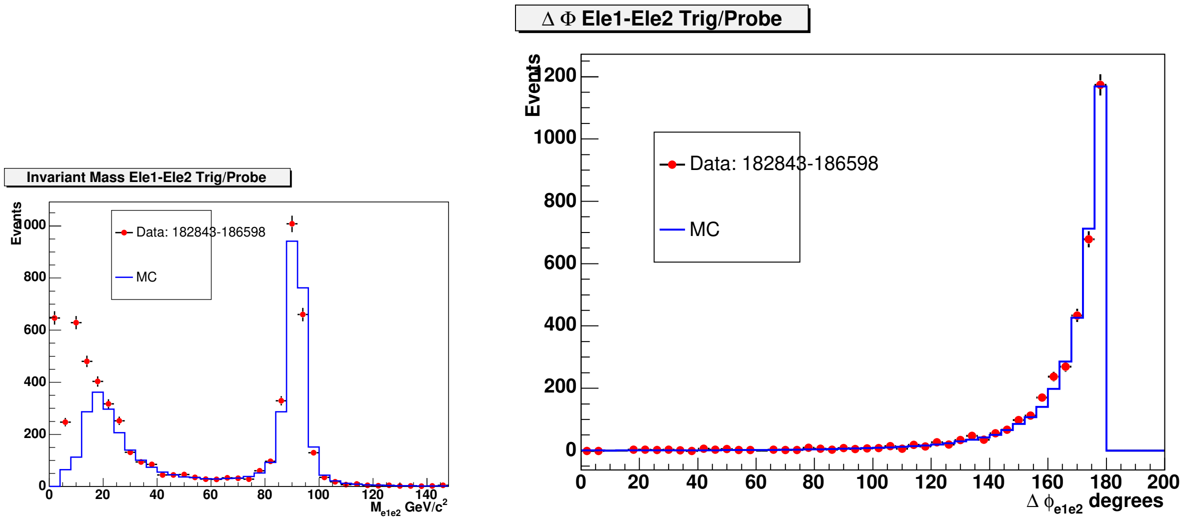

Figure 1: Figure shows the invariant mass and $\triangle\Phi$ distribution of the trigger and probe electrons. Same-sign events are subtracted in both. The mass distribution is normalized to number of events between 85 and 97 GeV/c^2. The $\triangle\Phi$ distribution is normalized to number of events between 160 and 180 degrees. The $\triangle\Phi$ distribution is plotted after requiring invariant mass ≥ 20 GeV/c^2. These plots are for the subset of interest of the Gen 5 dataset. MC sample used is sexo9t(See Table 2 for details).

