PVDIS Backgrounds Study Updates

11/21/2017

ECAL Trigger Efficiency Curves with backgrounds

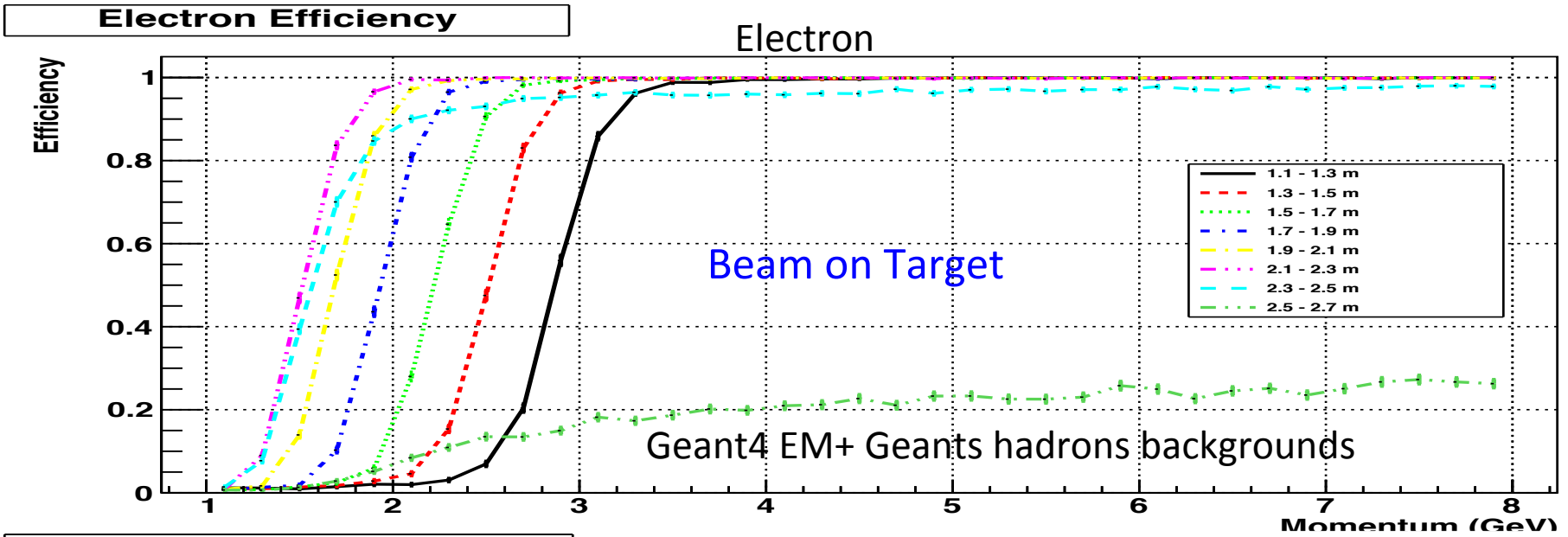
➢ Beam on Target:

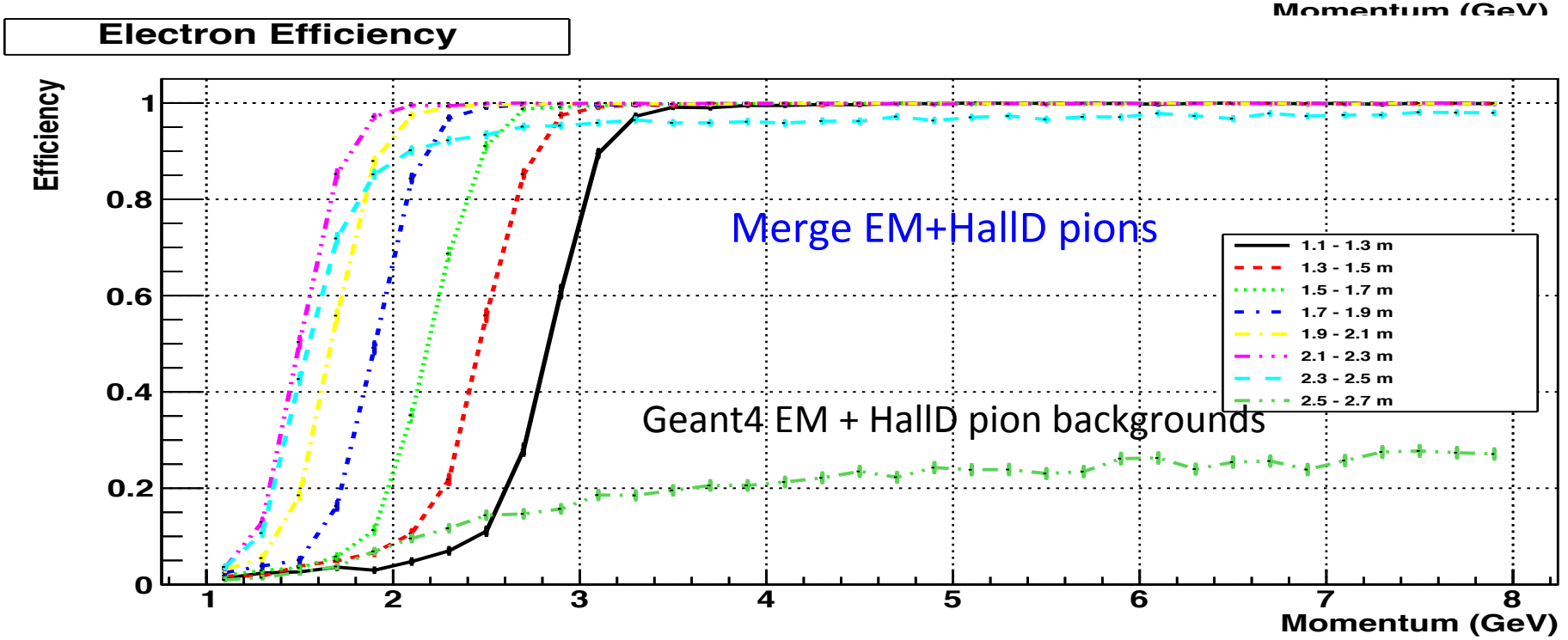
- 11 GeV e^- hit on deuterium target
- Geant4 physics: hadron + standard EM + optical physics process
- Mark event time window information (30 ns window) based on the Rates: total time windows: 1068

➢ Merge backgrounds: (Rekitha's method)

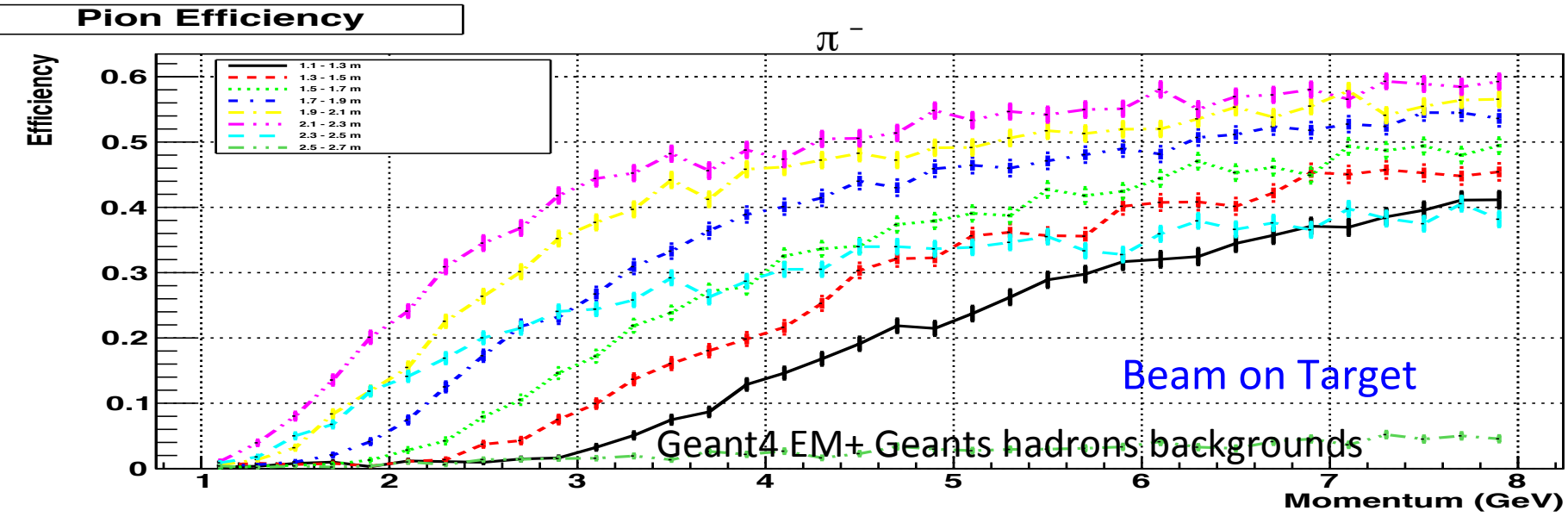
- Geant4 physics: standard EM+ optical physics process
- Hall D: π^-, π^0, π^+ simulation files
- All hadron and EM backgrounds are evenly distributed in time based on their rates: total time windows: 1064

