

High-angle matching systematics

Prod 6 vs Prod 7

- Last estimation was made in 2021 (prod 6 T).
- In the present study we compare results of estimation high-angle matching systematics prod 6T and prod 7

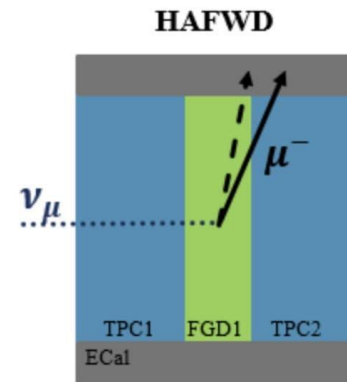
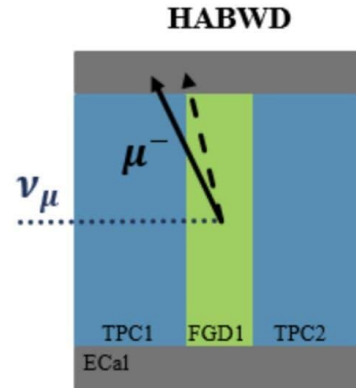
2021

- Estimation high-angle matching systematics including new data.
- Data samples: ND280 runs starting from Run~2 and up to Run~9 .

2022

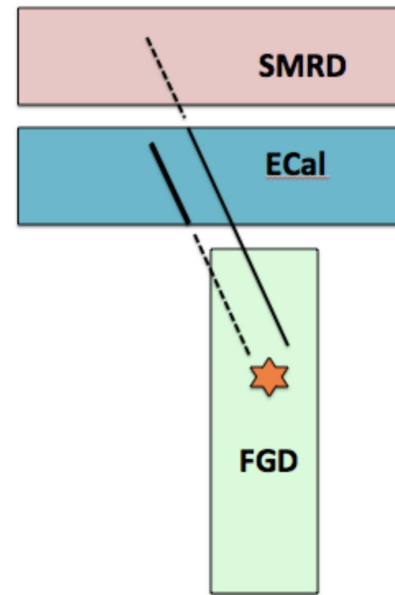
- Comparison of results prod 6T and prod 7 (Run 4)

- In order to increase tracker phase space coverage need to deal with high-angle (w.r.t. to beam axis) FGD-non-TPC tracks 4pi analyses
- These high-angle samples include FGD(1/2)-(Barrel)ECal(-SMRD) topologies → are often composite objects built out of segments from 2-3 sub-detectors
- Need to estimate the corresponding matching systematics: FGD-ECal(-SMRD)



High-angle matching efficiency check

- FGD1/FGD2: ECal (non-TPC) track that points to FGD (crosses the FV when approximated with a straight line) and “leaks” inwards
- At least two hits in the FGD of interest in time bunch
- No TPC tracks in the neighbourhood (TPC1/TPC2 or TPC2/TPC3)
- Michel electron presence in the FGD of interest
- FGD1/FGD2-ECal (non-TPC) track that points to SMRD (crosses the inner plane when approximated with a straight line) and “leaks” outwards from ECal
- Michel electron presence in the FGD of interest

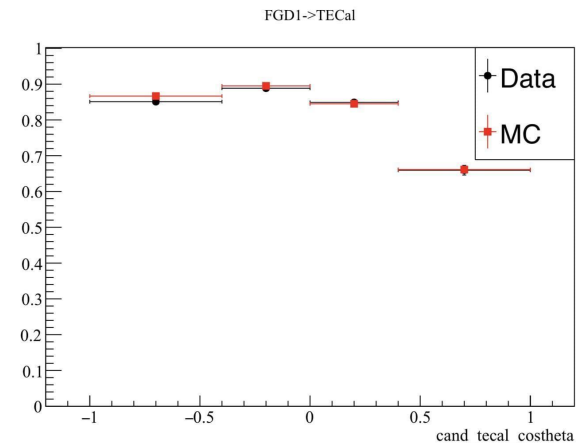


Selection topologies

FGD1→TECal matching

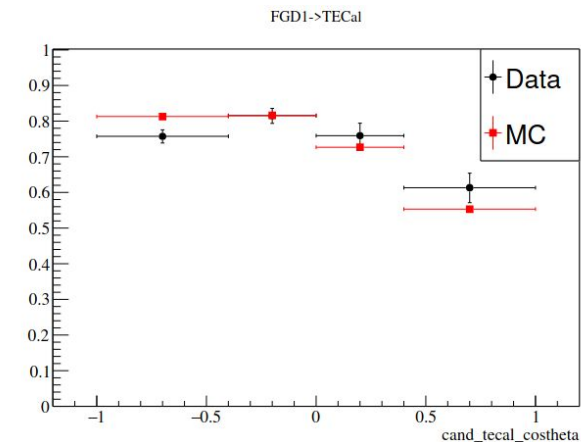
• Prod 6

costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.85099	0.00530578	0.00520386	0.866637	0.00127346	0.00126663
-0,4	0	0.888573	0.00602263	0.00583859	0.895059	0.00141993	0.00140871
0	0,4	0.849072	0.0103597	0.00998393	0.845117	0.00257413	0.00255104
0,4	1	0.659455	0.013498	0.0133277	0.661204	0.00352984	0.00351793



• Prod 7

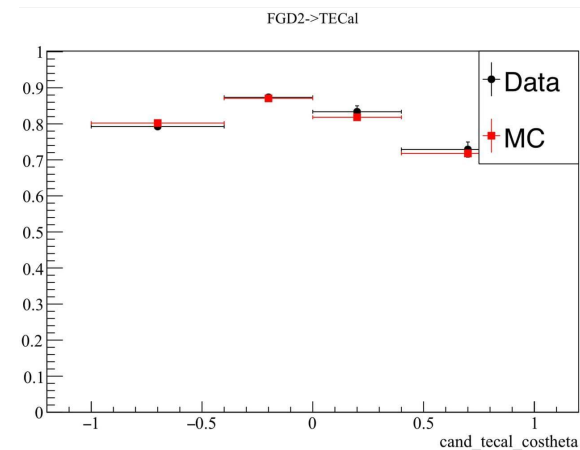
costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.757407	0.0187467	0.0181121	0.812955	0.00388874	0.00384766
-0,4	0	0.815249	0.0216012	0.020372	0.816101	0.00493743	0.0048699
0	0,4	0.759124	0.0375842	0.0350877	0.726672	0.00860041	0.00848931
0,4	1	0.613139	0.0418871	0.0407986	0.553191	0.00988498	0.00985702



FGD2→TECal matching

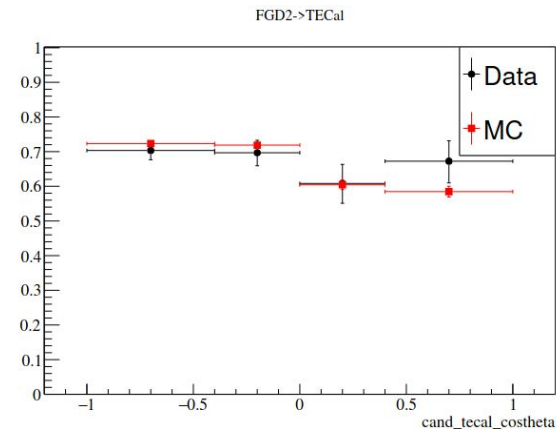
● Prod 6

costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.792619	0.00767253	0.00753529	0.802246	0.00186726	0.00185845
-0,4	0	0.873717	0.00953138	0.00913791	0.87073	0.0023095	0.00228631
0	0,4	0.833671	0.0172105	0.0163093	0.818271	0.0043074	0.00425509
0,4	1	0.728929	0.0215333	0.0208397	0.717889	0.00545784	0.00541543



● Prod 7

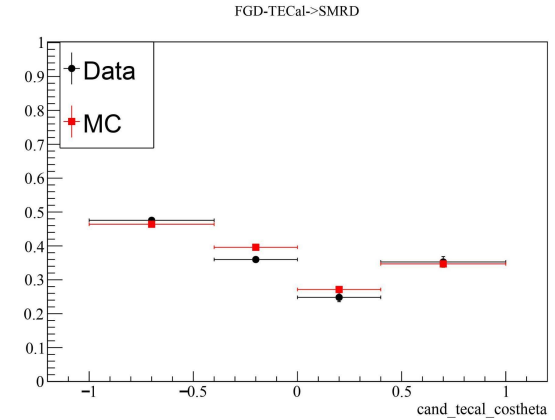
costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.703333	0.0267597	0.0258598	0.723229	0.00582412	0.00577411
-0,4	0	0.696774	0.0375651	0.0358884	0.71879	0.00807263	0.00797965
0	0,4	0.608108	0.0570006	0.0550958	0.604249	0.0137695	0.0136602
0,4	1	0.672414	0.0626167	0.0587622	0.584646	0.0155104	0.0153994



FGD→TECal→SMRD

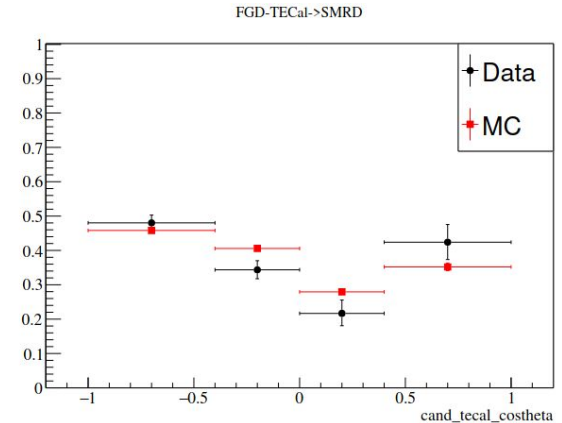
• Prod 6

costheta low	costheta up	DATA	MC	Yhigh DATA	Ylow DATA	Yhigh MC	Ylow MC
-1	-0,4	0.475601	0.464035	0.00756578	0.00755832	0.00195883	0.00195808
-0,4	0	0.359876	0.395999	0.00894615	0.00888171	0.00225073	0.0022478
0	0,4	0.248182	0.271378	0.0131749	0.0128697	0.00344377	0.00342558
0,4	1	0.35262	0.346991	0.0158873	0.0156729	0.00421562	0.00419968



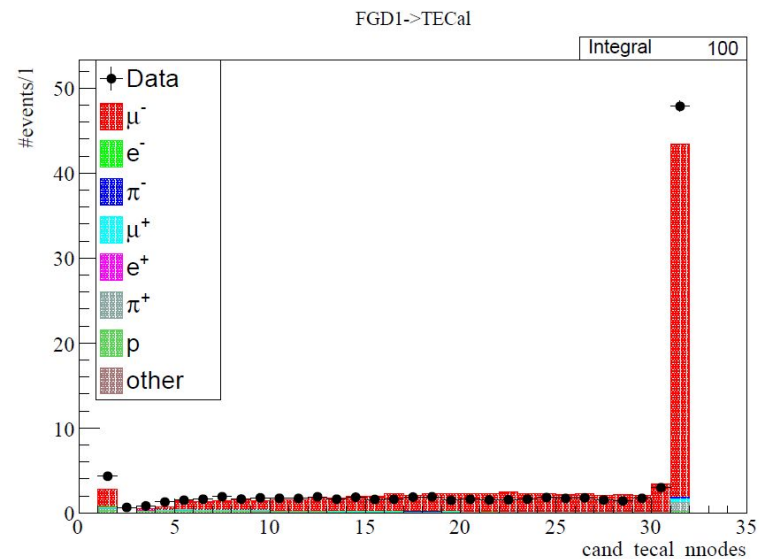
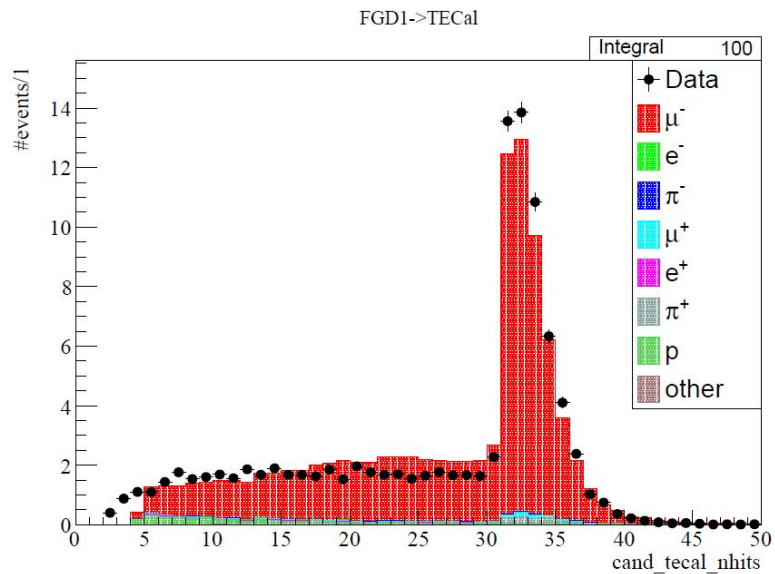
• Prod 7

costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.480167	0.0227672	0.0228223	0.458154	0.00523166	0.00523782
-0,4	0	0.343558	0.0259237	0.026561	0.405672	0.00599236	0.00601115
0	0,4	0.216667	0.0358305	0.0389437	0.279294	0.00913516	0.00925884
0,4	1	0.423913	0.0504665	0.0515496	0.351996	0.011191	0.0113004