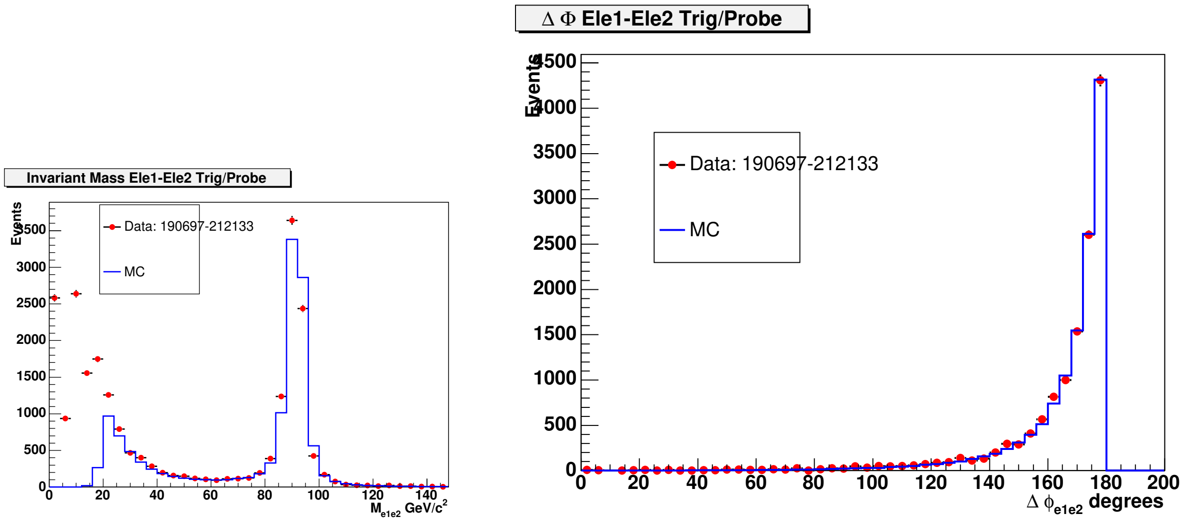

Figure 2: Figure shows the invariant mass and $\triangle\Phi$ distribution of the trigger and probe electrons. Same-sign events are subtracted in both. The mass distribution is normalized to number of events between 85 and 97 GeV/c^2. The $\triangle\Phi$ distribution is normalized to number of events between 160 and 180 degrees. The $\triangle\Phi$ distribution is plotted after requiring invariant mass ≥ 20 GeV/c^2. These plots are for the entire Gen 6 dataset ($190697 \leq RUN \leq 212133$). MC sample used is Gen 6 zewk6d(See Table 2 for details).

The ID efficiency/scale-factor for different E_T bins for the subset of interest are shown in Table 6. Appendix A.1 show the results for the entire Gen 5 dataset (Table 10). Table 8 shows the combined scale factors for entire Gen 5 dataset and the subset of interest.

The ID efficiency/scale-factor for different E_T bins for the entire Gen 6 run range is shown in

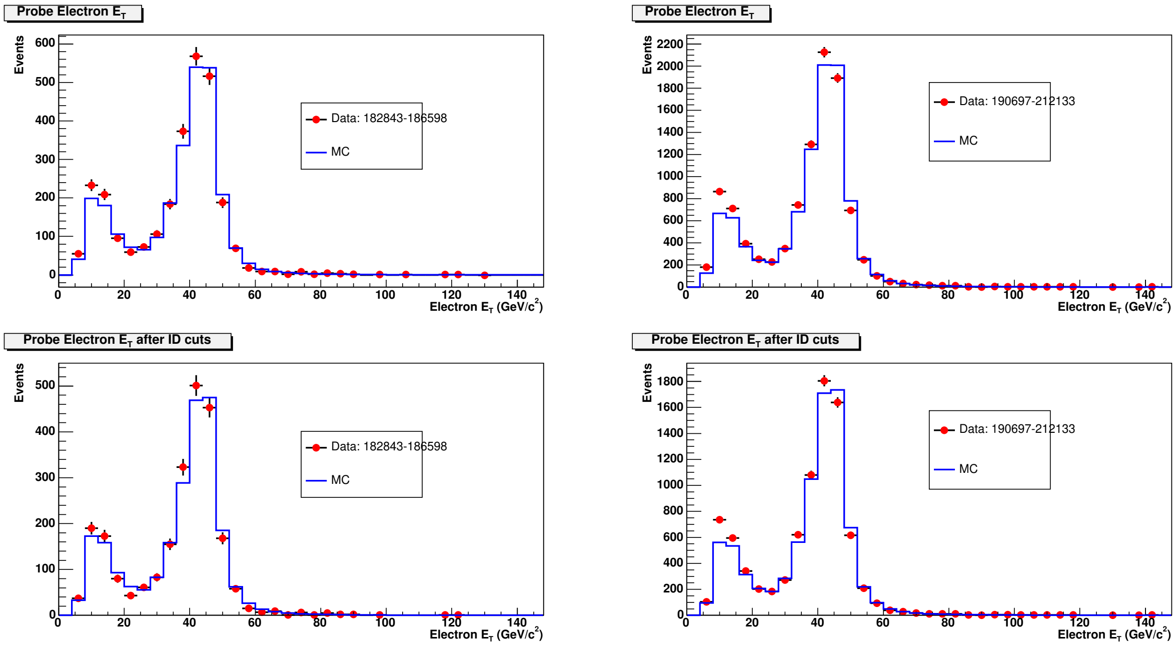

Figure 3: Figure shows the E_T distributions before(top) and after(bottom) ID requirements on probe have been made. Same-sign events are subtracted in both. The E_T distributions are normalized to number of events between 30 and 60 GeV. Invariant mass $\geq 20\ GeV/c^2$ and $\Delta\Phi \geq 160$ degrees have already been required. Left hand plots are for the subset of interest of the Gen 5 dataset. MC sample used is sexo9t. Right hand plots are for the entire Gen 6 dataset ($190697 \leq RUN \leq 212133$). MC sample used is Gen 6 zewk6d. See Table 2 for details.

