Calorimeter Spacer Study: Update

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Introduction

Calorimeter Spacers

We took 1 shifts worth of data with plastic spacers between the calorimeters and the vacuum chambers

These spacers moved the calorimeters out radially and changed their acceptances in a way which can be compared with the gm2ringsim predictions

Runs with spacers inserted

https://dbweb8.fnal.gov:8443/ECL/gm2/E/show?e=136997

https://dbweb8.fnal.gov:8443/ECL/gm2/E/show?e=141529

60866-60871

Reference run

From production the weekend before, ~~perhaps data afterwards as well~~

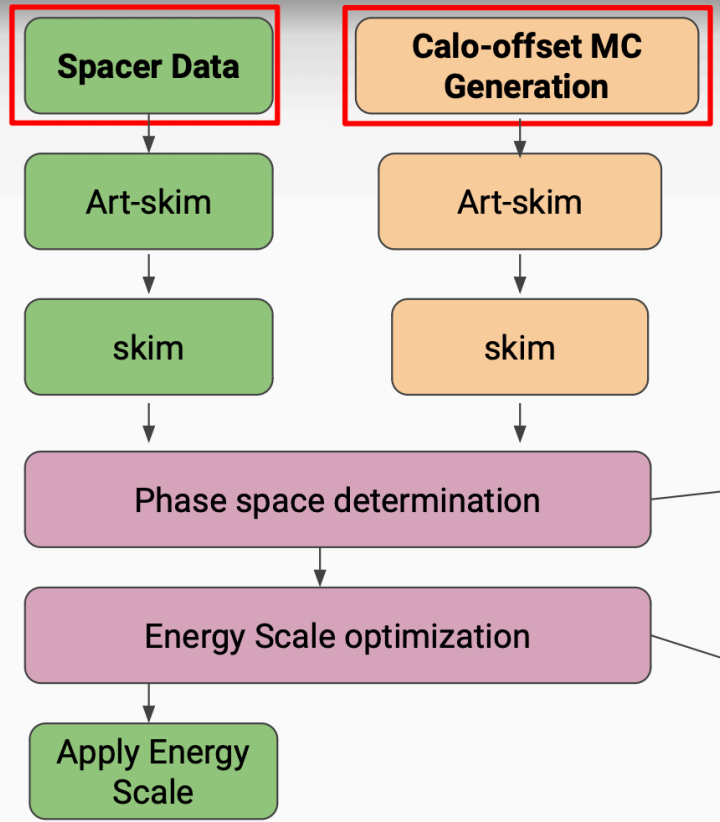
60787-60791

Would be great if I could access these info!

Fermilab

DocDB-29238

Recap: workflow



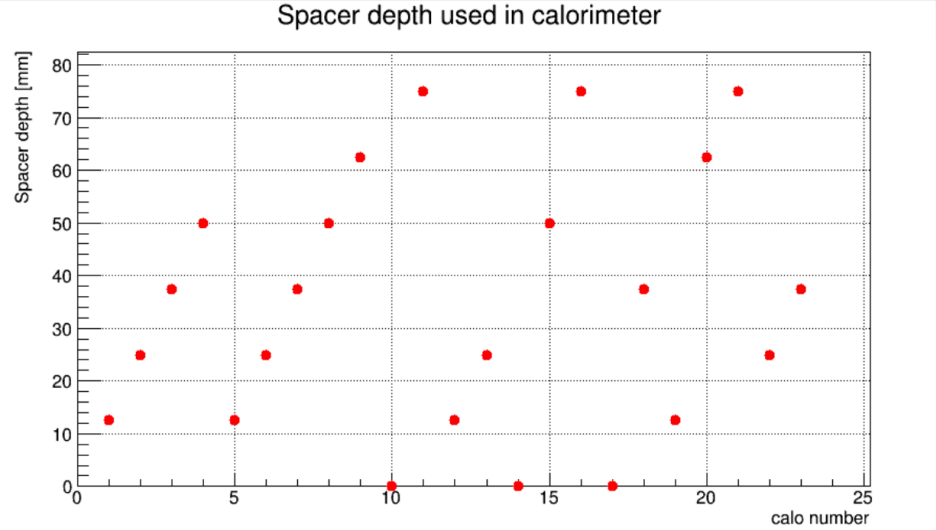
~ 100 million events for each Data and MC