Number of hits and nodes

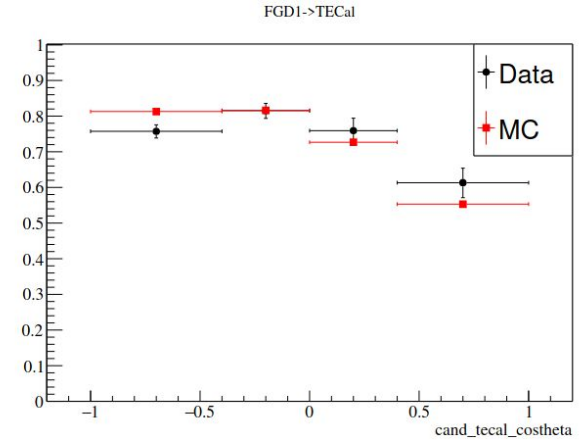
Data - Prod 7



FGD1->TECaI

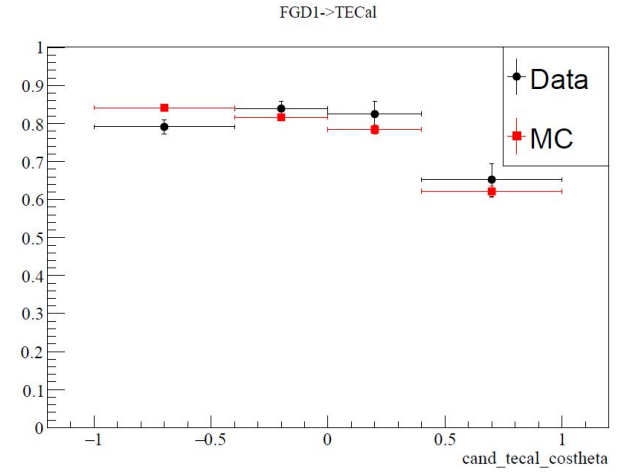
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.757407	0.812955	0.0187467	0.0181121	0.00388874	0.00384766
-0,4	0	0.815249	0.816101	0.0216012	0.020372	0.00493743	0.0048699
0	0,4	0.759124	0.726672	0.0375842	0.0350877	0.00860041	0.00848931
0,4	1	0.613139	0.553191	0.0418871	0.0407986	0.00988498	0.00985702



Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.791339	0.841477	0.0183949	0.0176315	0.00503287	0.00494787
-0,4	0	0.839394	0.816525	0.0208709	0.0195031	0.00681299	0.00668469
0	0,4	0.825	0.784344	0.0363034	0.0327276	0.0115396	0.0112486
0,4	1	0.652542	0.621459	0.0443621	0.0426613	0.0142769	0.014138



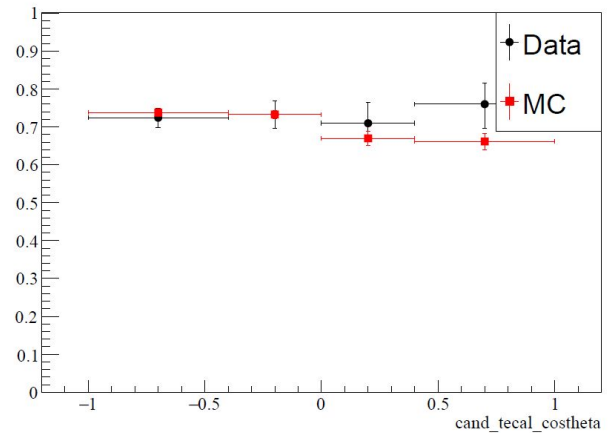
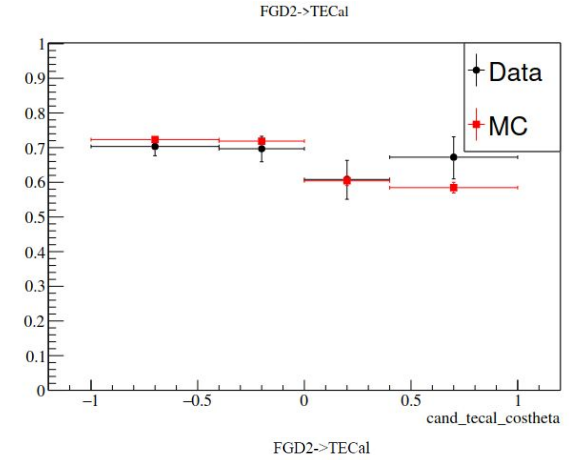
FGD2->TECaI

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.703333	0.723229	0.0267597	0.0258598	0.00582412	0.00577411
-0,4	0	0.696774	0.71879	0.0375651	0.0358884	0.00807263	0.00797965
0	0,4	0.608108	0.604249	0.0570006	0.0550958	0.0137695	0.0136602
0,4	1	0.672414	0.584646	0.0626167	0.0587622	0.0155104	0.0153994

Prod 7 (cut number of hits > 5)

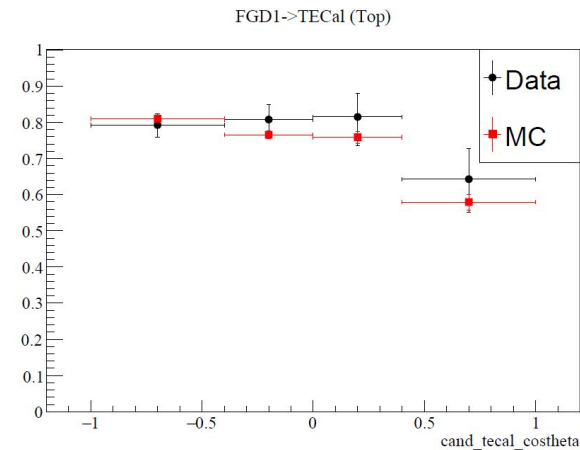
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.724138	0.737922	0.0266954	0.0256694	0.0078674	0.00776716
-0,4	0	0.732877	0.732938	0.0374765	0.0353705	0.0108715	0.0106872
0	0,4	0.709677	0.669725	0.0590581	0.0546613	0.0185488	0.0182032
0,4	1	0.76	0.661605	0.0628207	0.0560892	0.0222395	0.0217732



FGD1->TECal (Top)

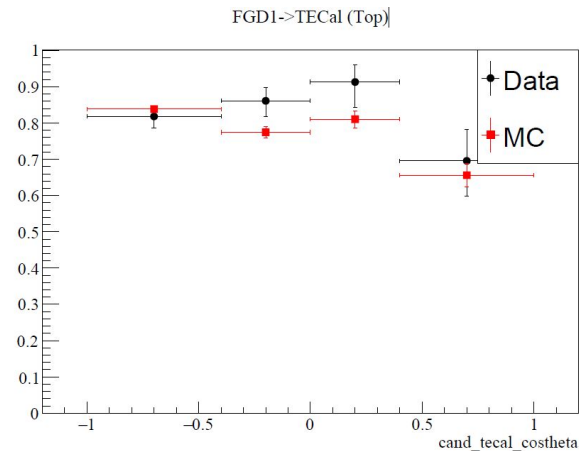
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.792453	0.810565	0.0332451	0.0308121	0.0097833	0.00953177
-0,4	0	0.807692	0.735476	0.0468296	0.041657	0.0156947	0.0153068
0	0,4	0.814815	0.764706	0.0803484	0.0655354	0.0241015	0.0230126
0,4	1	0.642857	0.583333	0.0908522	0.084441	0.0291621	0.0287782



Prod 7 (cut number of hits > 5)

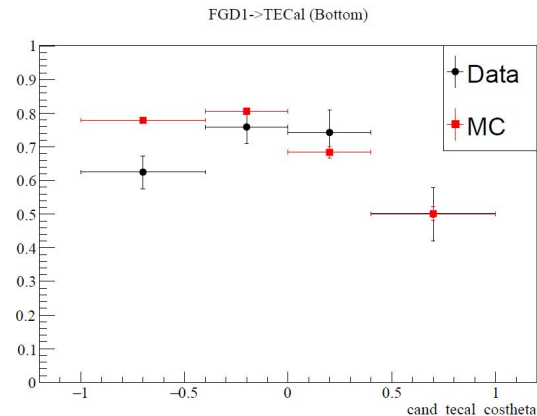
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.818182	0.838462	0.0323275	0.0295935	0.00946485	0.00917542
-0,4	0	0.861111	0.774629	0.0437944	0.0372002	0.0155893	0.0150955
0	0,4	0.913043	0.810526	0.0704919	0.0469576	0.0238934	0.0224459
0,4	1	0.695652	0.656109	0.0976728	0.087092	0.0323038	0.0313681



FGD1->TECal (Bottom)

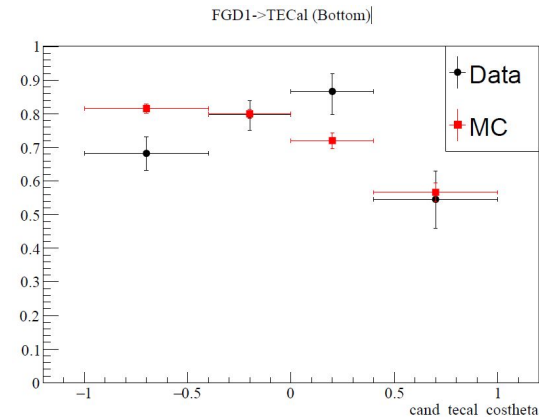
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.625	0.783158	0.049803	0.0480959	0.0135662	0.0131689
-0,4	0	0.759036	0.781038	0.0485515	0.0444623	0.0141011	0.0136783
0	0,4	0.742857	0.661538	0.0765994	0.0677416	0.0241933	0.0236427
0,4	1	0.5	0.508876	0.0791008	0.0791008	0.0271468	0.027112



Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.682353	0.815909	0.0513883	0.0485805	0.0133018	0.0128233
-0,4	0	0.797468	0.8	0.0472871	0.042351	0.0139103	0.0134427
0	0,4	0.866667	0.720117	0.0690394	0.0532735	0.0246195	0.0237669
0,4	1	0.545455	0.566553	0.0850912	0.0833475	0.029022	0.0287206



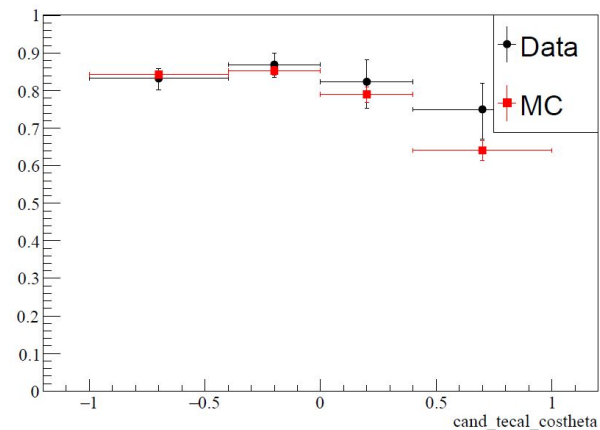
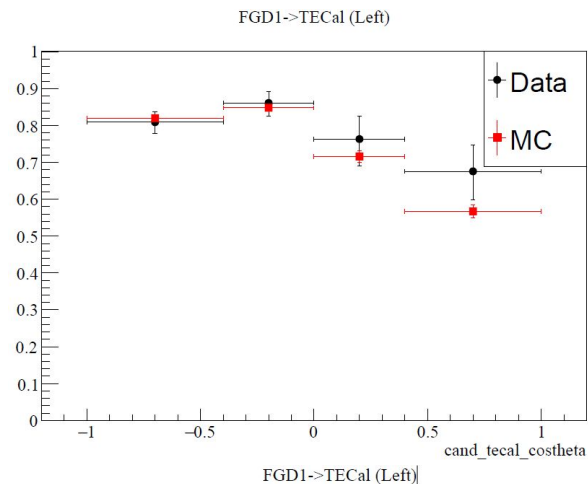
FGD1->TECal (Left)

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.808989	0.812778	0.0305132	0.028214	0.00931266	0.00908085
-0,4	0	0.861111	0.841285	0.0353516	0.0309332	0.0116244	0.0111813
0	0,4	0.763158	0.723653	0.0719989	0.063117	0.0219583	0.0212617
0,4	1	0.675676	0.583535	0.0781557	0.0720974	0.0243497	0.0240809

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.83237	0.842782	0.029585	0.0270393	0.00893619	0.00866892
-0,4	0	0.869159	0.852642	0.0347623	0.0302009	0.0115396	0.0110617
0	0,4	0.823529	0.789894	0.0702779	0.0580544	0.0214922	0.0204669
0,4	1	0.75	0.640805	0.0796096	0.0696723	0.0259325	0.025395