Table 7. Appendix A.2 shows the results for the separate run ranges (0h = 190697-203799, 0i = 203819-212133). Table 9 shows the combined scale factors for entire Gen 6 run range.

5 Systematics

We do not assign systematic errors to any of our measurements presented in this note. However, we have performed several checks which we will describe in this section.

E_T GeV	Data ϵ_{ID}	MC ϵ_{ID}	Scale Factor	Data ϵ_{Iso}	MC ϵ_{Iso}	Scale Factor
8 - 12	0.815±0.025	0.835±0.002	0.976±0.03	0.891±0.022	0.932±0.001	0.956±0.024
12 - 16	0.828±0.026	0.845±0.002	0.98±0.04	0.965±0.014	0.947±0.001	1.019±0.014
16 - 20	0.842±0.036	0.844±0.003	0.997±0.043	0.907±0.03	0.942±0.002	0.963±0.032
$\geq$ 20	0.9±0.006	0.875±0.001	1.028±0.007	0.98±0.003	0.982±0.0002	0.998±0.003

Table 6: The ID/Iso efficiency/scale-factor for different E_T bins for the subset of interest. MC used is sexo9t (See Table 2 for details).

E_T GeV	Data ϵ_{ID}	MC ϵ_{ID}	Scale Factor	Data ϵ_{Iso}	MC ϵ_{Iso}	Scale Factor
8 - 12	0.851±0.012	0.829±0.002	1.027±0.015	0.893±0.011	0.913±0.002	0.979±0.012
12 - 16	0.833±0.014	0.838±0.002	0.995±0.017	0.932±0.01	0.927±0.002	1.005±0.015
16 - 20	0.87±0.02	0.843±0.003	1.033±0.02	0.927±0.014	0.921±0.002	1.006±0.015
$\geq$ 20	0.885±0.004	0.876±0.001	1.01±0.004	0.979±0.002	0.978±0.0002	1.001±0.002

Table 7: The ID/Iso efficiency/scale-factor for different E_T bins for the entire Gen 6 run range. MC used is Gen 6 zewk6d (See Table 2 for details).

E_T GeV	Gen 5	Subset of Interest
8 - 12	0.926±0.02	0.933±0.037
12 - 16	0.953±0.02	0.999±0.043
16 - 20	0.955±0.027	0.96±0.052
$\geq$ 20	1.012±0.004	1.026±0.008

Table 8: The complete (ID/Iso) scale-factors for the entire Gen 5 dataset and for the subset of interest. MC used is sexo9t (See Table 2 for details).

E_T GeV	Gen 6 ($190697 \leq RUN \leq 212133$)
8 - 12	1.005±0.019
12 - 16	1.0±0.023
16 - 20	1.039±0.025
$\geq$ 20	1.011±0.004

Table 9: The complete (ID/Iso) scale-factors for the entire Gen 6 run range MC used is Gen 6 zewk6d (See Table 2 for details).

We measure the scale-factor for High E_T electrons ($E_T \geq 20$ GeV).

Our measurement agrees excellently with blessed results for the 0d dataset [our SF=1.0±0.002 (Table 8), blessed SF=0.996±0.005 (Table 5:Ref. [2])].

For the results with 0h and 0i datasets we find a 2% difference when compared to Gen 5 MC [Comparing Table 15 this note with Table 4:Ref. [4])], and upto 4% difference when compared to the same Gen 6 MC samples [Comparing Table 9 this note with Table 6:Ref. [6]]. Part of this difference could be due to slight difference in estimating backgrounds between our method and the blessed result method.

We also measure the high E_T scale-factor using $\triangle\Phi_{ee} \geq 160$ degrees (instead of default $76 \leq M_{ee}(GeV/c^2) \leq 106$) and obtain a difference of about 1%.

We compare two different MC samples, with and without min. Bias overlaid for Gen 5 (sexo9t and Gen 5 zewk6d in Table 2), and we find that the scale-factors are same within errors (actually similar to within 1%).

