

2012 Alignment Studies with Millepede II

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Hamburg/MillePede meeting
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Outline

- Start from Summer12 alignment by Joerg (mp1129)
- Observe χ^2/ndf for alignment with and without LA/BP corrections.
- Large z expansion was observed:
 - Reweight cosmic tracks in alignment and compare the z expansion.
- Compare phi modulation of Z mass with and without cosmic track weights.
- IOVs by run numbers

Initial setup – Geometry, datasets

- Start from setup mp1129:
 - Joerg's presentation on 26 July alignment meeting
 - Starting geometry: CRAFT12
- Datasets used:
 - Minbias (20.2M)
 - Isolated muons (37.2M)
 - Z->mumu (3.6M)
 - Cosmics CRAFT12 (.51M)
 - Cosmics Interfill peak (.85M)
 - (No Upsilon tracks)
 - Total 58.8M tracks

1.4M

Initial setup – JSON files

- Cert_190456-199011_8TeV_PromptReco_Collisions12_JSON_MuonPhys_template.txt
- if_peak_good_json.txt
- if_peak_good_RunB_json.txt
- Craft_peak_json.txt

Alignments tested

1. Switch off LA and BP corrections:

1. Cosmic track weight = 1
2. Cosmic track weight = 10

2. Switch on LA and BP corrections:

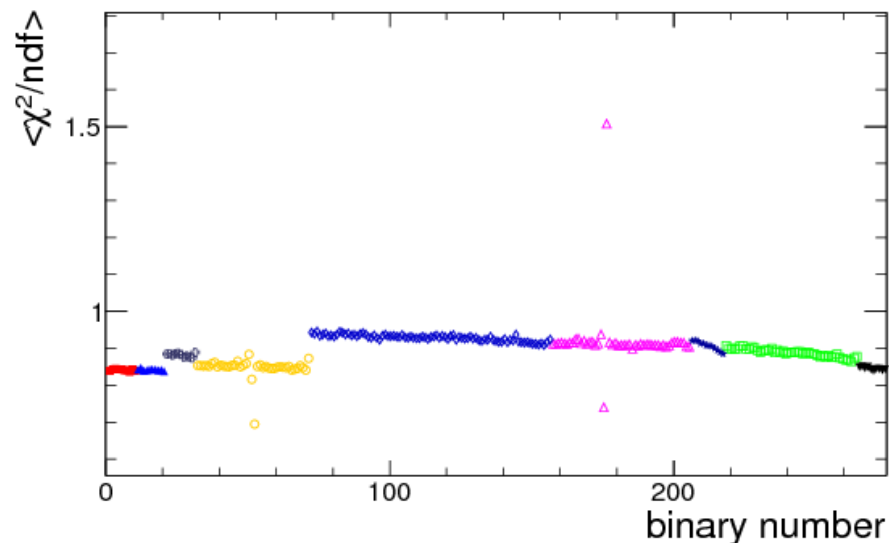
1. Cosmic track weight = 1
2. Cosmic track weight = 10

Alignables

```
' TrackerTPBLayer , 1 1 1 1 1 1 ',  
' TrackerTPEHal fDi sk , 1 1 1 1 1 1 ',  
' Tr a c k e rTIBHa l fBa r r e l , 1 1 1 1 1 1 ',  
' TrackerTOBHal fBar rel , 1 1 1 1 1 1 ',  
' TrackerTIDEndcap , 1 1 1 1 1 1 ',  
' TrackerTECEndcap , 1 1 1 1 1 1 ',  
' TrackerTPBModule , 1 1 1 1 1 1 ',  
' TrackerTPEModule , 111001 ',  
' TrackerTIBModuleUni t , 1 0 1 1 1 1 ',  
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' TrackerTIDModuleUni t , 1 0 1 1 1 1 ',  
' TrackerTECModuleUnit , 10111 1 '
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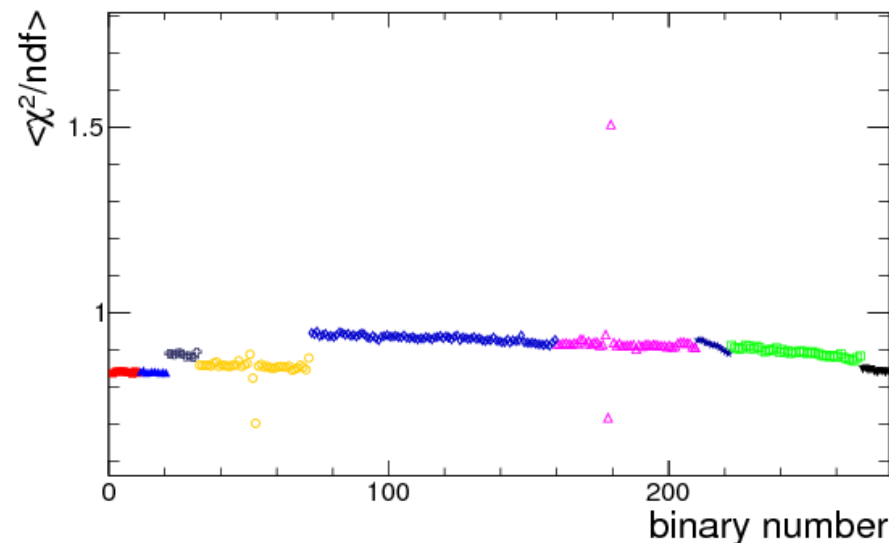
$$\chi^2/\text{ndf}$$