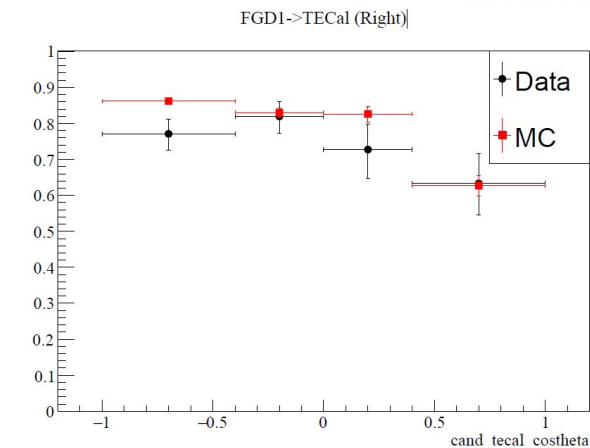
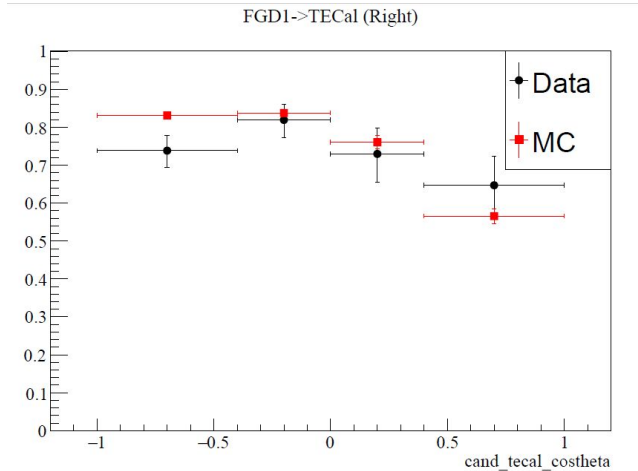
FGD1->TECal (Right)

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.738318	0.834898	0.0436437	0.0407144	0.0105617	0.0102122
-0,4	0	0.819444	0.819783	0.0478387	0.0420256	0.0144333	0.0138559
0	0,4	0.72973	0.780488	0.0753486	0.0674093	0.0233823	0.0222459
0,4	1	0.647059	0.572222	0.0825341	0.0770414	0.0261544	0.0258879

Prod 7 (cut number of hits > 5)

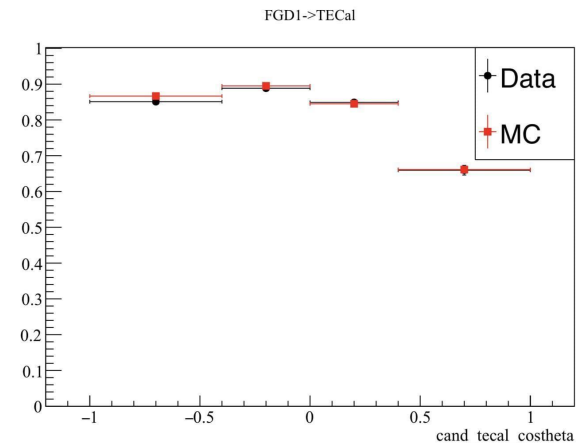
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.770833	0.862097	0.0444179	0.0407109	0.0101097	0.00971092
-0,4	0	0.819444	0.830056	0.0478387	0.0420256	0.0143805	0.0137628
0	0,4	0.727273	0.826087	0.0799619	0.0712013	0.02261	0.0211605
0,4	1	0.633333	0.627063	0.0881292	0.0825238	0.0279889	0.0274322



FGD1→TECal matching

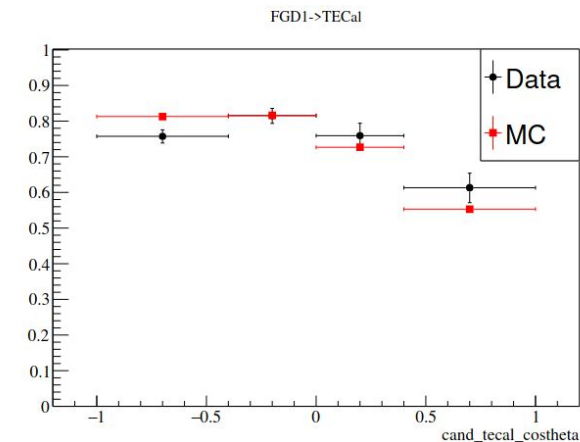
● Prod 6

costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.85099	0.00530578	0.00520386	0.866637	0.00127346	0.00126663
-0,4	0	0.888573	0.00602263	0.00583859	0.895059	0.00141993	0.00140871
0	0,4	0.849072	0.0103597	0.00998393	0.845117	0.00257413	0.00255104
0,4	1	0.659455	0.013498	0.0133277	0.661204	0.00352984	0.00351793



● Prod 7

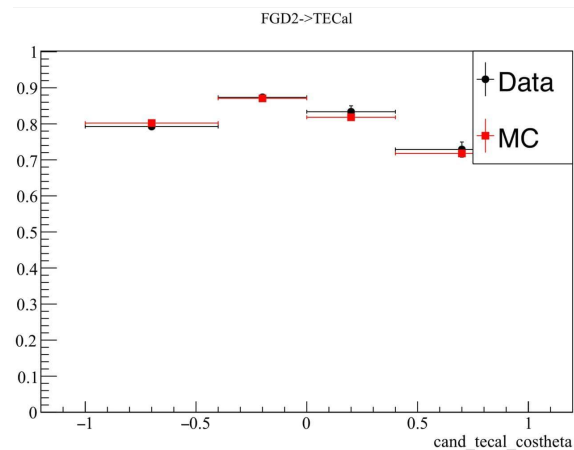
costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.757407	0.0187467	0.0181121	0.812955	0.00388874	0.00384766
-0,4	0	0.815249	0.0216012	0.020372	0.816101	0.00493743	0.0048699
0	0,4	0.759124	0.0375842	0.0350877	0.726672	0.00860041	0.00848931
0,4	1	0.613139	0.0418871	0.0407986	0.553191	0.00988498	0.00985702



FGD2→TECal matching

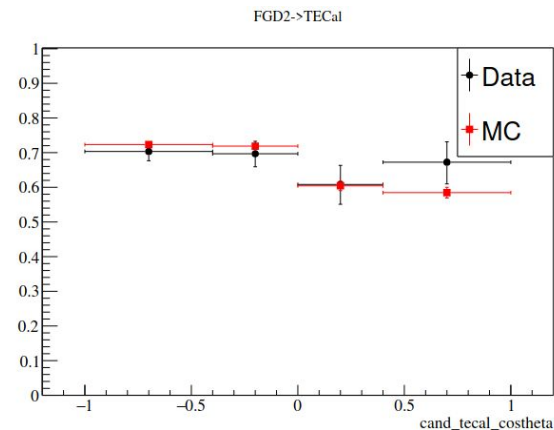
● Prod 6

costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.792619	0.00767253	0.00753529	0.802246	0.00186726	0.00185845
-0,4	0	0.873717	0.00953138	0.00913791	0.87073	0.0023095	0.00228631
0	0,4	0.833671	0.0172105	0.0163093	0.818271	0.0043074	0.00425509
0,4	1	0.728929	0.0215333	0.0208397	0.717889	0.00545784	0.00541543



● Prod 7

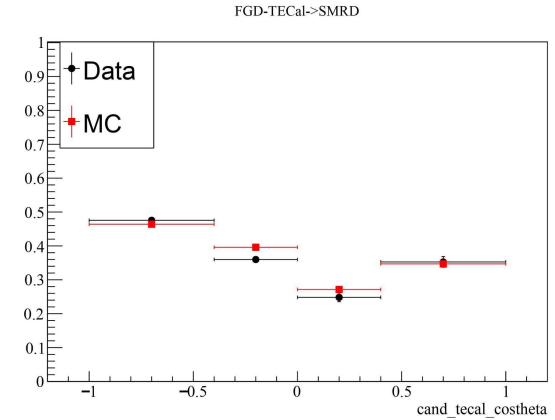
costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.703333	0.0267597	0.0258598	0.723229	0.00582412	0.00577411
-0,4	0	0.696774	0.0375651	0.0358884	0.71879	0.00807263	0.00797965
0	0,4	0.608108	0.0570006	0.0550958	0.604249	0.0137695	0.0136602
0,4	1	0.672414	0.0626167	0.0587622	0.584646	0.0155104	0.0153994



FGD→TECal→SMRD

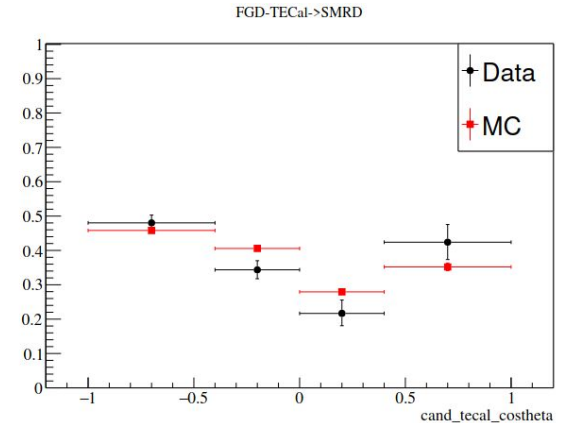
• Prod 6

costheta low	costheta up	DATA	MC	Yhigh DATA	Ylow DATA	Yhigh MC	Ylow MC
-1	-0,4	0.475601	0.464035	0.00756578	0.00755832	0.00195883	0.00195808
-0,4	0	0.359876	0.395999	0.00894615	0.00888171	0.00225073	0.0022478
0	0,4	0.248182	0.271378	0.0131749	0.0128697	0.00344377	0.00342558
0,4	1	0.35262	0.346991	0.0158873	0.0156729	0.00421562	0.00419968



• Prod 7

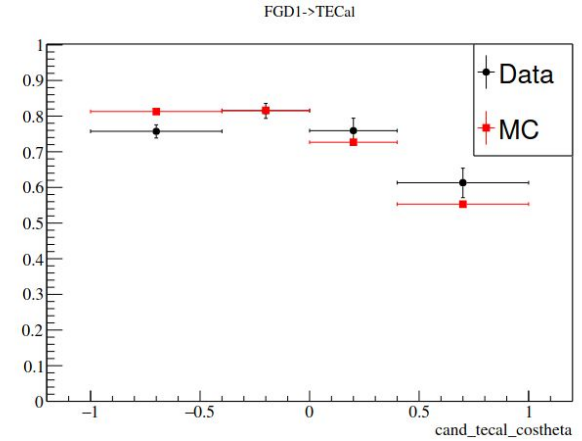
costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.480167	0.0227672	0.0228223	0.458154	0.00523166	0.00523782
-0,4	0	0.343558	0.0259237	0.026561	0.405672	0.00599236	0.00601115
0	0,4	0.216667	0.0358305	0.0389437	0.279294	0.00913516	0.00925884
0,4	1	0.423913	0.0504665	0.0515496	0.351996	0.011191	0.0113004



FGD1->TECaI

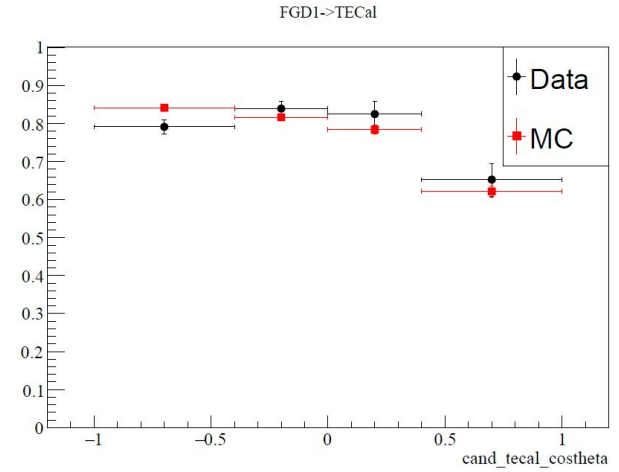
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.757407	0.812955	0.0187467	0.0181121	0.00388874	0.00384766
-0,4	0	0.815249	0.816101	0.0216012	0.020372	0.00493743	0.0048699
0	0,4	0.759124	0.726672	0.0375842	0.0350877	0.00860041	0.00848931
0,4	1	0.613139	0.553191	0.0418871	0.0407986	0.00988498	0.00985702



Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.791339	0.841477	0.0183949	0.0176315	0.00503287	0.00494787
-0,4	0	0.839394	0.816525	0.0208709	0.0195031	0.00681299	0.00668469
0	0,4	0.825	0.784344	0.0363034	0.0327276	0.0115396	0.0112486
0,4	1	0.652542	0.621459	0.0443621	0.0426613	0.0142769	0.014138