We have also compared scale-factors that we measure using the Gen 6 zewk6d with the latest $Z \rightarrow ee$ sample from the EWK group (called zewkad) and we find that the measurements are consistent within errors as expected.

In [1] the overall systematic error was calculated to be of the order of 2%. We can be conservative and take our systematic error to be 5%. Our dilepton+track analysis ([5]) has total systematic errors of around 20%, of which the ID/Iso scale-factors are a small part. Hence an error of 5% on the scale-factors for electrons is acceptable to us.

6 Conclusions

We have measured the electron identification scale factors for medium E_T electrons ($8 \leq E_T(\text{GeV}) \leq 20$) and also for high energy electrons ($E_T \geq 20$GeV). The results are presented for various scenarios

- Table 8 shows the scale-factors for the entire Gen 5 run range and also for a subset of interest to us.
- Table 9 shows the scale-factors for the entire Gen 6 run range.
- Table 13 shows the scale-factors for Gen 6 0h and 0i datasets separately.
- Table 15 shows the scale-factors between Gen 6 0h data and Gen 5 Monte Carlo.

The results shown here are preliminary and do not include any systematic errors. However, systematic studies are discussed in the previous section. Further updates of this note will include systematic errors as well.

The authors would like to note that work is underway to obtain scale-factors for the low E_T electrons ($5 \leq E_T(\text{GeV})8$). Backgrounds for such electrons cannot be calculated using same-sign events, as this is of the order of 70-80% and there is significant contribution to same-sign events from heavy-flavor (eg. semileptonic decay of b-quarks). Various methods (such as using $\triangle\Phi_{ee} \geq 160$ degrees, or using J/Ψ,Υ resonances) are being considered. For now, results for this E_T range can be obtained from CDF Note 7379, and from Table 5 in CDF Note 8098 for various scenarios.

References

[1] Central Electron ID Efficiencies at Medium Energy, G. Manca, B. Heinemann, G. Martin. CDF7233

[2] Electron Identification in Offline Release 5.3, C. Hill, J. Incandela, and C. Mills. CDF7309

[3] Low E_T electron ID efficiency and scale-factors using J/Ψ, S. Dube, J. Zhou, S. Somalwar. CDF7379

[4] Electron Identification in Offline Release 6.1.2, T. Spreitzer, C. Mills, J. Incandela. CDF7950

[5] Searches for Chargino-Neutralino Production in mSUGRA Model in a Dielectron + Track Channel, S. Dube, J. Zhou, A. Lath, S. Somalwar. CDF8098

[6] Electron ID efficiency and Scale Factor for Summer 2006, T. Spreitzer, C. Mills, J. Incandela. CDF8274

A Appendix A

A.1 Plots and Tables for entire Gen 5 Dataset

In this section we present the results for the entire Gen 5 dataset ($141544 \leq Run \leq 186598$). Figure 4 shows the invariant mass and $\triangle\Phi$ distribution, Figure 5 shows the probe electron E_T distribution before and after ID cuts. Table 10 shows the ID/Iso efficiency and scale factors in different E_T bins. The combined scale factors can be found in Table 8.