With LA/BP turned off



- Cosmics_craft12
- ▲ Cosmics_interfill_peak_runa
- ▼ Cosmics_interfill_peak_runb
- isolated_mu_prompt_runa
- isolated_mu_prompt_runb
- △ minbias_prompt_runa
- ◇ minbias_prompt_runb
- ⊕ ztomumu_runa
- ★ ztomumu_runb

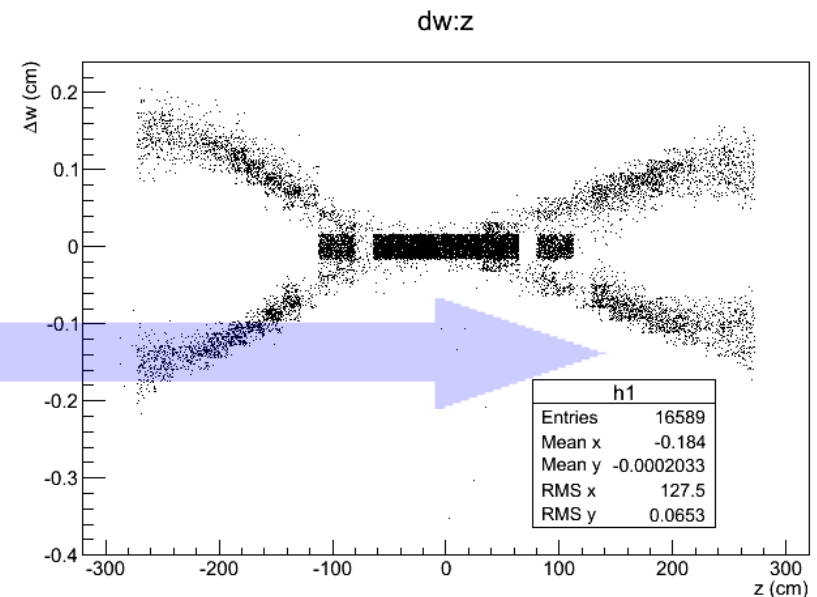
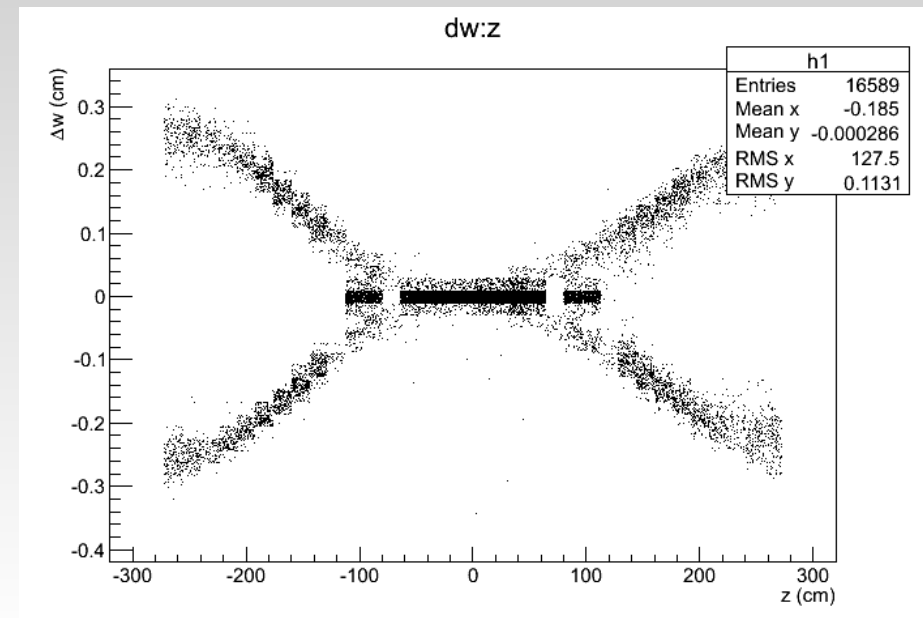
With LA/BP turned on



- Cosmics_craft12
- ▲ Cosmics_interfill_peak_runa
- ▼ Cosmics_interfill_peak_runb
- isolated_mu_prompt_runa
- isolated_mu_prompt_runb
- △ minbias_prompt_runa
- ◇ minbias_prompt_runb
- ⊕ ztomumu_runa
- ★ ztomumu_runb

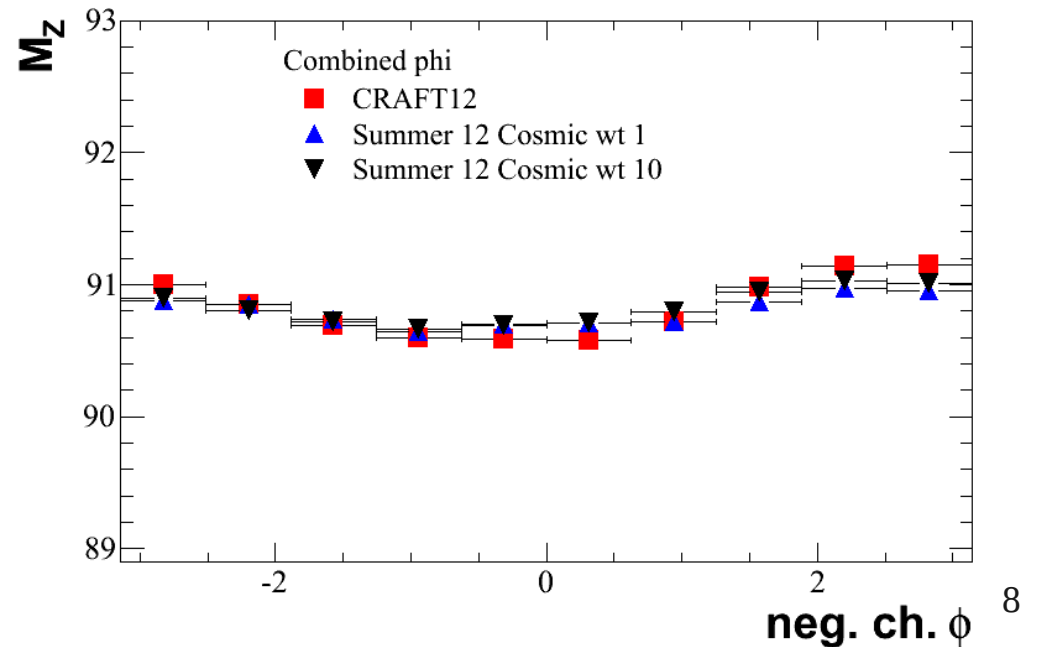
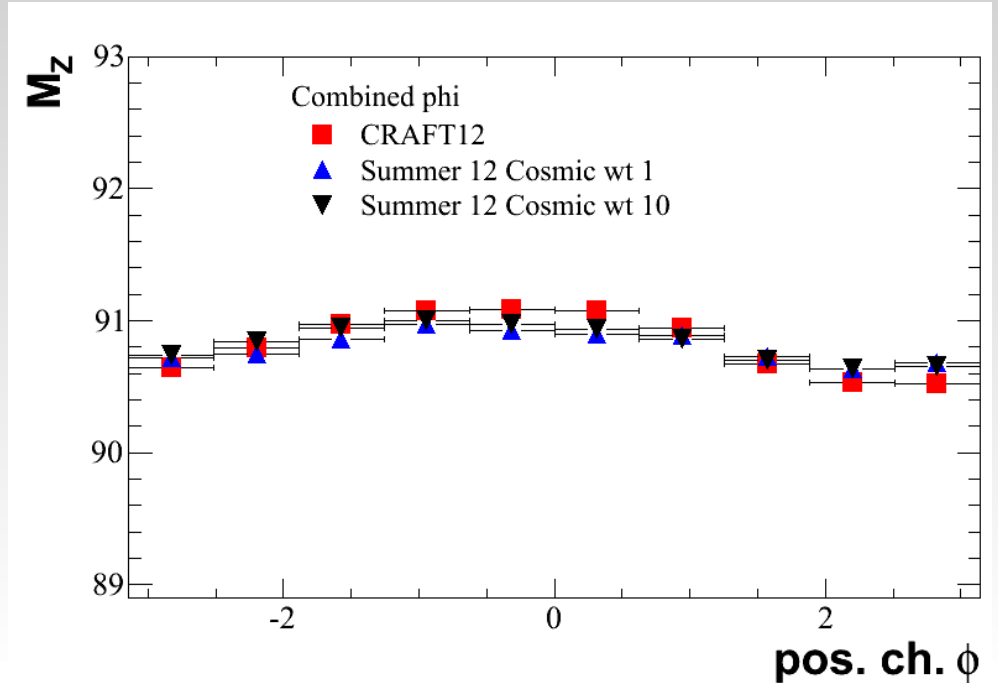
Z expansion

- Z expansion seen is almost twice as large as from Joerg's slides.
 - Different number of tracks per sample?
- Alignment with cosmic track weights of 10:
- Z expansion "cures" but still present
 - Due to the magnitude of the original expansion?
 - Asymmetric expansion between forward and backward region.