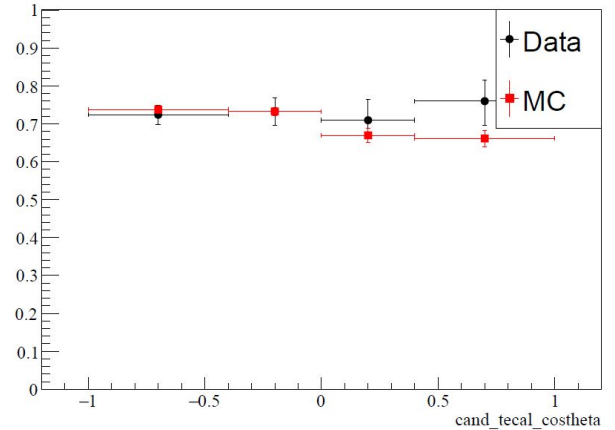
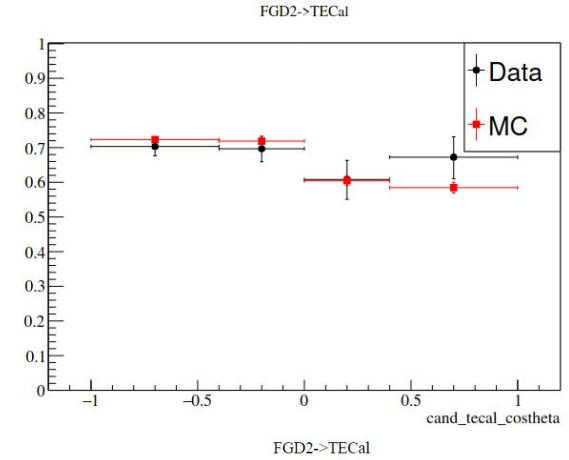
FGD2->TECaI

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.703333	0.723229	0.0267597	0.0258598	0.00582412	0.00577411
-0,4	0	0.696774	0.71879	0.0375651	0.0358884	0.00807263	0.00797965
0	0,4	0.608108	0.604249	0.0570006	0.0550958	0.0137695	0.0136602
0,4	1	0.672414	0.584646	0.0626167	0.0587622	0.0155104	0.0153994

Prod 7 (cut number of hits > 5)

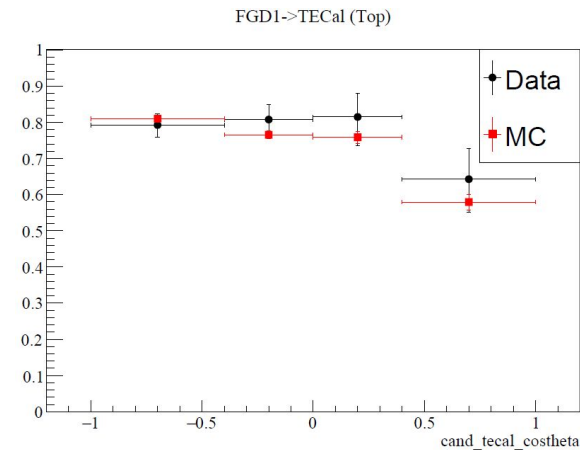
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.724138	0.737922	0.0266954	0.0256694	0.0078674	0.00776716
-0,4	0	0.732877	0.732938	0.0374765	0.0353705	0.0108715	0.0106872
0	0,4	0.709677	0.669725	0.0590581	0.0546613	0.0185488	0.0182032
0,4	1	0.76	0.661605	0.0628207	0.0560892	0.0222395	0.0217732



FGD1->TECal (Top)

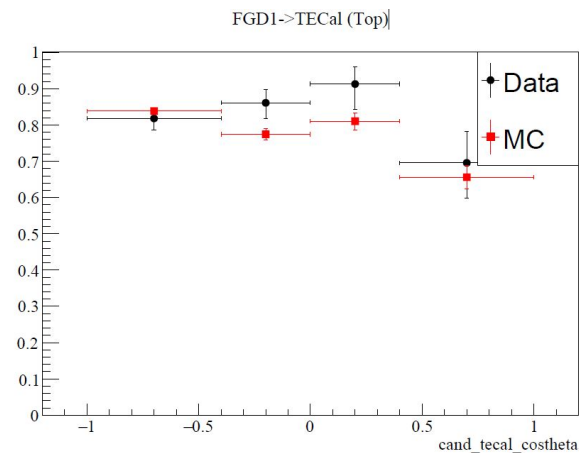
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.792453	0.810565	0.0332451	0.0308121	0.0097833	0.00953177
-0,4	0	0.807692	0.735476	0.0468296	0.041657	0.0156947	0.0153068
0	0,4	0.814815	0.764706	0.0803484	0.0655354	0.0241015	0.0230126
0,4	1	0.642857	0.583333	0.0908522	0.084441	0.0291621	0.0287782



Prod 7 (cut number of hits > 5)

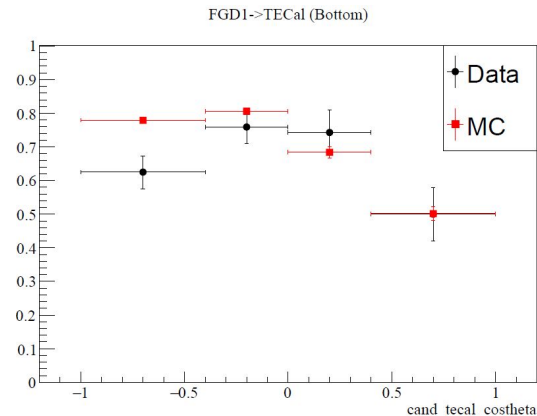
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.818182	0.838462	0.0323275	0.0295935	0.00946485	0.00917542
-0,4	0	0.861111	0.774629	0.0437944	0.0372002	0.0155893	0.0150955
0	0,4	0.913043	0.810526	0.0704919	0.0469576	0.0238934	0.0224459
0,4	1	0.695652	0.656109	0.0976728	0.087092	0.0323038	0.0313681



FGD1->TECal (Bottom)

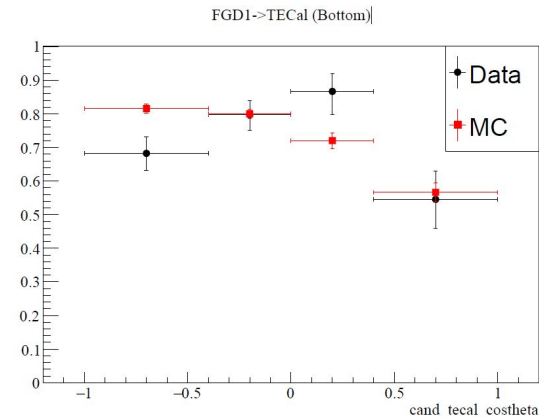
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.625	0.783158	0.049803	0.0480959	0.0135662	0.0131689
-0,4	0	0.759036	0.781038	0.0485515	0.0444623	0.0141011	0.0136783
0	0,4	0.742857	0.661538	0.0765994	0.0677416	0.0241933	0.0236427
0,4	1	0.5	0.508876	0.0791008	0.0791008	0.0271468	0.027112



Prod 7 (cut number of hits > 5)

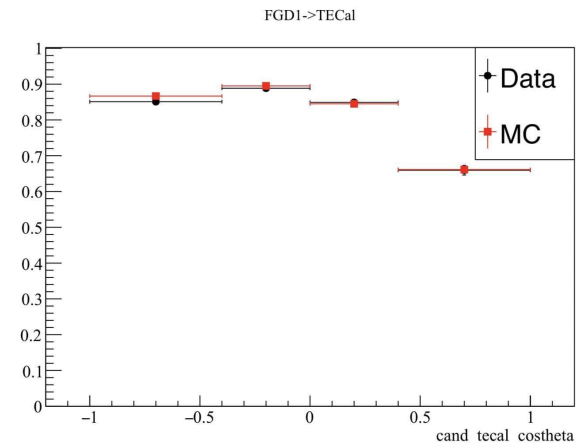
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.682353	0.815909	0.0513883	0.0485805	0.0133018	0.0128233
-0,4	0	0.797468	0.8	0.0472871	0.042351	0.0139103	0.0134427
0	0,4	0.866667	0.720117	0.0690394	0.0532735	0.0246195	0.0237669
0,4	1	0.545455	0.566553	0.0850912	0.0833475	0.029022	0.0287206



FGD1→TECal matching

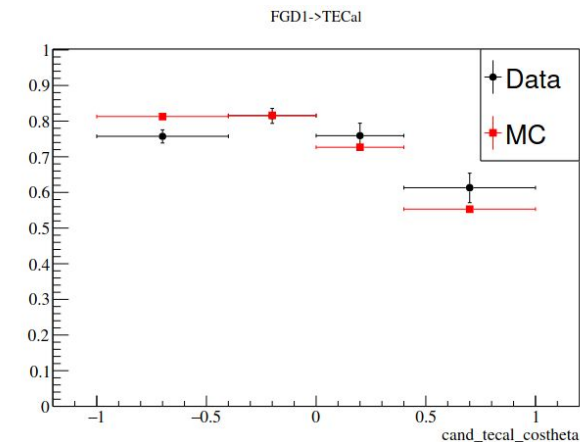
● Prod 6

costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.85099	0.00530578	0.00520386	0.866637	0.00127346	0.00126663
-0,4	0	0.888573	0.00602263	0.00583859	0.895059	0.00141993	0.00140871
0	0,4	0.849072	0.0103597	0.00998393	0.845117	0.00257413	0.00255104
0,4	1	0.659455	0.013498	0.0133277	0.661204	0.00352984	0.00351793



● Prod 7

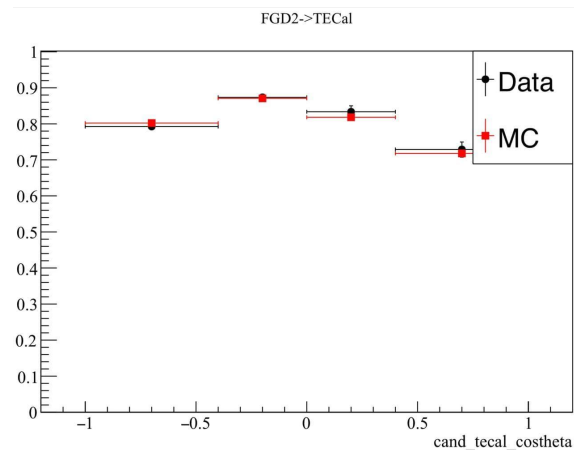
costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.757407	0.0187467	0.0181121	0.812955	0.00388874	0.00384766
-0,4	0	0.815249	0.0216012	0.020372	0.816101	0.00493743	0.0048699
0	0,4	0.759124	0.0375842	0.0350877	0.726672	0.00860041	0.00848931
0,4	1	0.613139	0.0418871	0.0407986	0.553191	0.00988498	0.00985702



FGD2→TECal matching

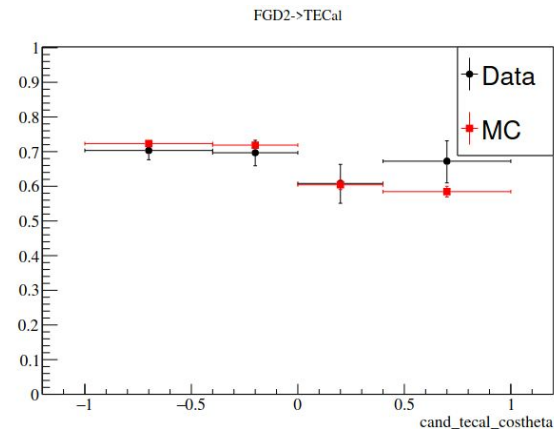
● Prod 6

costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.792619	0.00767253	0.00753529	0.802246	0.00186726	0.00185845
-0,4	0	0.873717	0.00953138	0.00913791	0.87073	0.0023095	0.00228631
0	0,4	0.833671	0.0172105	0.0163093	0.818271	0.0043074	0.00425509
0,4	1	0.728929	0.0215333	0.0208397	0.717889	0.00545784	0.00541543



● Prod 7

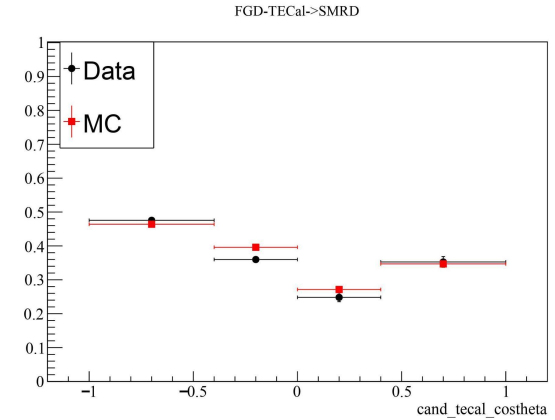
costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.703333	0.0267597	0.0258598	0.723229	0.00582412	0.00577411
-0,4	0	0.696774	0.0375651	0.0358884	0.71879	0.00807263	0.00797965
0	0,4	0.608108	0.0570006	0.0550958	0.604249	0.0137695	0.0136602
0,4	1	0.672414	0.0626167	0.0587622	0.584646	0.0155104	0.0153994



FGD→TECal→SMRD

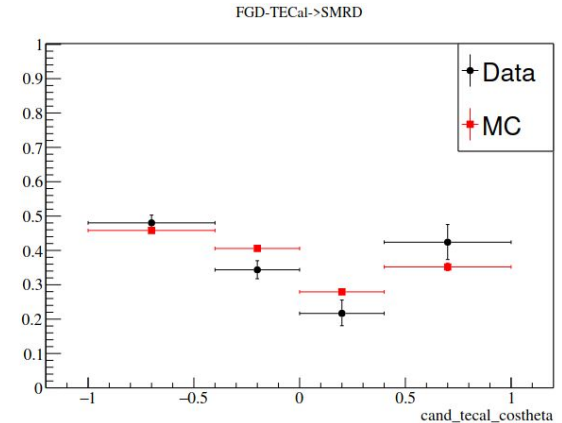
• Prod 6

costheta low	costheta up	DATA	MC	Yhigh DATA	Ylow DATA	Yhigh MC	Ylow MC
-1	-0,4	0.475601	0.464035	0.00756578	0.00755832	0.00195883	0.00195808
-0,4	0	0.359876	0.395999	0.00894615	0.00888171	0.00225073	0.0022478
0	0,4	0.248182	0.271378	0.0131749	0.0128697	0.00344377	0.00342558
0,4	1	0.35262	0.346991	0.0158873	0.0156729	0.00421562	0.00419968