- Art-skim and local-skim:
  - Drop irrelevant branches
  - Clock tick conversion (Data ONLY)
  - Time>25 us (Data ONLY)
  - Time randomization (Data and MC)

Datasets name	Selection for phase determination
MC	caloHitEdep>1600
Data	clusterEn>1700 && clusterTime>100 us && clusterTime<600 us && clusterEn<8000

Datasets	Baseline Selection
Data	Time>100 us && Time<600 us && clusterEn<8 GeV && [59.6048 , 600.879] us (123 periods)
MC	Time window [2.19626 , 499.843] us (114 periods)

Prescribed spacer depth



No.	Spacer depth (mm)	calorimter
1	0.0	10, 14, 17
2	12.5	1, 5, 12, 19
3	25.0	2, 6, 13, 22
4	37.5	3, 7, 18, 23
5	50.0	4, 8, 15, 24
6	62.5	9, 20
7	75.0	11, 16, 21,

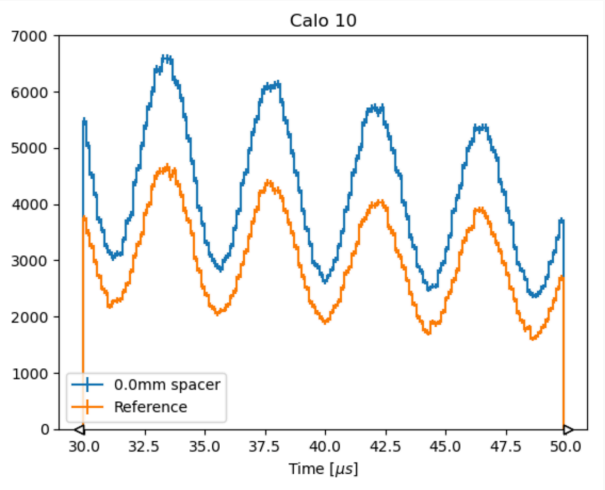
Full Production of Spacer and Reference Data

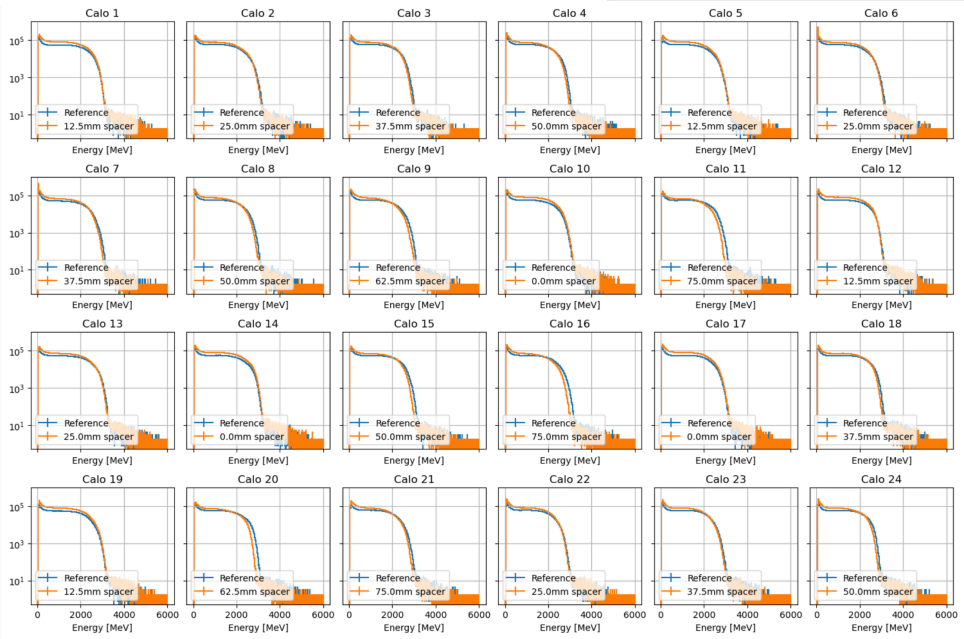
https://cdcvs.fnal.gov/redmine/projects/g-2/wiki/Production_Run6_Data#Full-Production-Offline-Datasets-Without-Subrun-DQC