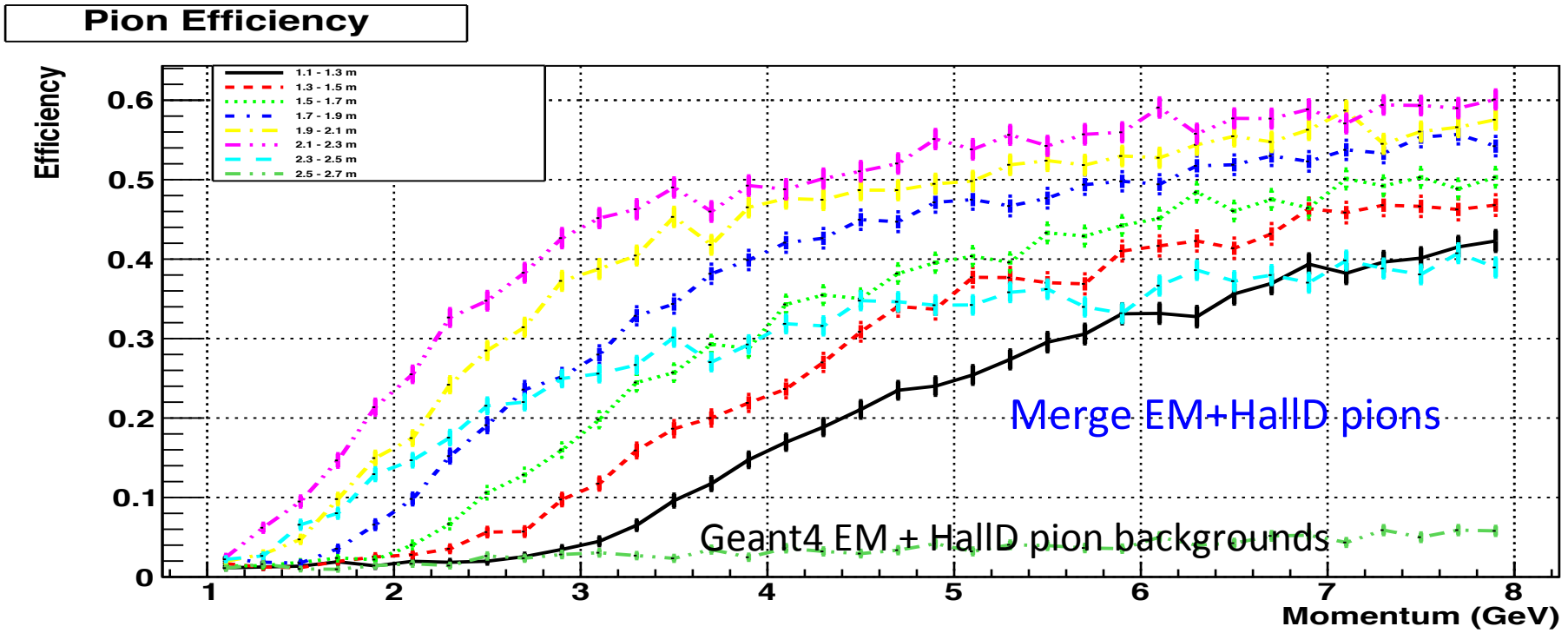
ECAL Trigger Response Curves for PVDIS configuration





ECAL Trigger Response Curves for PVDIS configuration





Merged Individual background Rate

Rekitha's parameters

Particle	Total Rate (GHz)	(1e9/total rate) ΔT (ns)	Total Events	Time Windows
π^-	28.51	0.035	1e6	1170
π^0	27.35	0.037	1e6	1219
π^+	28.51	0.035	1e6	1170
e- beam (EM)	346.03	0.00289	12e6	1170