• Prod 7

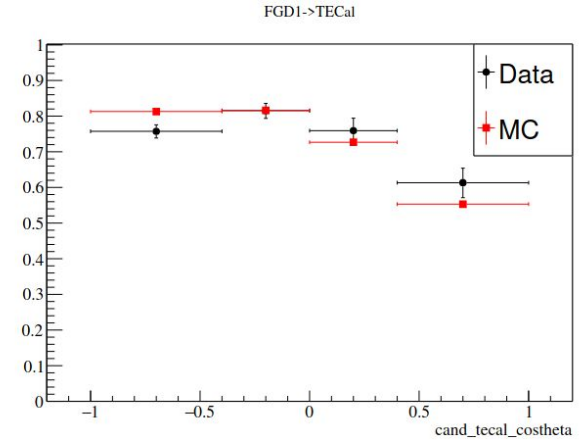
costheta low	costheta up	DATA	Ylow DATA	Yhigh DATA	MC	Ylow MC	Yhigh MC
-1	-0,4	0.480167	0.0227672	0.0228223	0.458154	0.00523166	0.00523782
-0,4	0	0.343558	0.0259237	0.026561	0.405672	0.00599236	0.00601115
0	0,4	0.216667	0.0358305	0.0389437	0.279294	0.00913516	0.00925884
0,4	1	0.423913	0.0504665	0.0515496	0.351996	0.011191	0.0113004



FGD1->TECaI

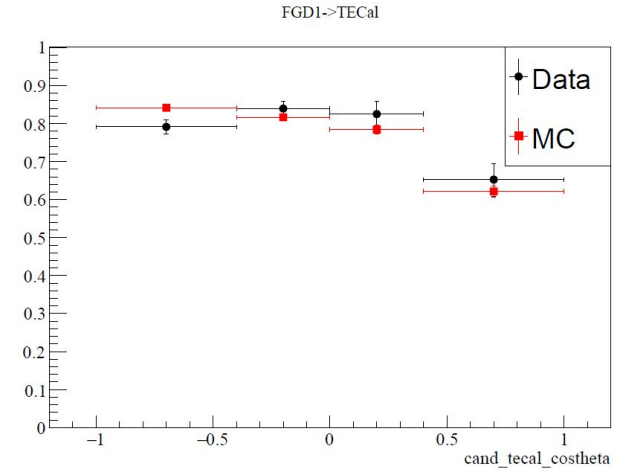
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.757407	0.812955	0.0187467	0.0181121	0.00388874	0.00384766
-0,4	0	0.815249	0.816101	0.0216012	0.020372	0.00493743	0.0048699
0	0,4	0.759124	0.726672	0.0375842	0.0350877	0.00860041	0.00848931
0,4	1	0.613139	0.553191	0.0418871	0.0407986	0.00988498	0.00985702



Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.791339	0.841477	0.0183949	0.0176315	0.00503287	0.00494787
-0,4	0	0.839394	0.816525	0.0208709	0.0195031	0.00681299	0.00668469
0	0,4	0.825	0.784344	0.0363034	0.0327276	0.0115396	0.0112486
0,4	1	0.652542	0.621459	0.0443621	0.0426613	0.0142769	0.014138



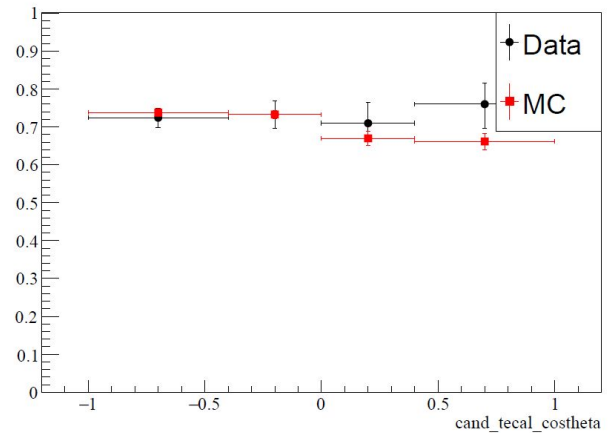
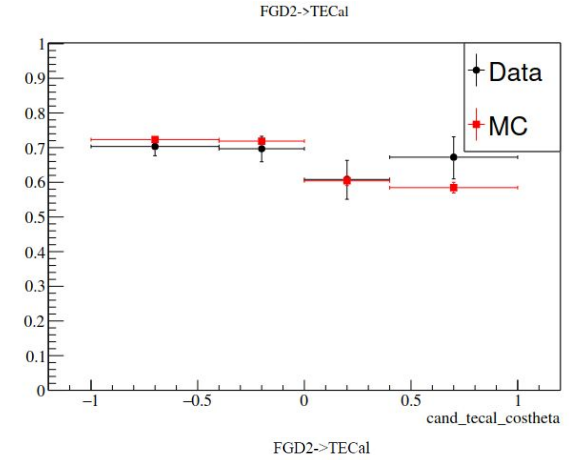
FGD2->TECaI

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.703333	0.723229	0.0267597	0.0258598	0.00582412	0.00577411
-0,4	0	0.696774	0.71879	0.0375651	0.0358884	0.00807263	0.00797965
0	0,4	0.608108	0.604249	0.0570006	0.0550958	0.0137695	0.0136602
0,4	1	0.672414	0.584646	0.0626167	0.0587622	0.0155104	0.0153994

Prod 7 (cut number of hits > 5)

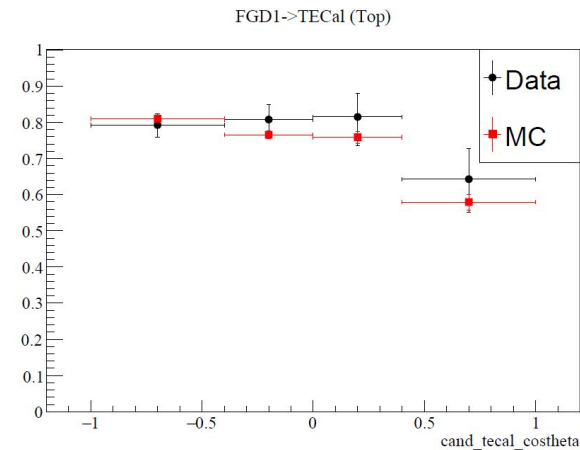
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.724138	0.737922	0.0266954	0.0256694	0.0078674	0.00776716
-0,4	0	0.732877	0.732938	0.0374765	0.0353705	0.0108715	0.0106872
0	0,4	0.709677	0.669725	0.0590581	0.0546613	0.0185488	0.0182032
0,4	1	0.76	0.661605	0.0628207	0.0560892	0.0222395	0.0217732



FGD1->TECal (Top)

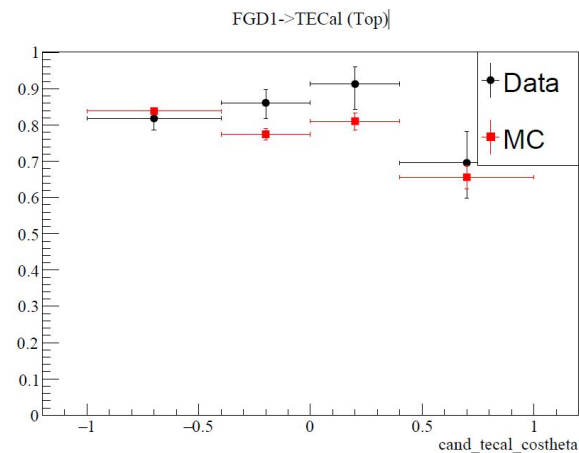
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.792453	0.810565	0.0332451	0.0308121	0.0097833	0.00953177
-0,4	0	0.807692	0.735476	0.0468296	0.041657	0.0156947	0.0153068
0	0,4	0.814815	0.764706	0.0803484	0.0655354	0.0241015	0.0230126
0,4	1	0.642857	0.583333	0.0908522	0.084441	0.0291621	0.0287782



Prod 7 (cut number of hits > 5)

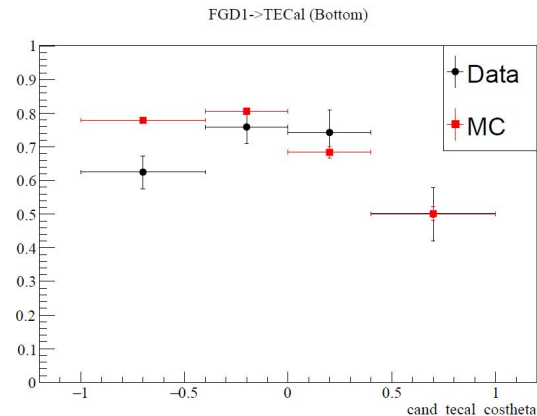
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.818182	0.838462	0.0323275	0.0295935	0.00946485	0.00917542
-0,4	0	0.861111	0.774629	0.0437944	0.0372002	0.0155893	0.0150955
0	0,4	0.913043	0.810526	0.0704919	0.0469576	0.0238934	0.0224459
0,4	1	0.695652	0.656109	0.0976728	0.087092	0.0323038	0.0313681



FGD1->TECal (Bottom)

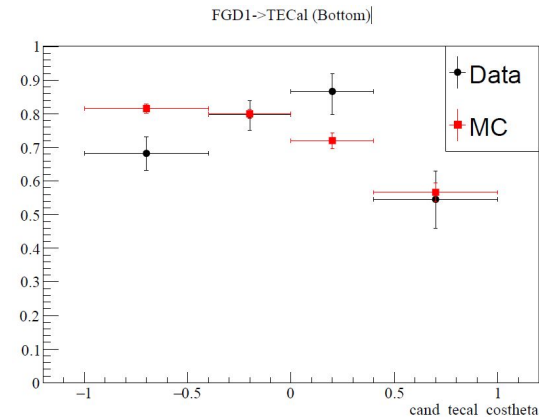
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.625	0.783158	0.049803	0.0480959	0.0135662	0.0131689
-0,4	0	0.759036	0.781038	0.0485515	0.0444623	0.0141011	0.0136783
0	0,4	0.742857	0.661538	0.0765994	0.0677416	0.0241933	0.0236427
0,4	1	0.5	0.508876	0.0791008	0.0791008	0.0271468	0.027112



Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.682353	0.815909	0.0513883	0.0485805	0.0133018	0.0128233
-0,4	0	0.797468	0.8	0.0472871	0.042351	0.0139103	0.0134427
0	0,4	0.866667	0.720117	0.0690394	0.0532735	0.0246195	0.0237669
0,4	1	0.545455	0.566553	0.0850912	0.0833475	0.029022	0.0287206



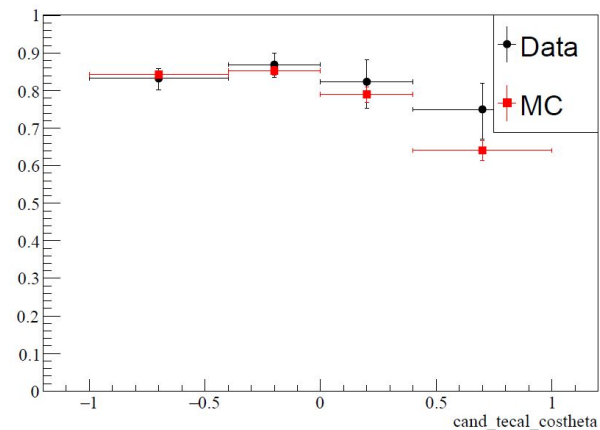
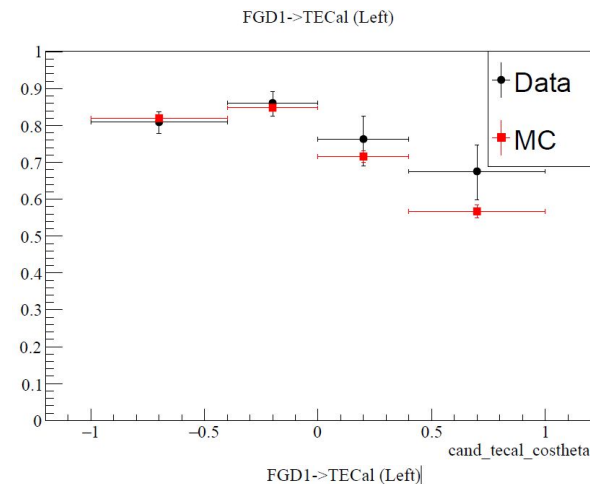
FGD1->TECal (Left)