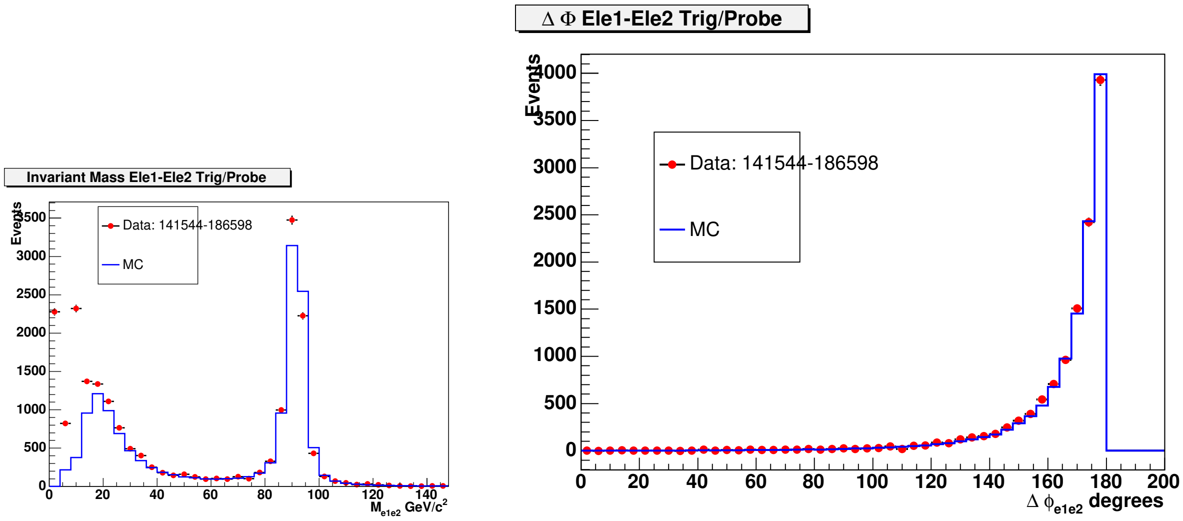

Figure 4: Figure shows the invariant mass and $\triangle\Phi$ distribution of the trigger and probe electrons. Same-sign events are subtracted in both. The mass distribution is normalized to number of events between 85 and 97 GeV/c^2. The $\triangle\Phi$ distribution is normalized to number of events between 160 and 180 degrees. The $\triangle\Phi$ distribution is plotted after requiring invariant mass ≥ 20 GeV/c^2. These plots are for entire Gen 5 dataset.

E_T GeV	Data ϵ_{ID}	MC ϵ_{ID}	Scale Factor	Data ϵ_{Iso}	MC ϵ_{Iso}	Scale Factor
8 - 12	0.828±0.013	0.835±0.002	0.992±0.016	0.869±0.013	0.932±0.001	0.933±0.014
12 - 16	0.824±0.014	0.845±0.002	0.975±0.017	0.926±0.01	0.947±0.001	0.977±0.011
16 - 20	0.821±0.019	0.844±0.003	0.972±0.023	0.926±0.014	0.942±0.002	0.983±0.015
$\geq$ 20	0.886±0.004	0.875±0.001	1.012±0.004	0.982±0.002	0.982±0.0002	1.0±0.002

Table 10: The ID/Iso efficiency and scale-factor for different E_T bins for the entire Gen 5 dataset. MC used is sexo9t (See Table 2 for details).

A.2 Plots and Numbers for Gen 6 dataset : 0h,0i separately

In this section we present results for two subsets of the entire Gen 6 run range. The Gen 6 dataset is divided into 0h, and 0i datasets. Figure 6 shows the invariant mass and $\triangle\Phi$ distribution for 0h data, Figure 8 shows the same for 0i data. Figure 7 shows the probe electron E_T distribution before and after ID cuts for 0h and 0i data. Table 11 shows the ID/Iso efficiency and scalefactor in

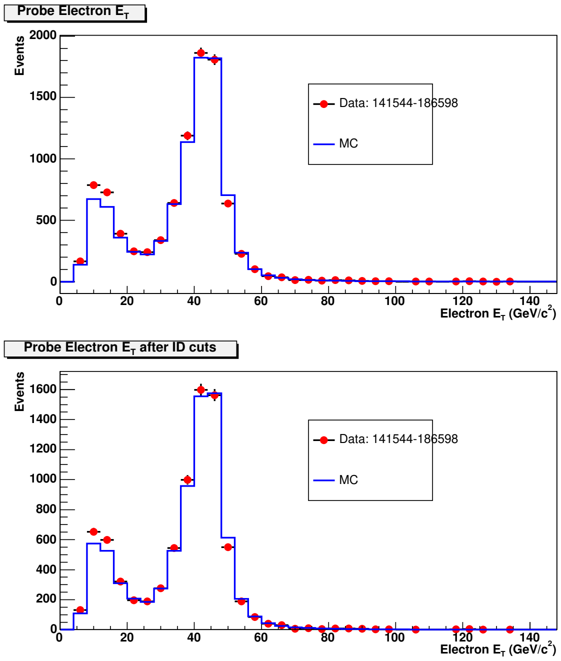

Figure 5: Figure shows the E_T distributions before(top) and after(bottom) ID requirements on probe have been made. Same-sign events are subtracted in both. The E_T distributions are normalized to number of events between 30 and 60 GeV. Invariant mass $\geq$ 20 GeV/c^2 and $\triangle\Phi \geq$ 160 degrees have already been required.These plots are for entire Gen 5 dataset.

different E_T bins for 0h data, Table 12 shows the same for 0i data. Table 13 shows the combined scale factors for 0h and 0i datasets.