EC flux rate

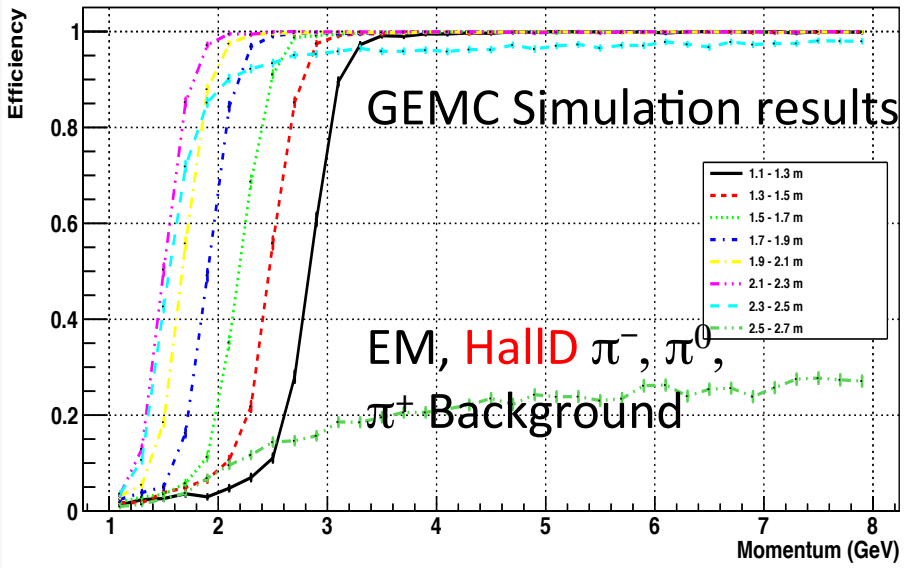
Ye's parameters

Particle	Total Rate (GHz)	(1e9/total rate) ΔT (ns)	Total Events	Time Windows
π^-	28.8	0.035	5e6	5794
π^0	27.5	0.036	5e6	6056
π^+	28.8	0.035	5e6	5794
e- beam (EM)	109.5	0.00913	3.5e6	1064