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.808989	0.812778	0.0305132	0.028214	0.00931266	0.00908085
-0,4	0	0.861111	0.841285	0.0353516	0.0309332	0.0116244	0.0111813
0	0,4	0.763158	0.723653	0.0719989	0.063117	0.0219583	0.0212617
0,4	1	0.675676	0.583535	0.0781557	0.0720974	0.0243497	0.0240809

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.83237	0.842782	0.029585	0.0270393	0.00893619	0.00866892
-0,4	0	0.869159	0.852642	0.0347623	0.0302009	0.0115396	0.0110617
0	0,4	0.823529	0.789894	0.0702779	0.0580544	0.0214922	0.0204669
0,4	1	0.75	0.640805	0.0796096	0.0696723	0.0259325	0.025395



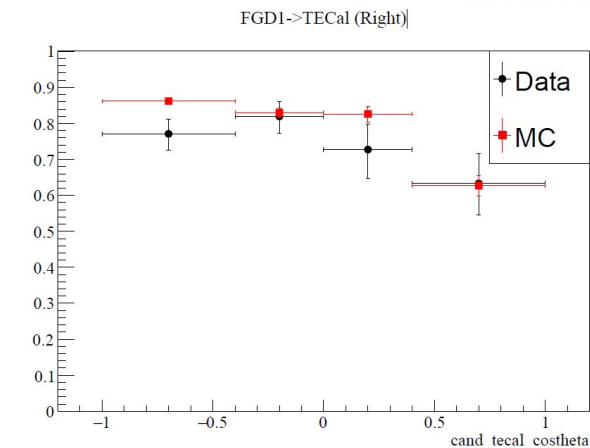
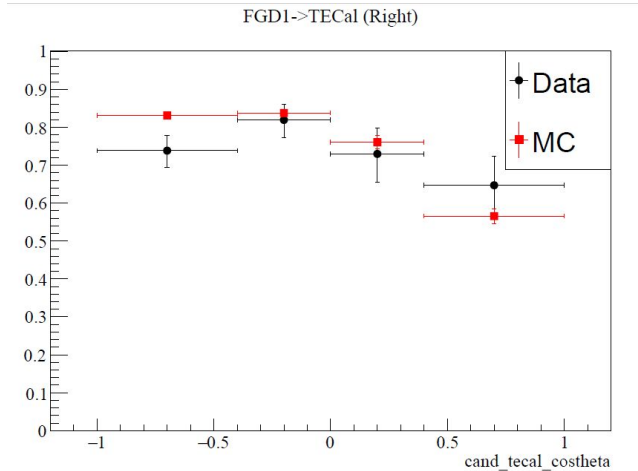
FGD1->TECal (Right)

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.738318	0.834898	0.0436437	0.0407144	0.0105617	0.0102122
-0,4	0	0.819444	0.819783	0.0478387	0.0420256	0.0144333	0.0138559
0	0,4	0.72973	0.780488	0.0753486	0.0674093	0.0233823	0.0222459
0,4	1	0.647059	0.572222	0.0825341	0.0770414	0.0261544	0.0258879

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.770833	0.862097	0.0444179	0.0407109	0.0101097	0.00971092
-0,4	0	0.819444	0.830056	0.0478387	0.0420256	0.0143805	0.0137628
0	0,4	0.727273	0.826087	0.0799619	0.0712013	0.02261	0.0211605
0,4	1	0.633333	0.627063	0.0881292	0.0825238	0.0279889	0.0274322



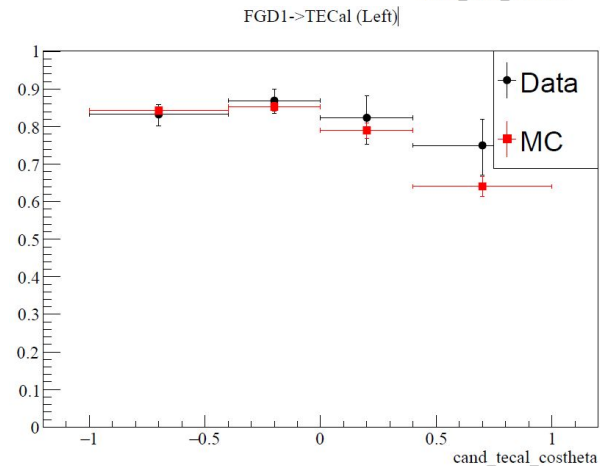
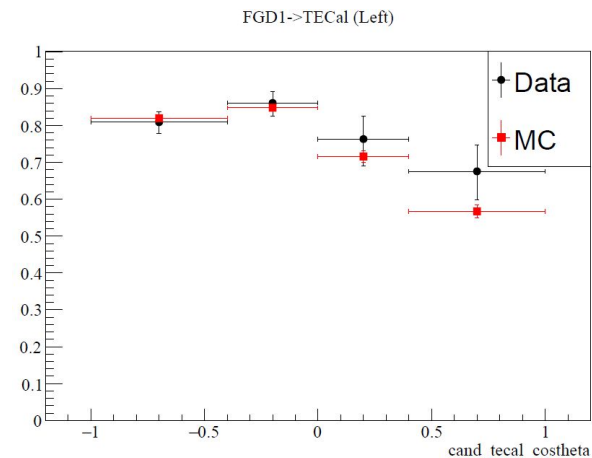
FGD1->TECal (Left)

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.808989	0.812778	0.0305132	0.028214	0.00931266	0.00908085
-0,4	0	0.861111	0.841285	0.0353516	0.0309332	0.0116244	0.0111813
0	0,4	0.763158	0.723653	0.0719989	0.063117	0.0219583	0.0212617
0,4	1	0.675676	0.583535	0.0781557	0.0720974	0.0243497	0.0240809

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.83237	0.842782	0.029585	0.0270393	0.00893619	0.00866892
-0,4	0	0.869159	0.852642	0.0347623	0.0302009	0.0115396	0.0110617
0	0,4	0.823529	0.789894	0.0702779	0.0580544	0.0214922	0.0204669
0,4	1	0.75	0.640805	0.0796096	0.0696723	0.0259325	0.025395



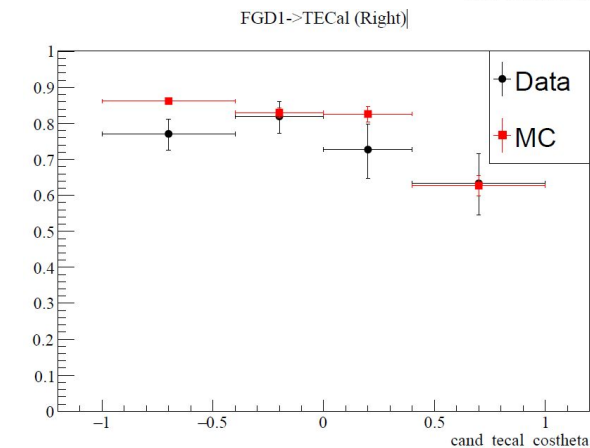
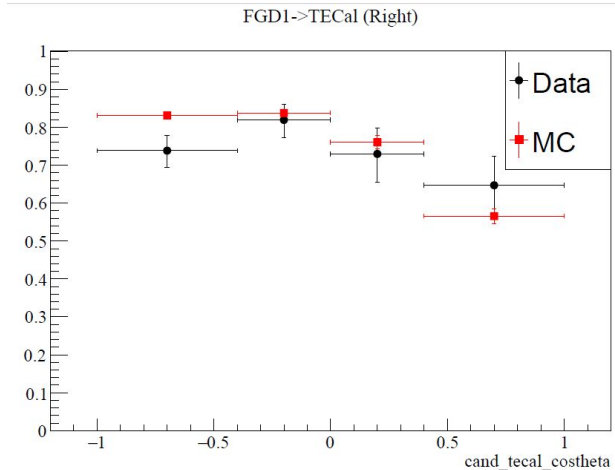
FGD1->TECal (Right)

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.738318	0.834898	0.0436437	0.0407144	0.0105617	0.0102122
-0,4	0	0.819444	0.819783	0.0478387	0.0420256	0.0144333	0.0138559
0	0,4	0.72973	0.780488	0.0753486	0.0674093	0.0233823	0.0222459
0,4	1	0.647059	0.572222	0.0825341	0.0770414	0.0261544	0.0258879

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.770833	0.862097	0.0444179	0.0407109	0.0101097	0.00971092
-0,4	0	0.819444	0.830056	0.0478387	0.0420256	0.0143805	0.0137628
0	0,4	0.727273	0.826087	0.0799619	0.0712013	0.02261	0.0211605
0,4	1	0.633333	0.627063	0.0881292	0.0825238	0.0279889	0.0274322



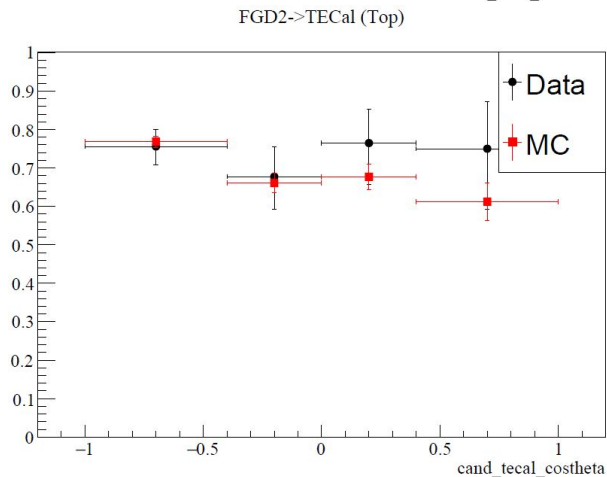
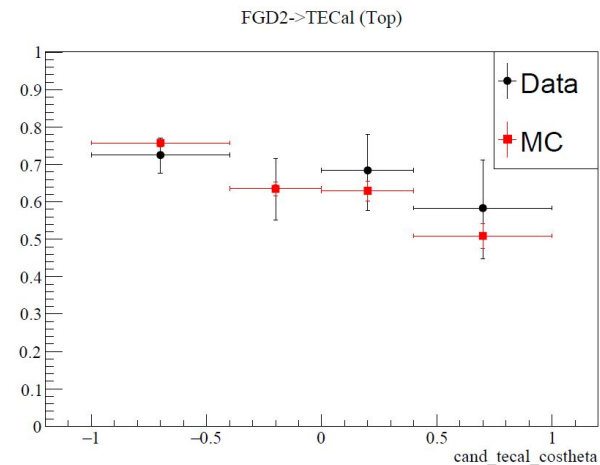
FGD2->TECal (Top)

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.725275	0.746791	0.0479966	0.0447501	0.0150407	0.014657
-0,4	0	0.636364	0.623269	0.0840609	0.0788225	0.0256783	0.0252246
0	0,4	0.684211	0.639269	0.107774	0.0958949	0.0327498	0.0319076
0,4	1	0.583333	0.48227	0.135924	0.127859	0.0417296	0.0418953

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.755814	0.768765	0.047858	0.0439583	0.0148618	0.0144482
-0,4	0	0.677419	0.660767	0.0852039	0.0779628	0.0259739	0.025344
0	0,4	0.764706	0.676923	0.107843	0.0887857	0.0339513	0.0327505
0,4	1	0.75	0.612245	0.156694	0.121818	0.049517	0.048015



FGD2->TECal (Bottom)

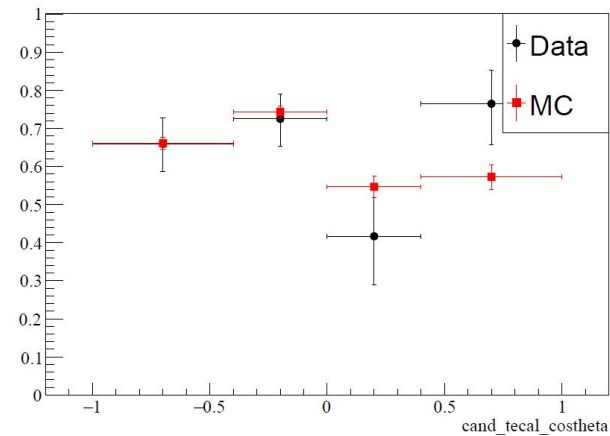
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.659091	0.653144	0.072331	0.0676867	0.0216156	0.0212023
-0,4	0	0.725	0.738589	0.0727375	0.0655236	0.0203204	0.0196618
0	0,4	0.416667	0.555556	0.127859	0.135924	0.036173	0.0357843
0,4	1	0.764706	0.55814	0.107843	0.0887857	0.0437151	0.0431216

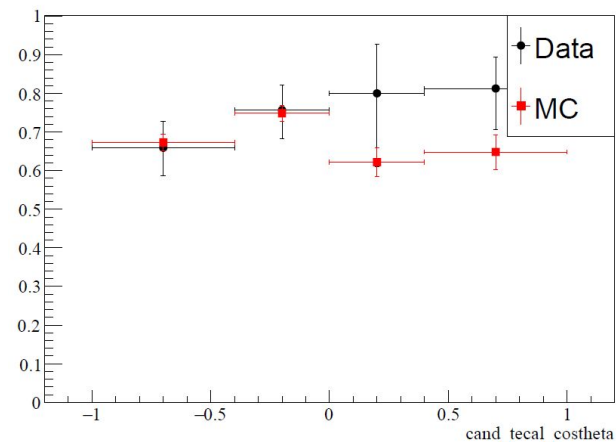
Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.659091	0.673077	0.072331	0.0676867	0.0219001	0.0214082
-0,4	0	0.756757	0.748414	0.0734764	0.0645895	0.0202781	0.0195793
0	0,4	0.8	0.621951	0.18916	0.126458	0.038157	0.0371748
0,4	1	0.8125	0.648148	0.105639	0.0816241	0.0464802	0.0446779