Run6 **Spacer** Full production + Reco calo took only 2 days

60787	60791	gm2pro_run6_siewyan_calospacer_60787_60791_5508A	1480	ischildof:(defname: siewyan_calospacer_60787_60791) and offline.requestid 5508A	https://pomsgpvm02.fnal.gov/poms/campaign_stage_info/gm2/production?campaign_stage_id=21937	siewyan_calospacer_60787_60791
60866	60871	gm2pro_run6_siewyan_calospacer_60866_60871_5508A	2736	ischildof:(defname: siewyan_calospacer_60866_60871) and offline.requestid 5508A	https://pomsgpvm02.fnal.gov/poms/campaign_stage_info/gm2/production?campaign_stage_id=21937	siewyan_calospacer_60866_60871

Reference

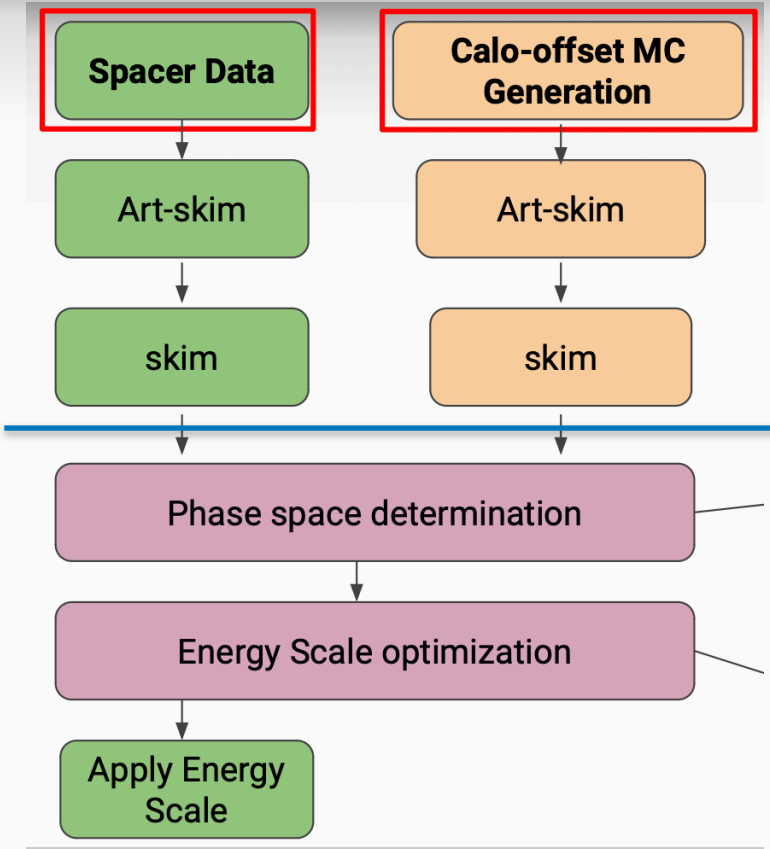


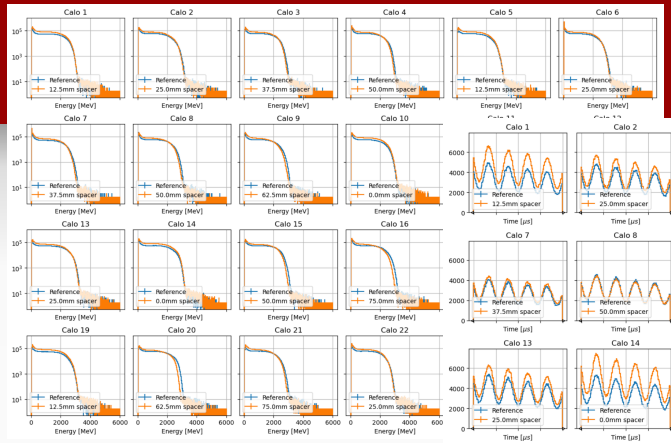


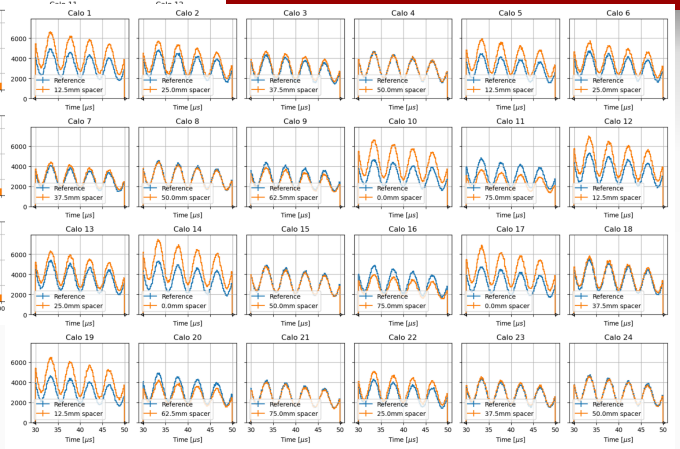
Missing normalization factor: T0 integral per run