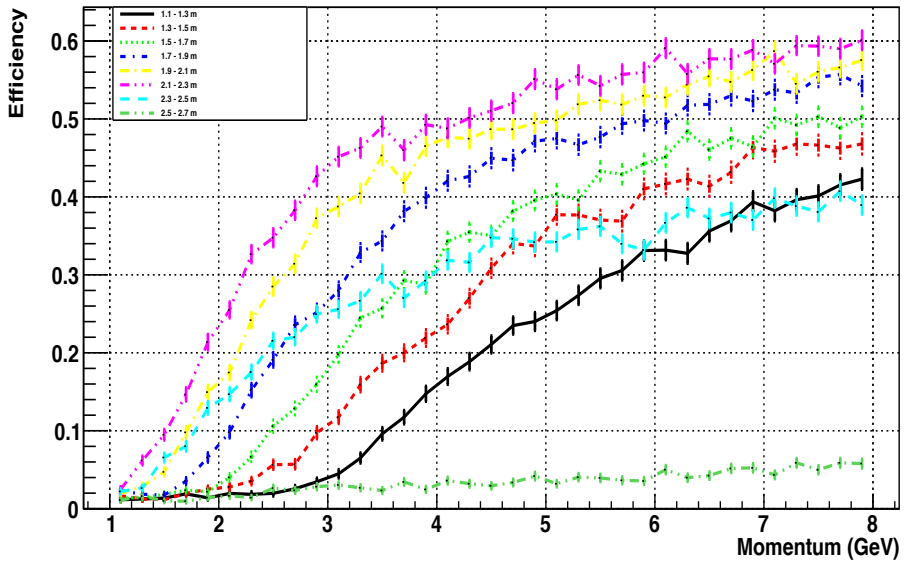
EC virtual plane rate

Total events hit on ECAL

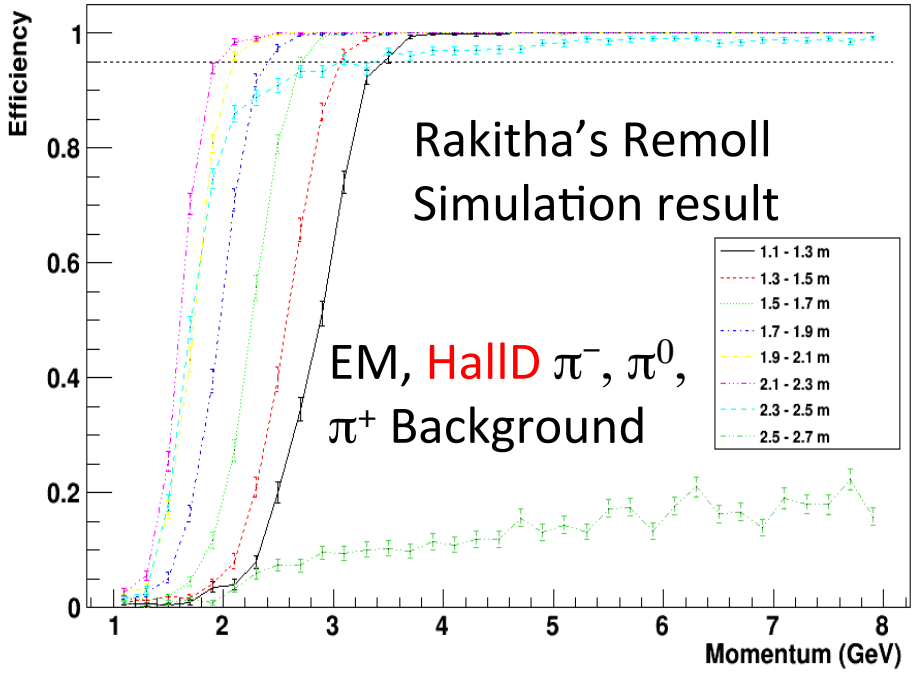
Electron Efficiency



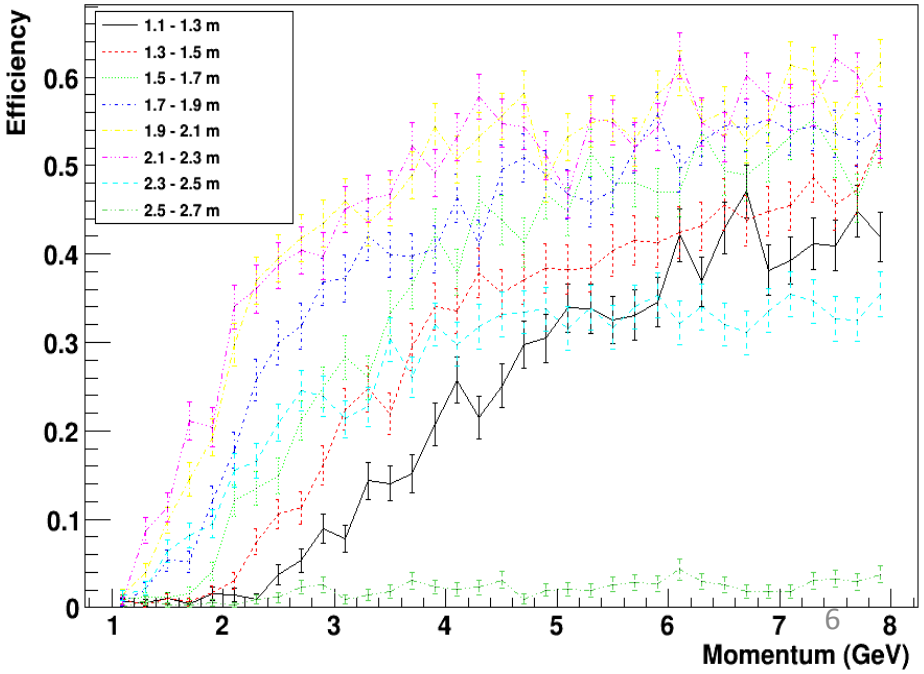
Pion Efficiency



Electron Efficiency



Pion Efficiency



Summary and Outlook

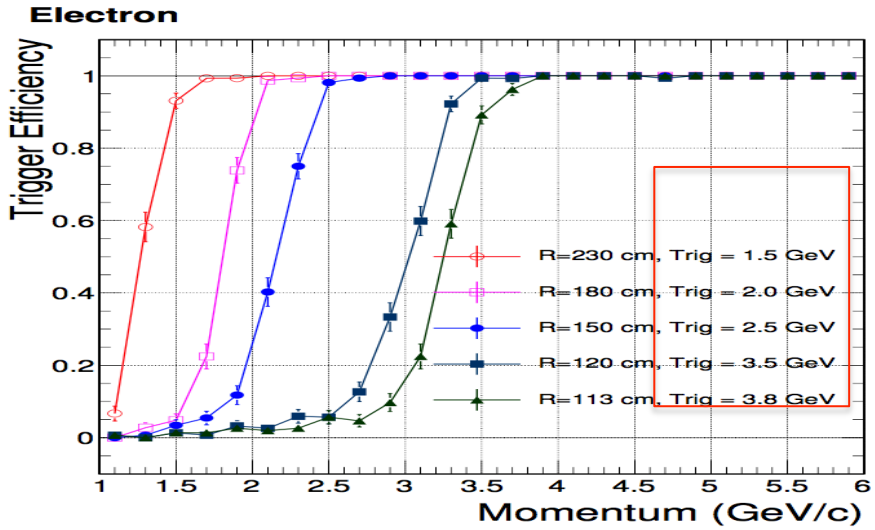
- The ECAL trigger response curves from the PVDIS configuration by merging backgrounds (Geant4 EM+HallD hadrons) together are consistent with previous Rakitha's Remoll simulation result. And the comparison shows that the current GEMC simulation result has a little better π^- rejection .

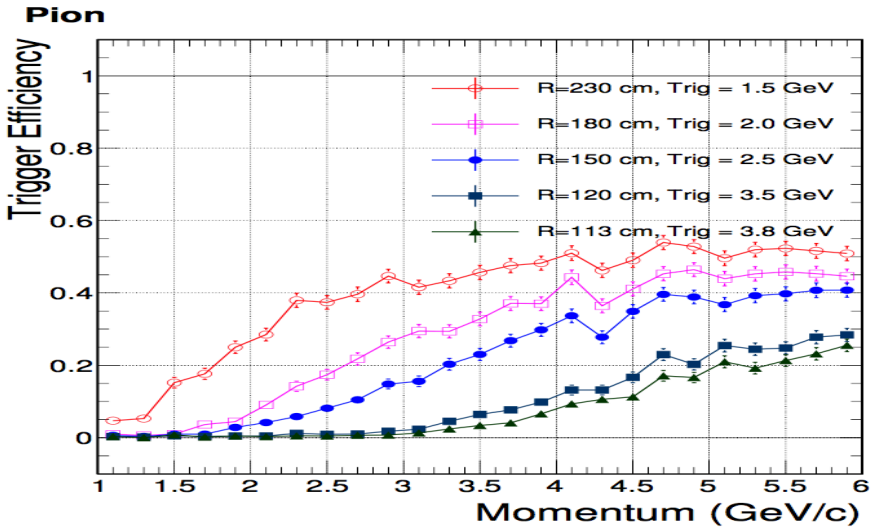
- Applying the background merging method on the SIDIS GEMC simulation files to get the corresponding ECAL trigger response curves.

Any comments and suggestions ?