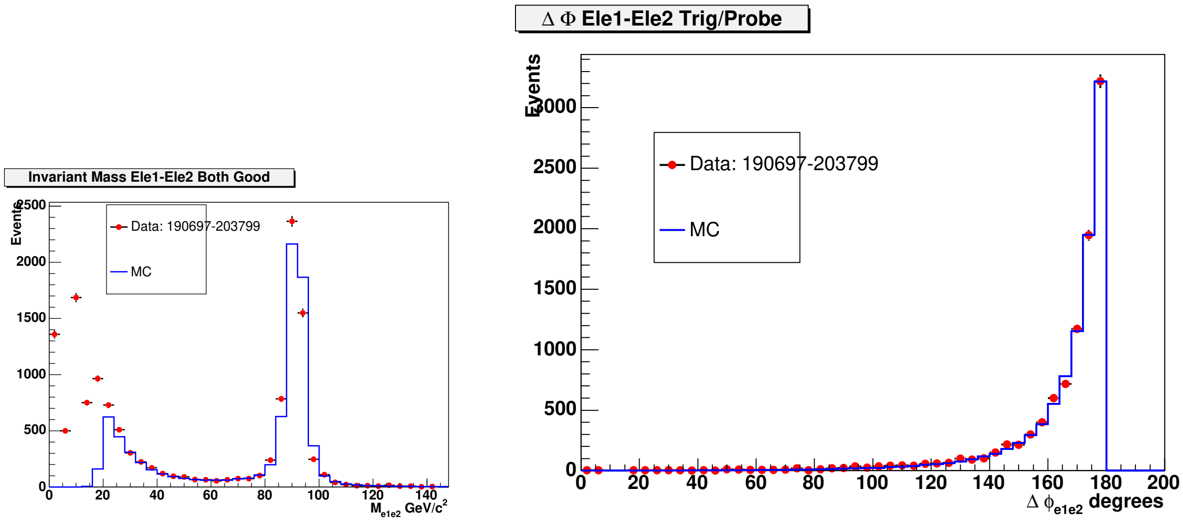

Figure 6: Figure shows the invariant mass and $\triangle\Phi$ distribution of the trigger and probe electrons. Same-sign events are subtracted in both. The mass distribution is normalized to number of events between 85 and 97 GeV/c^2. The $\triangle\Phi$ distribution is normalized to number of events between 160 and 180 degrees. The $\triangle\Phi$ distribution is plotted after requiring invariant mass $\geq$ 20 GeV/c^2. These plots are for the Gen 6 0h dataset.