FGD2->TECal (Bottom)



FGD2->TECal (Bottom)



FGD2->TECal (Left)

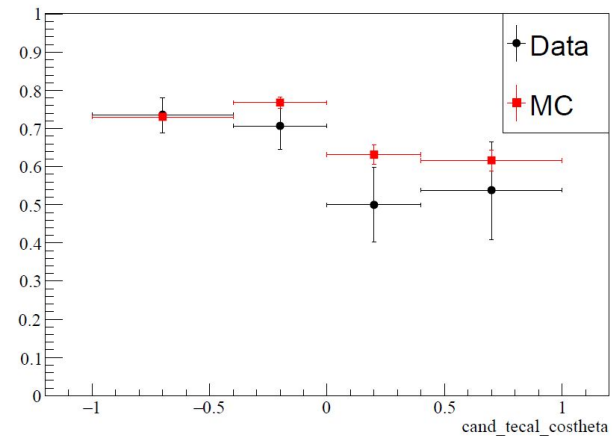
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.736264	0.742241	0.0474894	0.0440838	0.0129804	0.012702
-0,4	0	0.706897	0.757455	0.0612067	0.0565777	0.0194323	0.0187511
0	0,4	0.5	0.635897	0.0981013	0.0981013	0.0347716	0.0338495
0,4	1	0.538462	0.620482	0.130482	0.127015	0.0379485	0.0369897

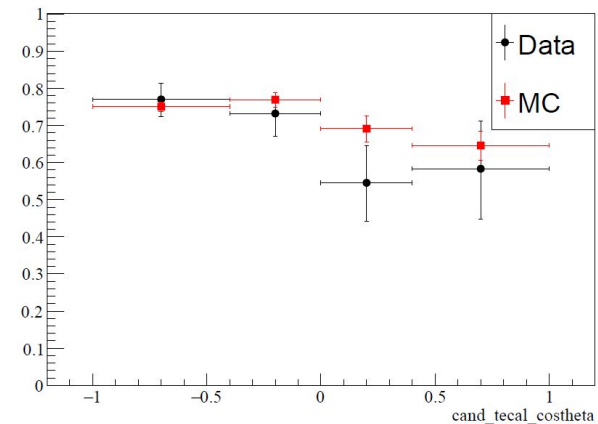
Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.770115	0.750663	0.0467583	0.0426854	0.0130106	0.0127151
-0,4	0	0.732143	0.769388	0.0609982	0.0556202	0.0193753	0.0186437
0	0,4	0.545455	0.691429	0.102972	0.100423	0.0354792	0.0340328
0,4	1	0.583333	0.645833	0.135924	0.127859	0.0402854	0.0389496

FGD2->TECal (Left)



FGD2->TECal (Left)



FGD2->TECal (Right)

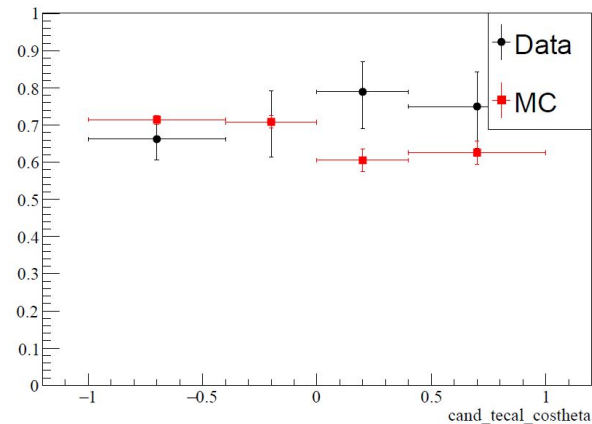
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.662162	0.712794	0.0557547	0.0528959	0.0165243	0.0161542
-0,4	0	0.708333	0.716837	0.0949405	0.0841042	0.0230858	0.0223504
0	0,4	0.789474	0.643939	0.0994695	0.080588	0.042122	0.0406852
0,4	1	0.75	0.633803	0.112505	0.0935204	0.0408035	0.0395608

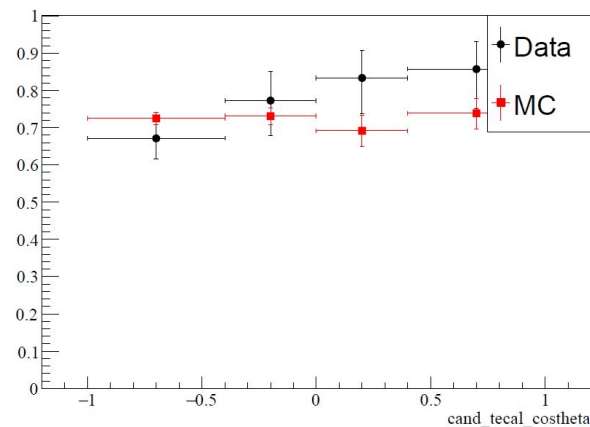
Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.671233	0.725067	0.0558507	0.0527911	0.0165838	0.0161797
-0,4	0	0.772727	0.73107	0.0940395	0.0785614	0.0230205	0.0222185
0	0,4	0.833333	0.691667	0.096533	0.0734398	0.0429142	0.0408115
0,4	1	0.857143	0.738739	0.106127	0.0745603	0.0428178	0.0399876

FGD2->TECal (Right)



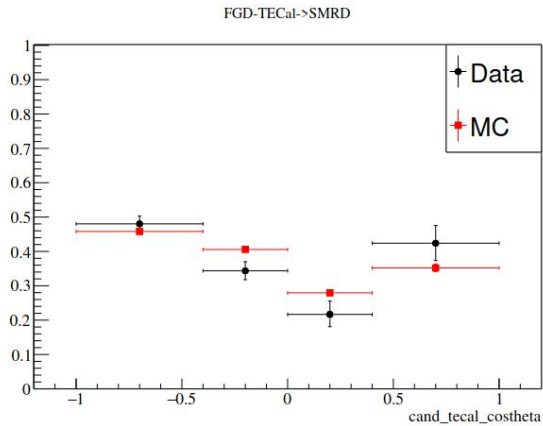
FGD2->TECal (Right)



FGD-TECal->SMRD SAME

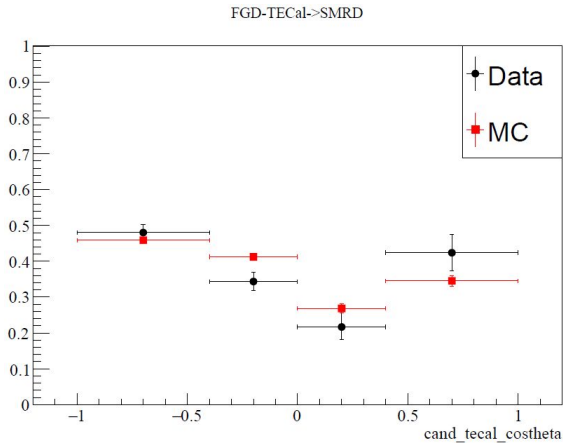
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.480167	0.458154	0.0227672	0.0228223	0.00523166	0.00523782
-0,4	0	0.343558	0.405672	0.0259237	0.026561	0.00599236	0.00601115
0	0,4	0.216667	0.279294	0.0358305	0.0389437	0.00913516	0.00925884
0,4	1	0.423913	0.351996	0.0504665	0.0515496	0.0111191	0.0113004



Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.480167	0.458892	0.0227672	0.0228223	0.00704546	0.00705644
-0,4	0	0.343558	0.412184	0.0259237	0.026561	0.00814107	0.00817323
0	0,4	0.216667	0.268385	0.0358305	0.0389437	0.0120837	0.0123178
0,4	1	0.423913	0.345472	0.0504665	0.0515496	0.0148127	0.0150154



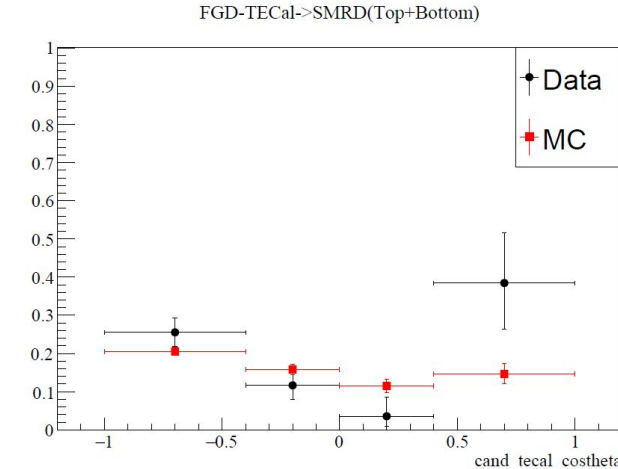
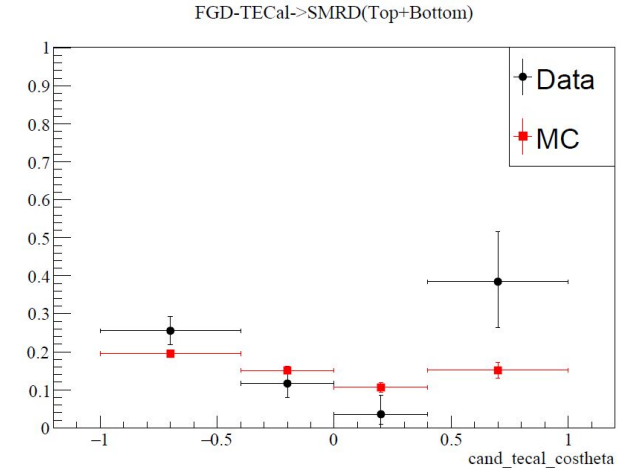
FGD-TECal->SMRD(Top+Bottom) SAME

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.255474	0.205054	0.0358753	0.0382306	0.0107077	0.0109917
-0,4	0	0.116667	0.158284	0.0370238	0.0454276	0.0136983	0.0143719
0	0,4	0.0357143	0.115152	0.0255044	0.0491693	0.0167878	0.0183405
0,4	1	0.384615	0.146199	0.12064	0.131069	0.0255767	0.0283202

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.255474	0.205054	0.0358753	0.0382306	0.0107077	0.0109917
-0,4	0	0.116667	0.158284	0.0370238	0.0454276	0.0136983	0.0143719
0	0,4	0.0357143	0.115152	0.0255044	0.0491693	0.0167878	0.0183405
0,4	1	0.384615	0.146199	0.12064	0.131069	0.0255767	0.0283202



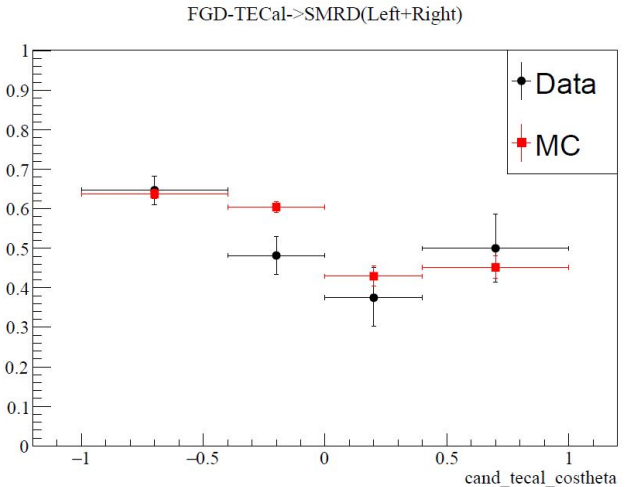
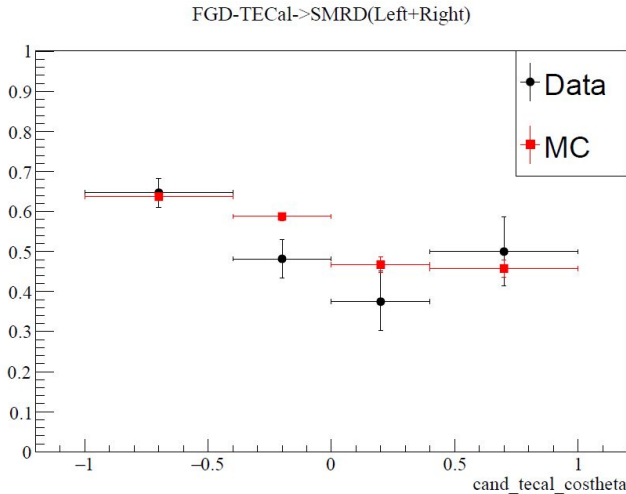
FGD-TECal->SMRD(Left+Right) SAME

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.647059	0.637261	0.0370421	0.035899	0.0119987	0.0118858
-0,4	0	0.481818	0.604553	0.0471357	0.0473528	0.0142539	0.0141364
0	0,4	0.375	0.429348	0.0728007	0.0767967	0.0256225	0.0258776
0,4	1	0.5	0.451827	0.0857941	0.0857941	0.0285031	0.0287155