Back up

ECAL Trigger Response Curves for PVDIS configuration

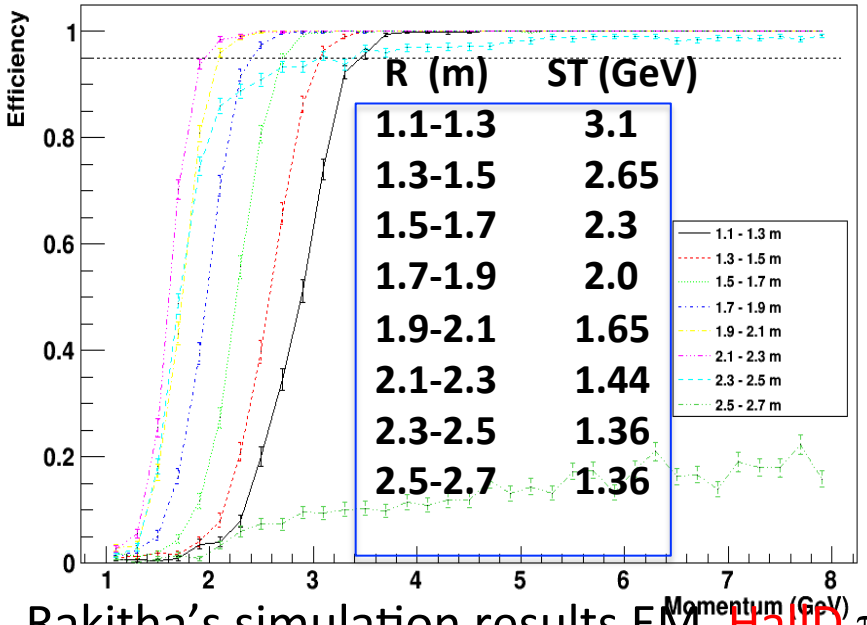




EM, Wiser π^-, π^0, π^+ Background

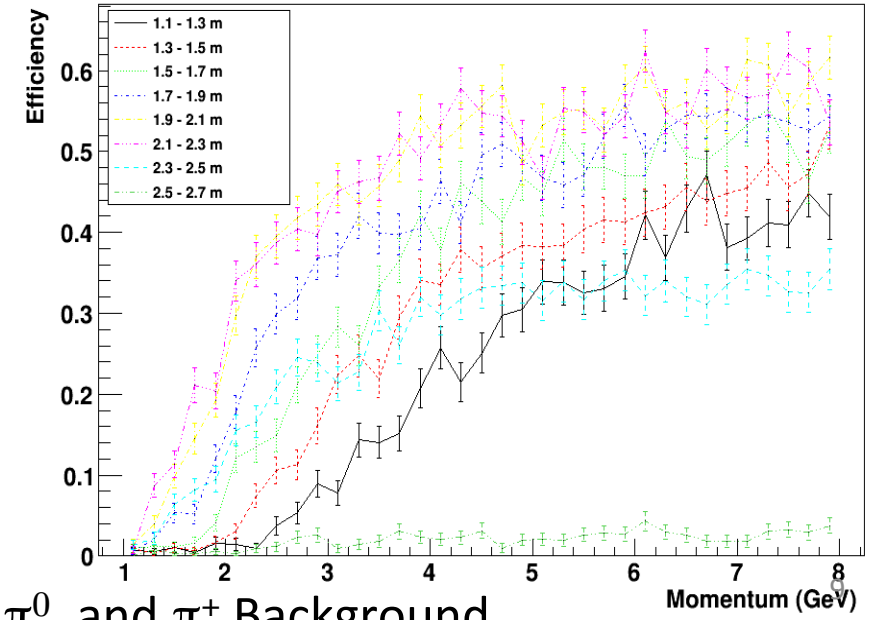
(b) Lower-radiation azimuthal region

Electron Efficiency



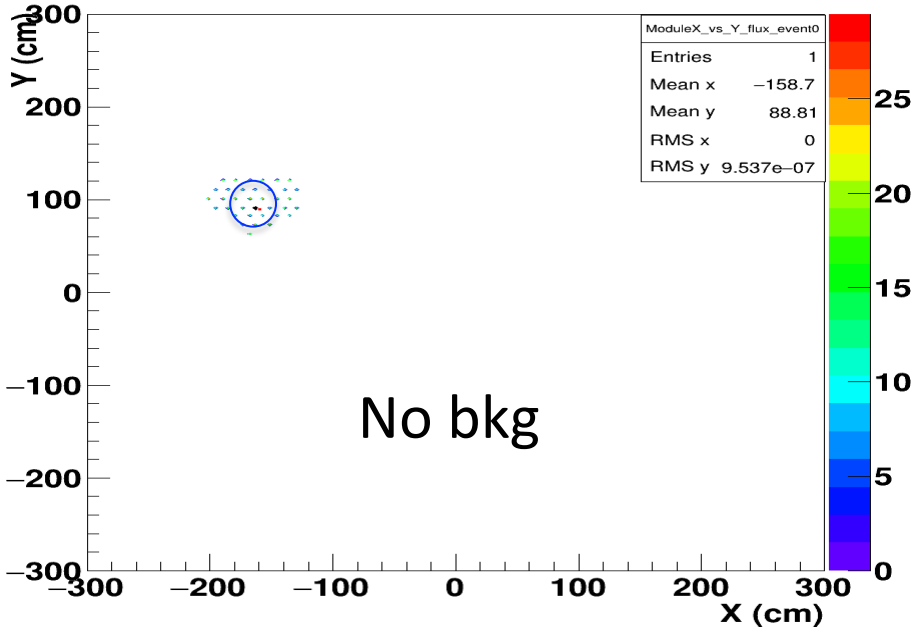
R (m)	ST (GeV)
1.1-1.3	3.1
1.3-1.5	2.65
1.5-1.7	2.3
1.7-1.9	2.0
1.9-2.1	1.65
2.1-2.3	1.44
2.3-2.5	1.36
2.5-2.7	1.36