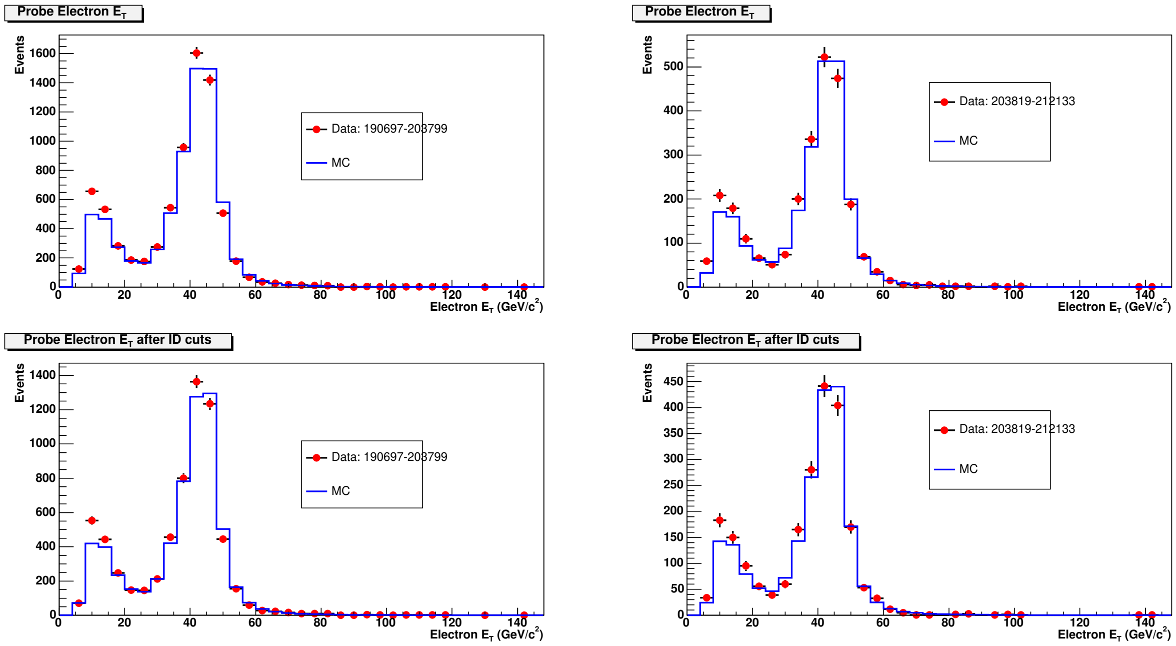

Figure 7: Figure shows the $\mathrm{E_T}$ distributions before(top) and after(bottom) ID requirements on probe have been made. Same-sign events are subtracted in both. The $\mathrm{E_T}$ distributions are normalized to number of events between 30 and 60 GeV. Invariant mass $\geq 20\ GeV/c^2$ and $\triangle\Phi \geq 160$ degrees have already been required. Left hand plots are for the Gen 6 0h dataset. Right hand plots are for the Gen 6 0i dataset.

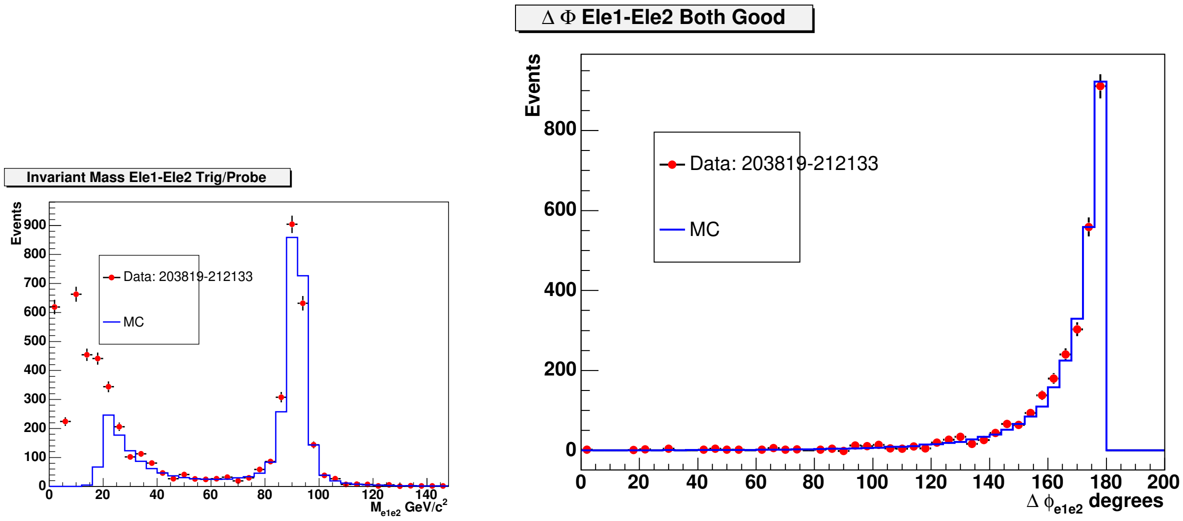

Figure 8: Figure shows the invariant mass and $\triangle\Phi$ distribution of the trigger and probe electrons. Same-sign events are subtracted in both. The mass distribution is normalized to number of events between 85 and 97 GeV/c^2. The $\triangle\Phi$ distribution is normalized to number of events between 160 and 180 degrees. The $\triangle\Phi$ distribution is plotted after requiring invariant mass $\geq 20\ GeV/c^2$. These plots are for the Gen 6 0i dataset.