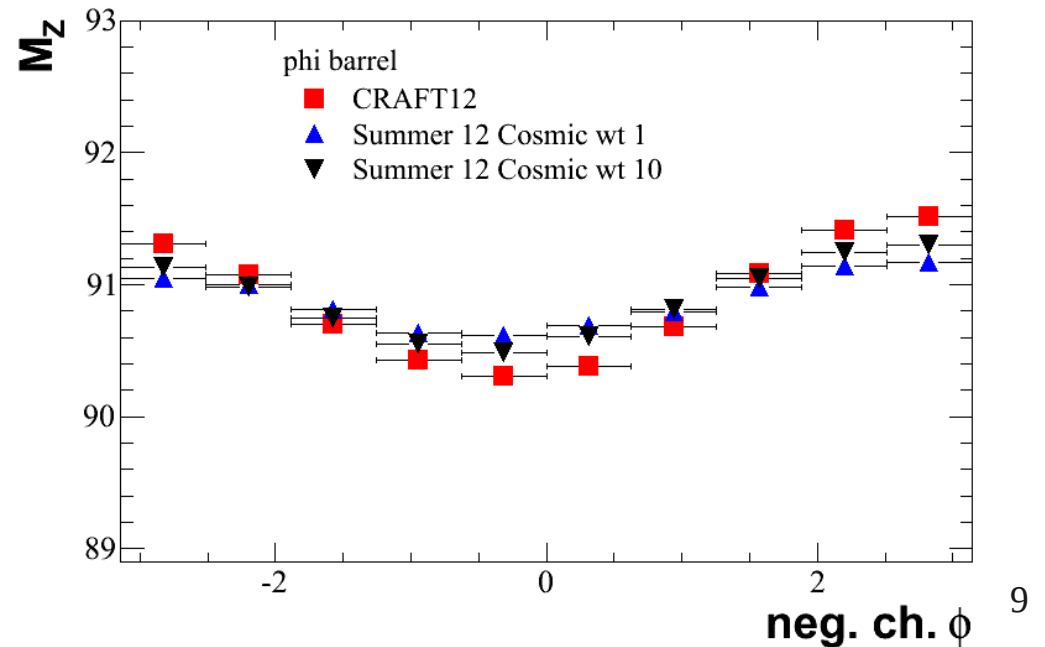
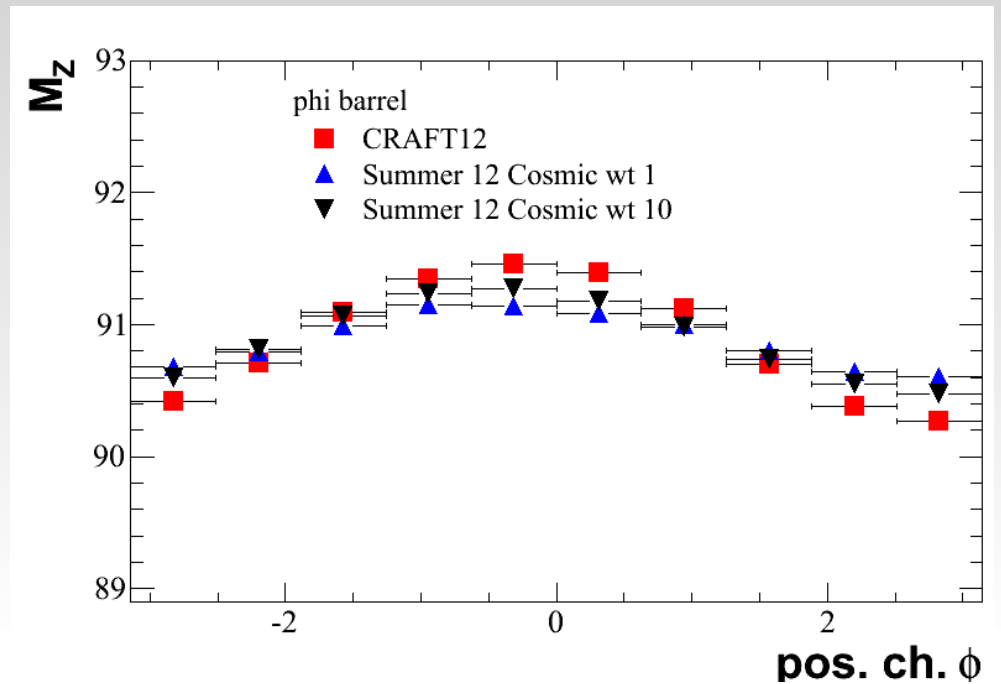
phi modulation of Z mass

- Improved phi modulation for Summer 12 alignment scenario.
- With cosmic tracks of weight 10, the phi modulation improves slightly.



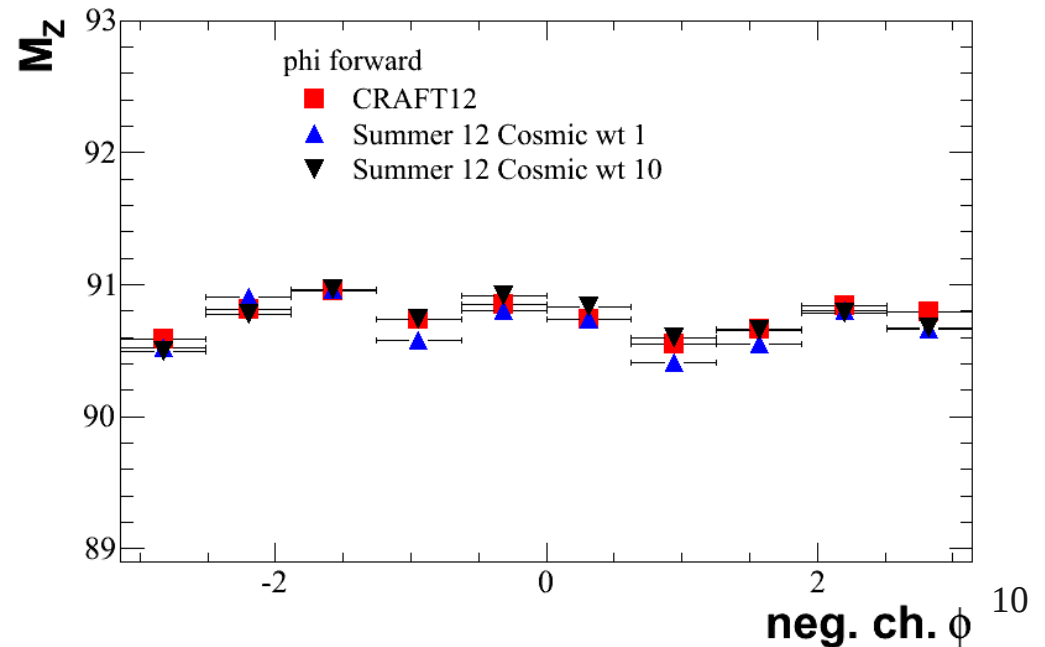
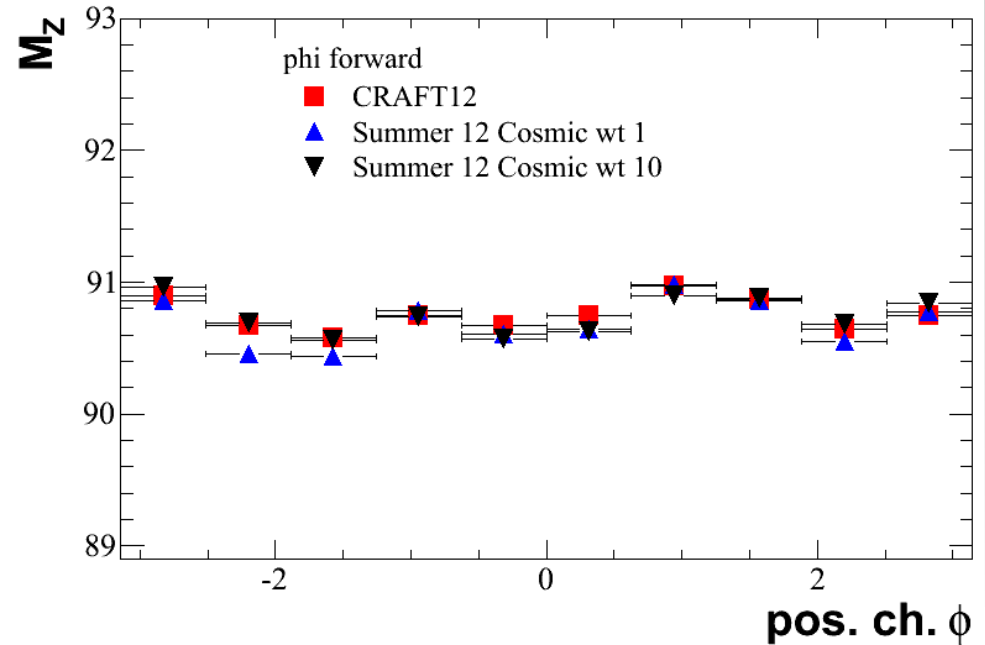
phi modulation of Z mass

- Stronger dependence on phi for the Z mass in the barrel region. (both tracks with $-0.9 < \eta < 0.9$)
