

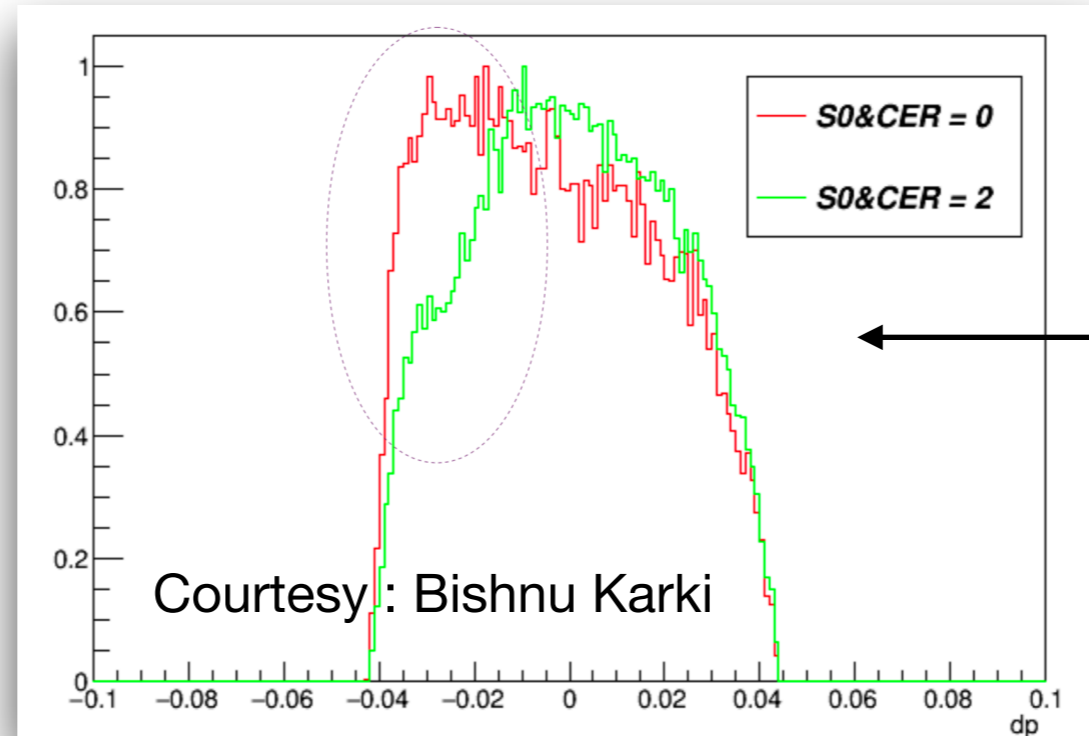
Mis-Labelled Events

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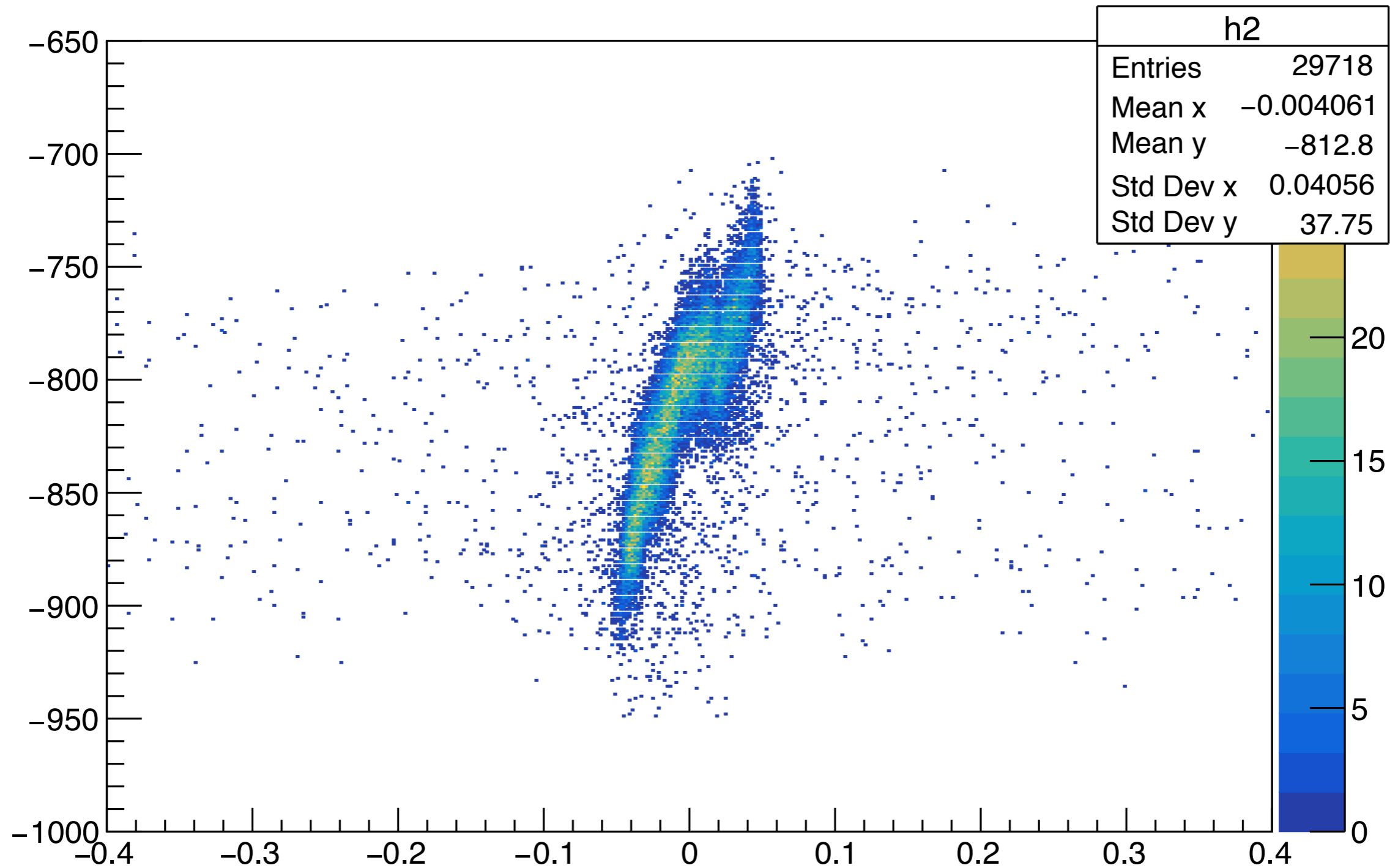
Problem :