E_T GeV	Data ϵ_{ID}	MC ϵ_{ID}	Scale Factor	Data ϵ_{Iso}	MC ϵ_{Iso}	Scale Factor
8 - 12	0.842±0.014	0.829±0.002	1.016±0.017	0.89±0.013	0.913±0.002	0.975±0.014
12 - 16	0.831±0.016	0.838±0.002	0.993±0.019	0.926±0.012	0.927±0.002	0.999±0.013
16 - 20	0.873±0.019	0.843±0.003	1.036±0.023	0.926±0.016	0.921±0.002	1.005±0.018
$\geq$ 20	0.887±0.004	0.876±0.001	1.012±0.005	0.977±0.002	0.978±0.0003	0.999±0.002

Table 11: The ID efficiency/scale-factor for different E_T bins for the Gen 6 0h dataset. MC used is Gen 6 zewk6d (See Table 2 for details).

E_T GeV	Data ϵ_{ID}	MC ϵ_{ID}	Scale Factor	Data ϵ_{Iso}	MC ϵ_{Iso}	Scale Factor
8 - 12	0.88±0.022	0.829±0.002	1.061±0.027	0.902±0.021	0.913±0.002	0.988±0.023
12 - 16	0.838±0.027	0.838±0.002	1.00±0.03	0.948±0.018	0.927±0.002	1.022±0.019
16 - 20	0.864±0.032	0.843±0.003	1.025±0.038	0.929±0.025	0.921±0.002	1.008±0.028
$\geq$ 20	0.881±0.007	0.876±0.001	1.005±0.008	0.986±0.003	0.978±0.0003	1.008±0.003

Table 12: The ID efficiency/scale-factor for different E_T bins for the Gen 6 0i dataset. MC used is Gen 6 zewk6d (See Table 2 for details).

E_T GeV	Gen 6 0h	Gen 6 0i
8 - 12	0.991±0.022	1.048±0.036
12 - 16	0.992±0.023	1.022±0.036
16 - 20	1.041±0.03	1.033±0.048
$\geq$ 20	1.011±0.005	1.013±0.009

Table 13: The complete (ID/Iso) scale-factors for the entire Gen 5 dataset and for the subset of interest. MC used is Gen 6 zewk6d (See Table 2 for details).

A.3 Plots and Numbers for Gen 6 Data vs Gen 5 MC

In this section we compare the Gen 6 data ($190697 \leq Run \leq 203799$) with Gen 5 MC (sexoat: See Table 2 for details). Table 14 shows the ID/Iso efficiency and scale factor in different E_T bins. Table 15 shows the combined scale factors between Gen 6 data and Gen 5 MC.

E_T GeV	Data ϵ_{ID}	MC ϵ_{ID}	Scale Factor	Data ϵ_{Iso}	MC ϵ_{Iso}	Scale Factor
8 - 12	0.842±0.014	0.833±0.002	1.01±0.017	0.89±0.013	0.917±0.002	0.971±0.014
12 - 16	0.831±0.016	0.842±0.003	0.988±0.019	0.926±0.012	0.933±0.002	0.993±0.013
16 - 20	0.873±0.019	0.84±0.003	1.039±0.023	0.926±0.016	0.918±0.003	1.009±0.018
$\geq$ 20	0.887±0.004	0.876±0.001	1.013±0.005	0.9797±0.002	0.977±0.0003	1.00±0.002

Table 14: The ID/Iso efficiency/scale-factor for different E_T bins for the Gen 6 run range ($190697 \leq Run \leq 203799$). MC used is Gen 5 sexoat (See Table 2 for details).

E_T GeV	Gen 6 ($190697 \leq RUN \leq 203799$)
8 - 12	0.981±0.022
12 - 16	0.981±0.023
16 - 20	1.048±0.03
$\geq$ 20	1.013±0.005

Table 15: The complete (ID/Iso) scale-factors for the Gen 6 run range ($190697 \leq Run \leq 203799$). MC used is sexoat (See Table 2 for details).