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.647059	0.637261	0.0370421	0.035899	0.0119987	0.0118858
-0,4	0	0.481818	0.604553	0.0471357	0.0473528	0.0142539	0.0141364
0	0,4	0.375	0.429348	0.0728007	0.0767967	0.0256225	0.0258776
0,4	1	0.5	0.451827	0.0857941	0.0857941	0.0285031	0.0287155



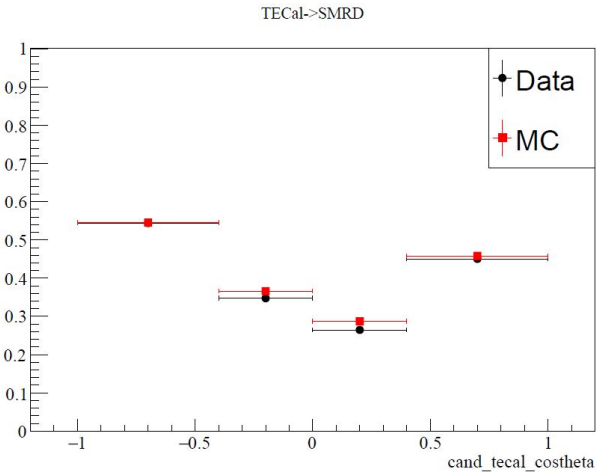
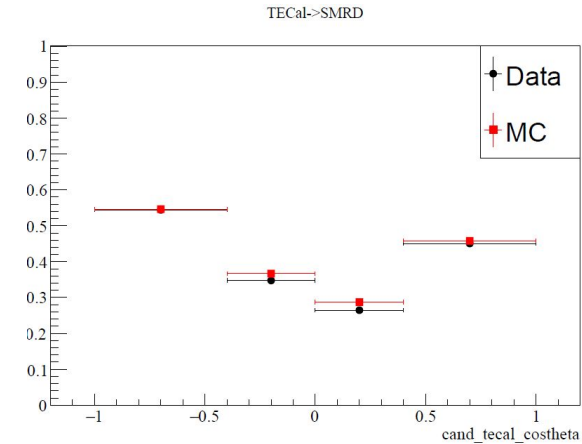
TECal->SMRD **SAME**

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.544116	0.545638	0.00166217	0.0016615	0.000517288	0.000517223
-0,4	0	0.347549	0.366175	0.00343926	0.0034499	0.00108037	0.00108127
0	0,4	0.264696	0.28707	0.00337184	0.00339027	0.00108847	0.00109013
0,4	1	0.450496	0.458406	0.00163012	0.00163084	0.000611189	0.000611271

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.544116	0.545638	0.00166217	0.0016615	0.000517288	0.000517223
-0,4	0	0.347549	0.366175	0.00343926	0.0034499	0.00108037	0.00108127
0	0,4	0.264696	0.28707	0.00337184	0.00339027	0.00108847	0.00109013
0,4	1	0.450496	0.458406	0.00163012	0.00163084	0.000611189	0.000611271



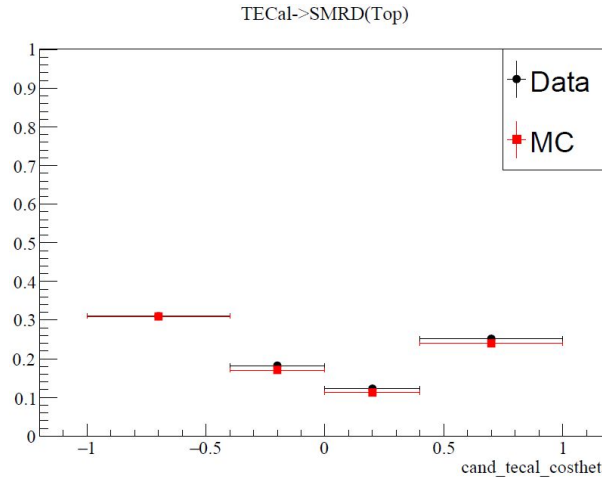
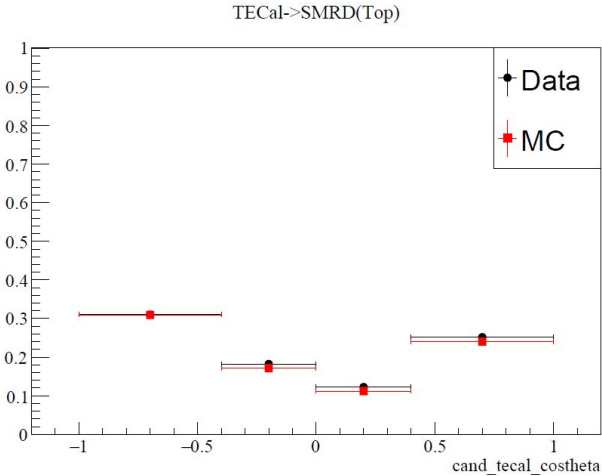
TECal->SMRD(Top) SAME

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.31037	0.30955	0.00373246	0.00374899	0.00116793	0.00116956
-0,4	0	0.182327	0.170725	0.00611036	0.00621832	0.0018975	0.00190872
0	0,4	0.122679	0.112622	0.00565026	0.00580356	0.00179169	0.00180844
0,4	1	0.251824	0.23982	0.00438516	0.00441919	0.00146915	0.00147327

Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.31037	0.30955	0.00373246	0.00374899	0.00116793	0.00116956
-0,4	0	0.182327	0.170725	0.00611036	0.00621832	0.0018975	0.00190872
0	0,4	0.122679	0.112622	0.00565026	0.00580356	0.00179169	0.00180844
0,4	1	0.251824	0.23982	0.00438516	0.00441919	0.00146915	0.00147327



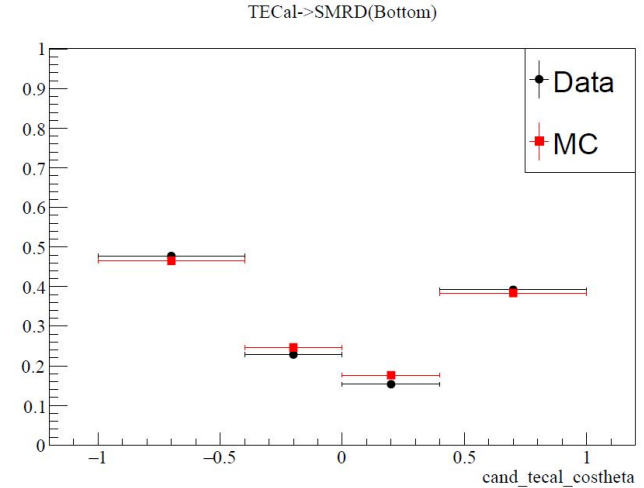
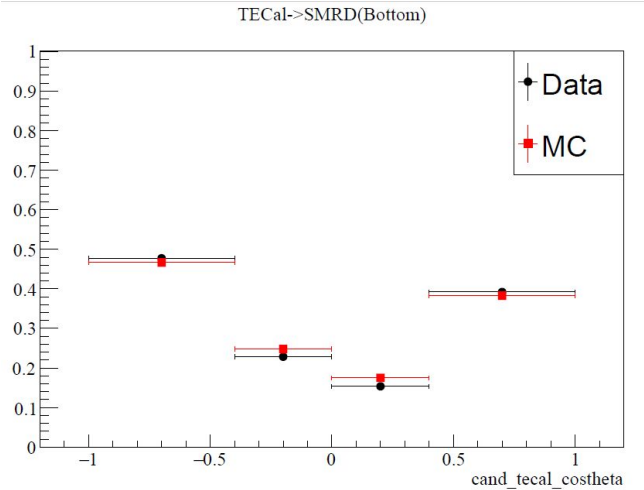
TECal->SMRD(Bottom) SAME

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.477319	0.465156	0.00246254	0.00246327	0.000764186	0.000764295
-0,4	0	0.22851	0.246454	0.00482926	0.00487764	0.00151373	0.00151791
0	0,4	0.153615	0.176296	0.00418244	0.00424552	0.0013761	0.00138176
0,4	1	0.392078	0.383518	0.00204759	0.00205013	0.000818287	0.000818725

Prod 7 (cut number of hits > 5)

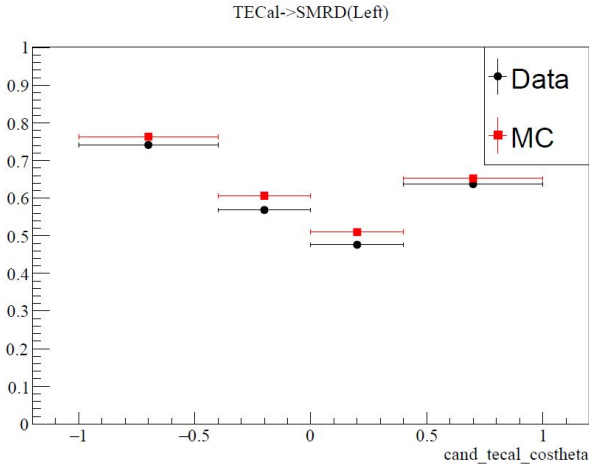
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.477319	0.465156	0.00246254	0.00246327	0.000764186	0.000764295
-0,4	0	0.22851	0.246454	0.00482926	0.00487764	0.00151373	0.00151791
0	0,4	0.153615	0.176296	0.00418244	0.00424552	0.0013761	0.00138176
0,4	1	0.392078	0.383518	0.00204759	0.00205013	0.000818287	0.000818725



TECal->SMRD(Left) SAME

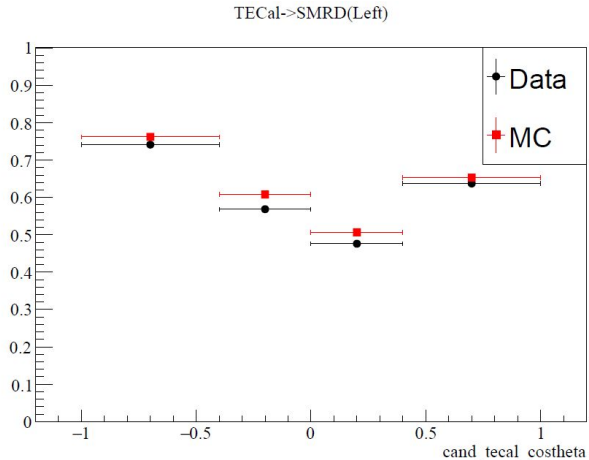
Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.741417	0.762238	0.00298351	0.00296863	0.000910215	0.000908599
-0,4	0	0.56853	0.607853	0.00728945	0.00726971	0.0022645	0.00226142
0	0,4	0.476164	0.506638	0.00831325	0.00832206	0.00263385	0.00263361
0,4	1	0.637266	0.65324	0.00405722	0.00404423	0.00135636	0.0013547



Prod 7 (cut number of hits > 5)

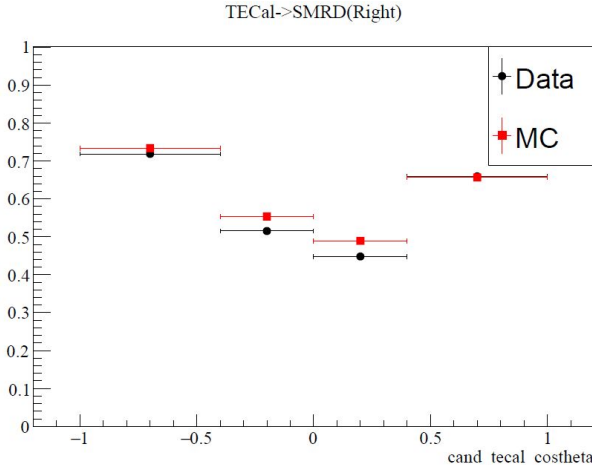
costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.741417	0.762238	0.00298351	0.00296863	0.000910215	0.000908599
-0,4	0	0.56853	0.607853	0.00728945	0.00726971	0.0022645	0.00226142
0	0,4	0.476164	0.506638	0.00831325	0.00832206	0.00263385	0.00263361
0,4	1	0.637266	0.65324	0.00405722	0.00404423	0.00135636	0.0013547



TECal->SMRD(Right) SAME

Prod 7

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.718705	0.735608	0.00415974	0.00413493	0.00124834	0.00124585
-0,4	0	0.51525	0.554495	0.00900843	0.00900181	0.00277003	0.00276778
0	0,4	0.448105	0.489871	0.00935016	0.00937469	0.00292343	0.00292388
0,4	1	0.659361	0.658373	0.0042418	0.00422488	0.00147075	0.00146873



Prod 7 (cut number of hits > 5)

costheta low	costheta up	DATA	MC	Ylow DATA	Yhigh DATA	Ylow MC	Yhigh MC
-1	-0,4	0.718705	0.735608	0.00415974	0.00413493	0.00124834	0.00124585
-0,4	0	0.51525	0.554495	0.00900843	0.00900181	0.00277003	0.00276778
0	0,4	0.448105	0.489871	0.00935016	0.00937469	0.00292343	0.00292388
0,4	1	0.659361	0.658373	0.0042418	0.00422488	0.00147075	0.00146873