In Progress

Status







- Complete validating the spacer and reference data.
- Validate MC sample with different spacer depth.
- Going through the processing chain (phase, energy scale computed)
- MC-data comparison at crystal-level

Spacer Study

R	S	T	U	V	W	X	Y	Z
Tuesday		local	Wednesday		local	Thursday		local
n oa - effect on R?		8:30	E-field tracker (Cedric?)		8:30	y-p correlations: potential impact on BD?		8:30
CBO phase advance (Elia in		8:45	E-field CERN-III (waiting for data), can w		8:45	miniSciFi - time-momentum, can the mir		8:45
tion?		9:00			9:00			9:00
		9:15	Pitch		9:15	quad HV and alignment		9:15
		9:30	buffer		9:30	buffer		9:30
		9:45			9:45			9:45
- what's special (FNAL)		10:00	break		10:00	break		10:00
- what's special (Bu)		10:15	EDM Run-1 wrap up		10:15			10:15
		10:30	EDM Run-2/3 status		10:30	J-PARC muon cooling		10:30
		10:45			10:45			10:45
		11:00	Dark Matter		11:00			11:00
		11:15	buffer		11:15	CPTLV Status and Outlook		11:15
		11:30			11:30	public omega_a dataset		11:30
		11:45	fringe field maps		11:45	discussion: PR material		11:45
		12:00	tracker alignment		12:00			12:00
		12:15			12:15			12:15
		12:30			12:30			12:30
		12:45			12:45			12:45
		13:00			13:00			13:00
		13:15			13:15			13:15
rce		13:30			13:30			13:30
rce		13:45			13:45	field interpolation and muon weighting		13:45
		14:00			14:00	field syst outlook, open questions		14:00
		14:15			14:15			14:15
		14:30			14:30	buffer		14:30
		14:45			14:45	break		14:45
- what's special (SJITU)		15:00			15:00			15:00
- what's special (Europe)		15:15			15:15	calo acceptance: "spacer" study		15:15
- what's special (UW)		15:30			15:30	phase acceptacne (incl. tracker accepta		15:30
- what's special (Cor)		15:45			15:45	BD: syst outlook and open questions		15:45
		16:00			16:00			16:00
		16:15			16:15	buffer		16:15
- what's special (Q)		16:30			16:30			16:30
- what's special (strob?)		16:45			16:45			16:45
		17:00			17:00			17:00
		17:15			17:15			17:15
		17:30			17:30			17:30
		17:45			17:45			17:45

Josh 10:35 PM

Hi Siewyan, I looked back at the files I used to do the study and unfortunately the crystal level information was not saved in a tree (I've attached one subrun here). I think the best approach would be to go back to the raw files and process from there. The energy calibrations in the nearline files are not the best (speed is prioritized over accuracy, so things like laser STDP/IFG corrections are neglected) so it would probably be good to run the full production if you're doing a very careful comparison with data. I'm not sure if the #production team would be able to run the files through that analysis chain quickly. For a first look, the nearline files may be sufficient though. Or I could re-run the nearline analyzer over the raw files but including the crystal-level information.

Binary

01 **gm2nearline_hists_run60871_00020.root**
Binary

Here are the files I used to make the plots I showed at the Liverpool meeting

4 files

01 **calorimeter_spacer_output.root**
Binary

01 **quick_comparison.ipynb**
Binary

<> **make_spacer_plots.py**
Python

<> **helpers.py**
Python

Siewyan 9:54 PM

Hi Josh, just to check/touchbase on the spacer study.

I have produced gasgun datasets with the spacer depth offset in specific calorimeters (100mil events)

I would like to look at the cluster level energy spectrum for now.

I reckon that those about-to-be-prestage datasets, example, **gm2nearline**_hists_run60870_00185.root is art-skimmed from an analyzer. Could you provide the analyzer so that i could run/process it on the gasgun datasets?

Backup

Phase Determination