- Higher improvement in Summer 12 and Summer 12 with reweighted cosmes w.r.t. The CRAFT 12 alignment.



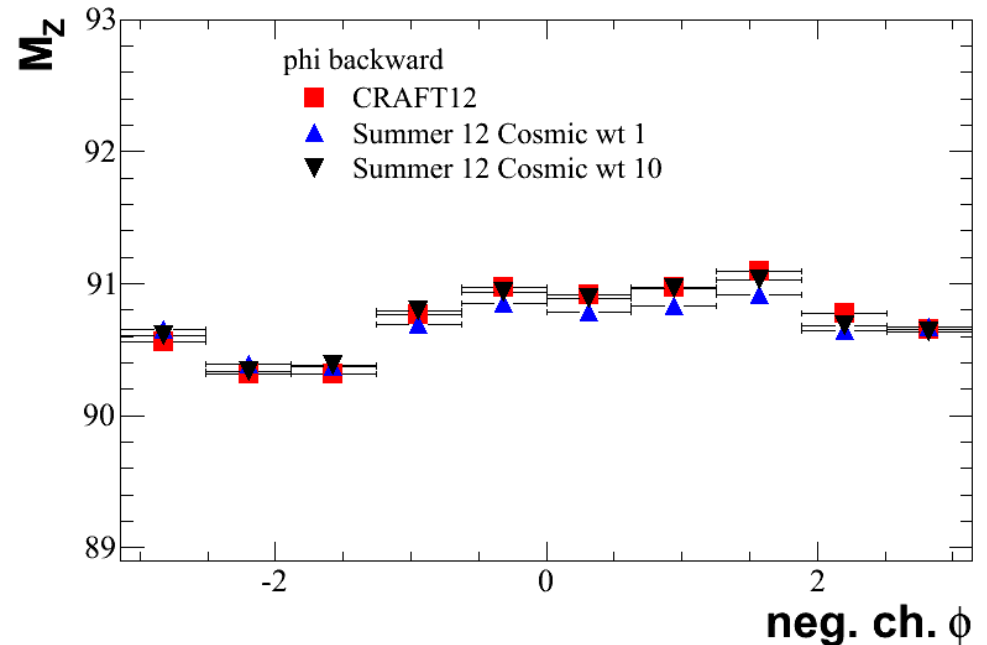
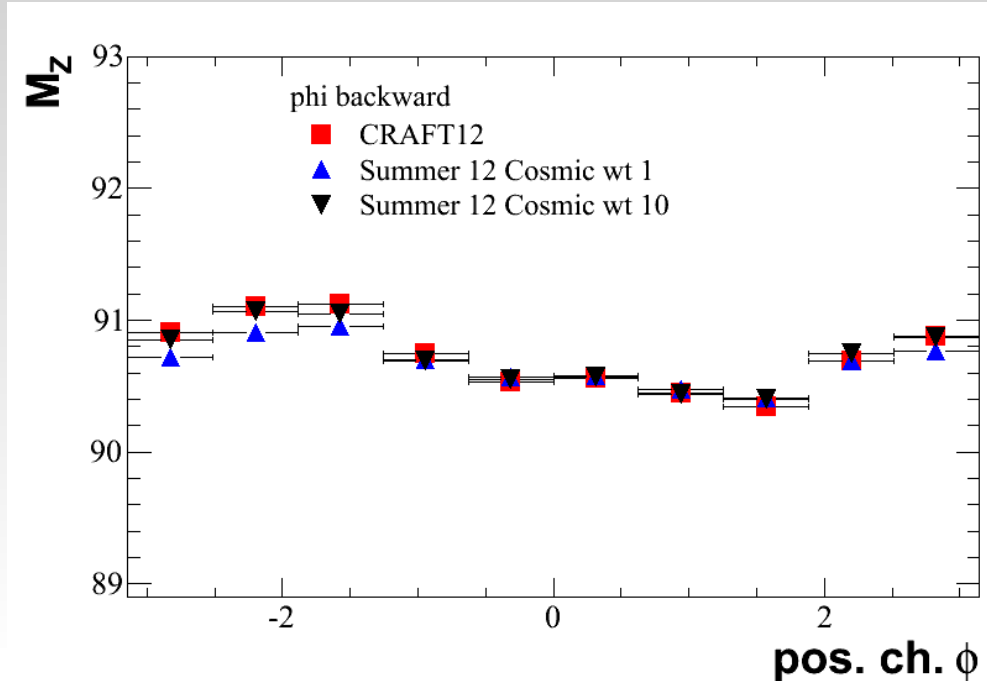
phi modulation of Z mass

- Phi modulation in the forward region
(both tracks with $\eta > 0.9$)



phi modulation of Z mass

- Phi modulation in the backward region.
(both tracks with $\eta < -0.9$)



IOVs by run numbers

- Currently work in progress....
- JSONs used:
- muon_json_july_24_2012_allruns/Cert_190456-199011_8TeV_PromptReco_Collisions12_JSON_MuonPhys_template.txt
- Number of IOVs: 246
- I have applied the fine-binned IOVs only to the TIB at present to try out the procedure. Will extend to TIB, TID and TEC once the alignment is set up.

Summary

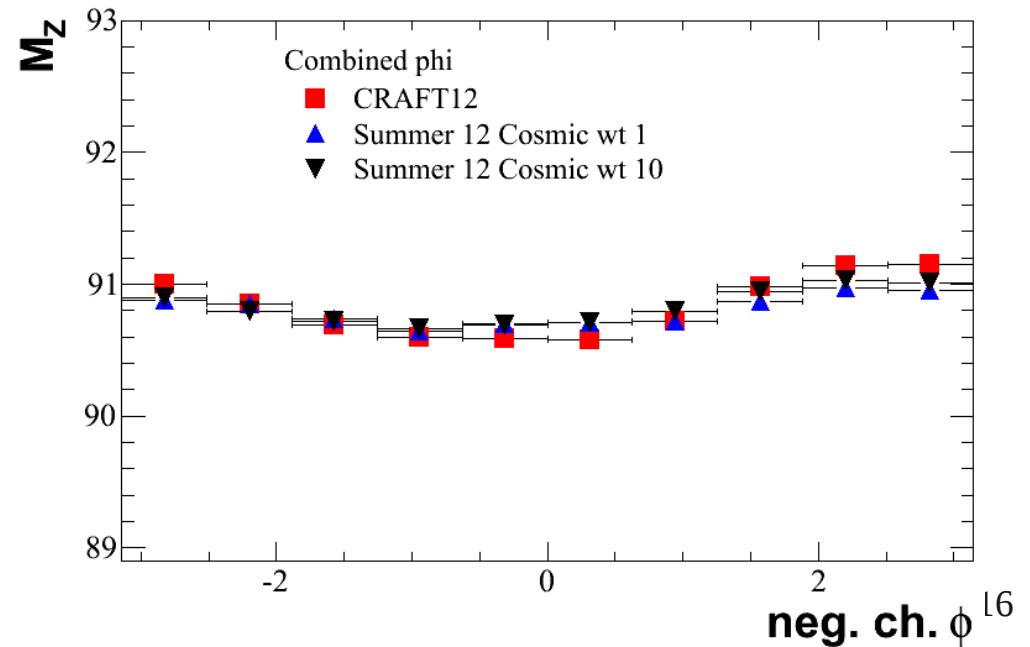
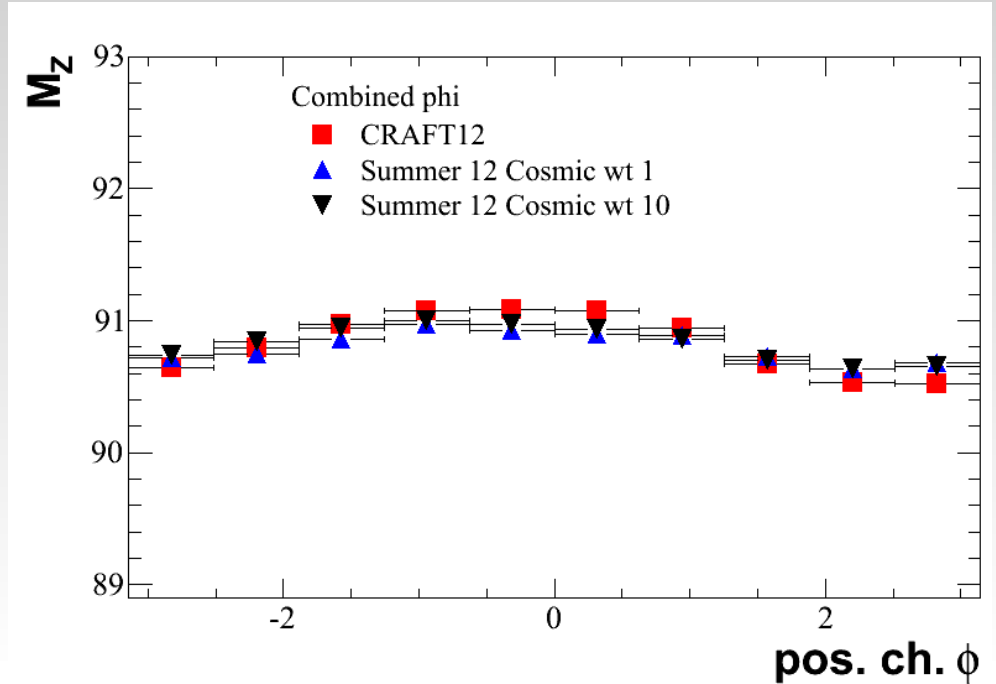
- Summer12 alignment performed with new LA/BP with CRAFT12 as staring geometry.