**Red : A Run
without S0_CER
Trigger
Green : A Run
with S0_CER
trigger**

- Some electron events (DIS & DVCS alike) which has proper S2M_CER coincidence are labelled exclusively as S0_CER coincidence events in the presence of S0_CER Trigger, Hence Missing from the regular trigger labels.
- Since DIS (S2M_CER - auto validation), DVCS (S2M_CER - Validation) and S0_CER triggers have different pre-scale factors, even when we recover these events, There is an ambiguity in the proper pre-scale multiplier*
- Problem only when S0_CER is in the trigger (Spring 2016 run period)

S0 Timing (S0 Vs dp)



Possible cause : S0 timing issues

Bishnu, Alexa and Frederic's Conclusions...

- Mis-Labelled events can be recovered by looking for the presence of CER and S2M in the trigger and using a timing cut to establish the coincidence (there is a case for dropping the t3 timing cut)
- These events are predominantly in the low dp region.
- Both validation and auto validation triggers have these “good but corrupted” events. => It's the presence of the S0_CER trigger the culprit.
- Scaling the “Good but corrupted” events works differently for DIS and DVCS and within the kinematics*

A Thought Experiment

	S2_CER	S2_CER (2)	S0_CER
Prescale Factor	1	2	3
# Recorded Events	10	20	5
Total Events	10	40	20
#Recorded Events	9(-1)	19(-1)	7(+2)
Total Events	9	38	? (22)

- For every miss labelled events
 - If it's a corrupted DIS events => There are two such events
 - If it's a corrupted DVCS events => There is only one such event

Hypothesis:

$$\text{DIS}_{\text{Yield}} = \text{Normalization (nDIS + nMis-Labelled)} * \text{DISPre-Scale}$$

- For DIS Analysis : Find Electrons among the S0_CER trigger
 - Scale it by 1 if it's a validation trigger event
 - Scale it by DIS pre-scale if not
- **For DVCS Analysis : No need to scale, Simple electron and photon requirement will take care of the issue since validation trigger is always pre-scaled 1**

Alexa's Comprehensive dp Analysis

https://hallaweb.jlab.org/dvcslog/12+GeV/180828_091829/MissingEvents_Delta.pdf

- High S0CER Pre-Scale - Few Corrupted events, effect of not multiplying by DIS Pre-Scale is small
- Kin 48_1 : DIS and S0CER has same pre scale 2
- Kin 48_4 : DIS Spectrum Scaled (?), or only S0CER is scaled =>

Recorded nEvents

Miss Labelled Events

Run#	nDVCS	nDIS	nMissing	nSOCEREI electron	DIS PreScale	SOCER PreSale	DVCS/DIS ratio
12541	38817	25888	2855	8844	2	2	1.50
13013	194393	108022	348	826	4	128	1.80
13191	297903	156991	509	1254	2	128	1.90
13197	166942	76097	491	1189	4	128	2.19
12888	73441	50478	126	358	2	128	1.45
13100	13534	8295	802	2057	2	4	1.63
13110	41503	14085	5420	14160	4	2	2.95
13150	52482	32122	6177	16226	2	2	1.63
13297	61425	20484	117	307	4	128	3.00

Larger DVCS:DIS Ratio means more of the “Good but Corrupted Events could be from DVCS

***Looking for Electrons among SOCER events rather than using a timing cut gives ~2.5 times larger yield for mis labelled events.**

Summary

- I still believe Mis-Labelled Events should be pre-Scaled
 - Events from Validation and Autovalidation (Pre-Scaled) should be separated
- Mis-Labeling is not an issue (or Doesn't need special attention) for DVCS