- Large z expansion observed, compared to Joerg's. Trying to pin down.
- phi modulation of Z mass improvement, compared to CRAFT12.
- Reweighting cosmic tracks improves both the z expansion and the phi modulation.
- Run number dependent IOVs tried for TIB. To study movement of the large structures.
- Upcoming tasks:
 - Study surface deformations (job submitted with k&bs switched on.)

Backups

Phi modulation plots
with the LA/BP turned off.....

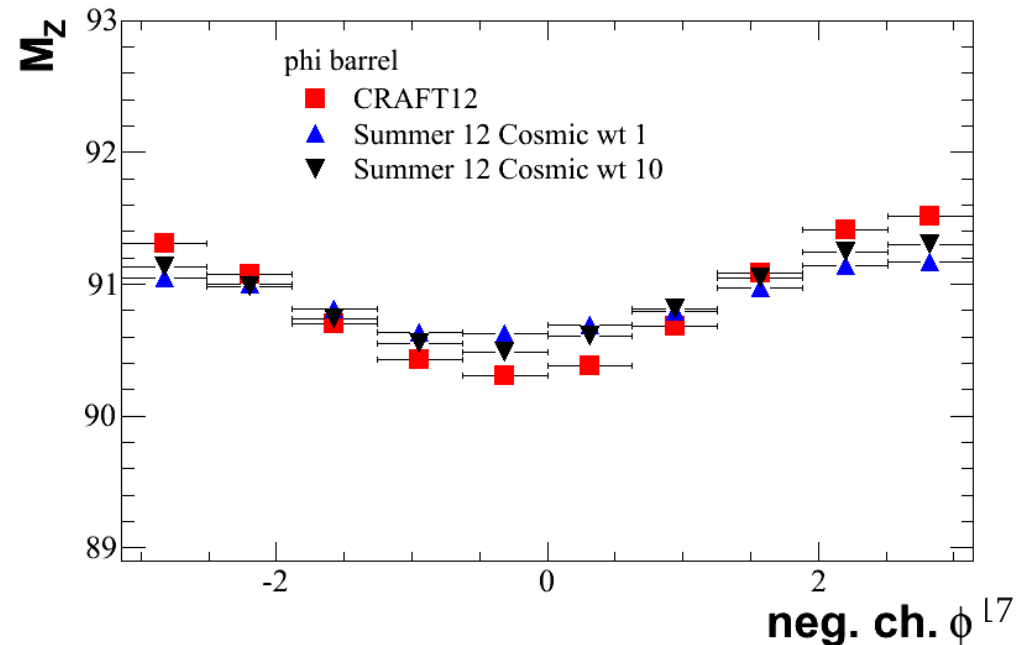
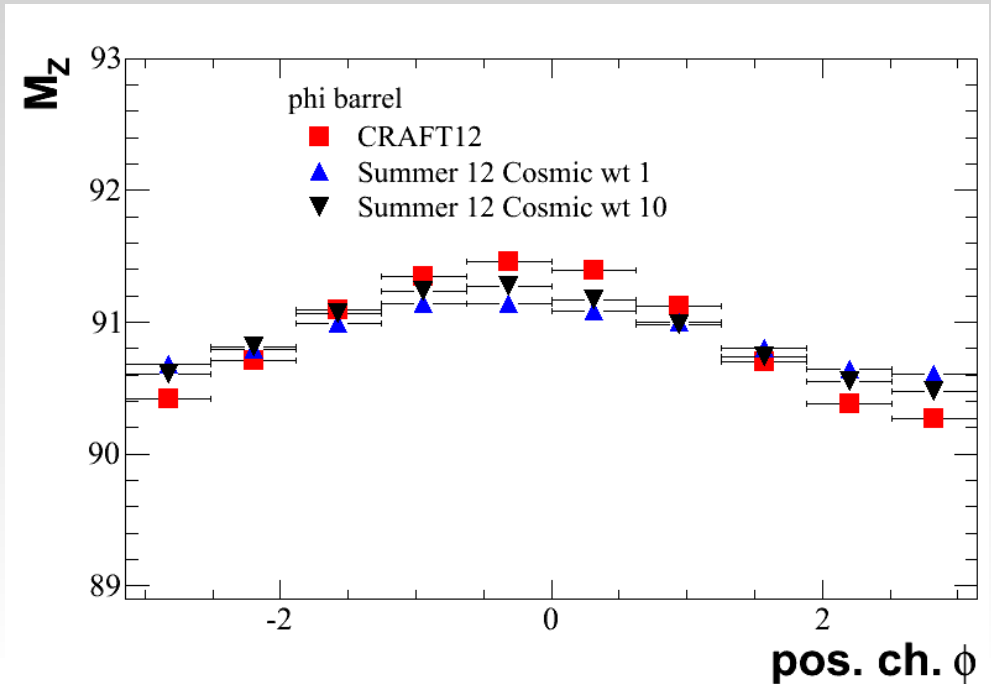
phi modulation of Z mass

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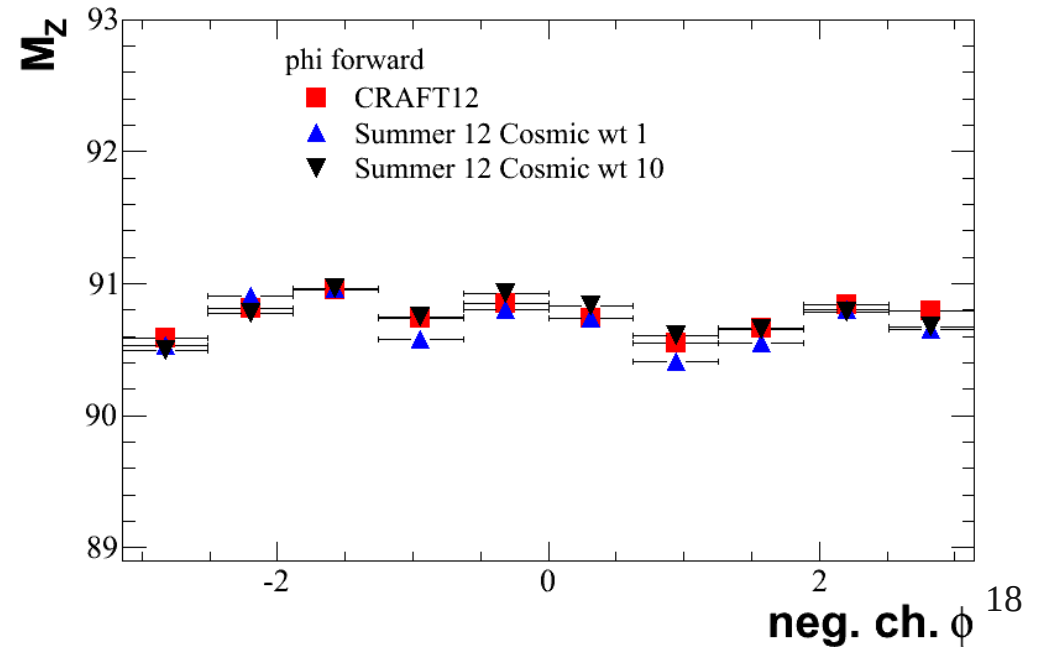
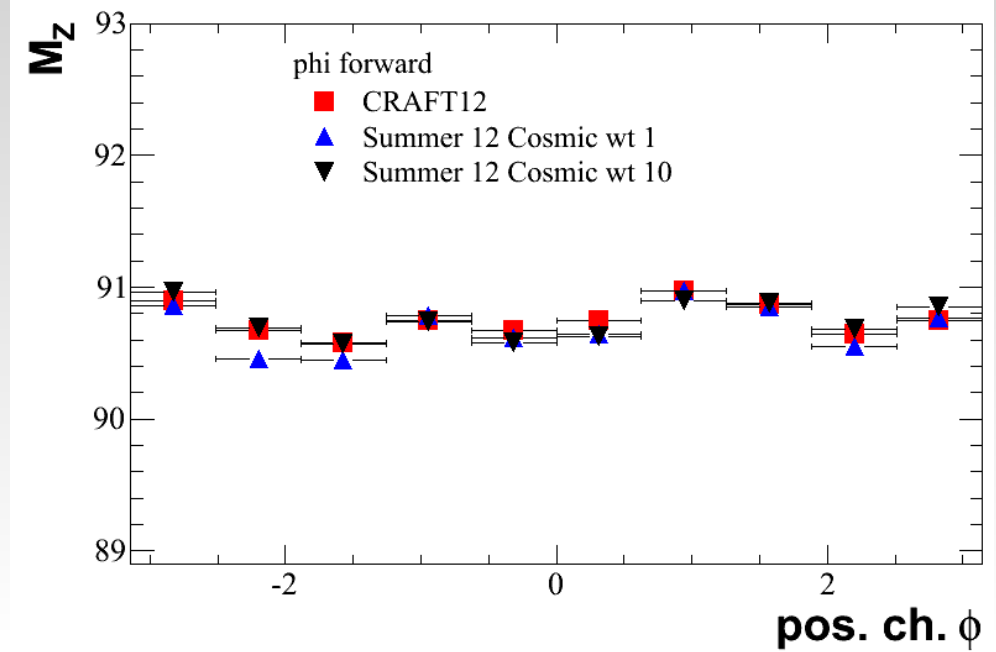
phi modulation of Z mass

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phi modulation of Z mass

- Phi modulation in the forward region.



phi modulation of Z mass

- Phi modulation in the backward region.