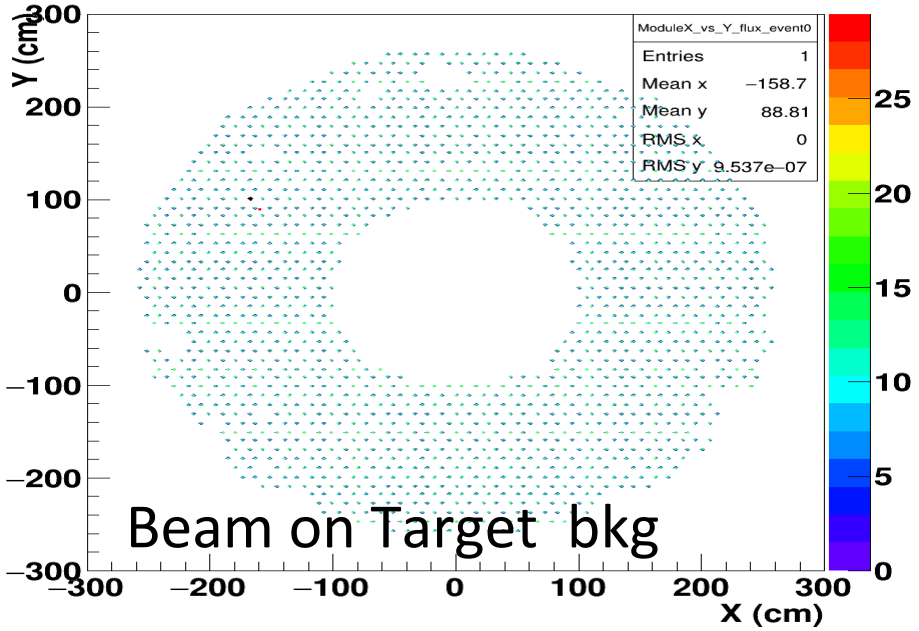
Pion Efficiency

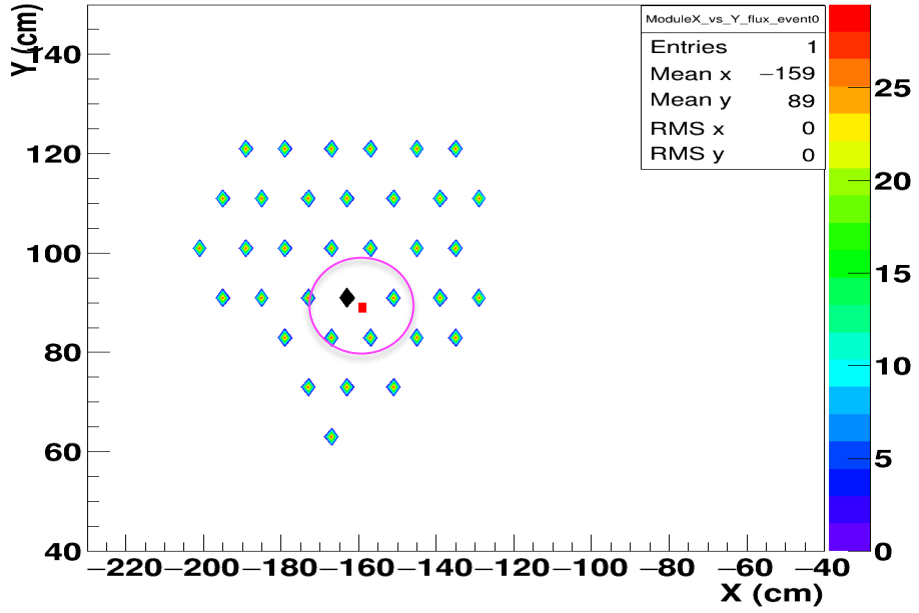


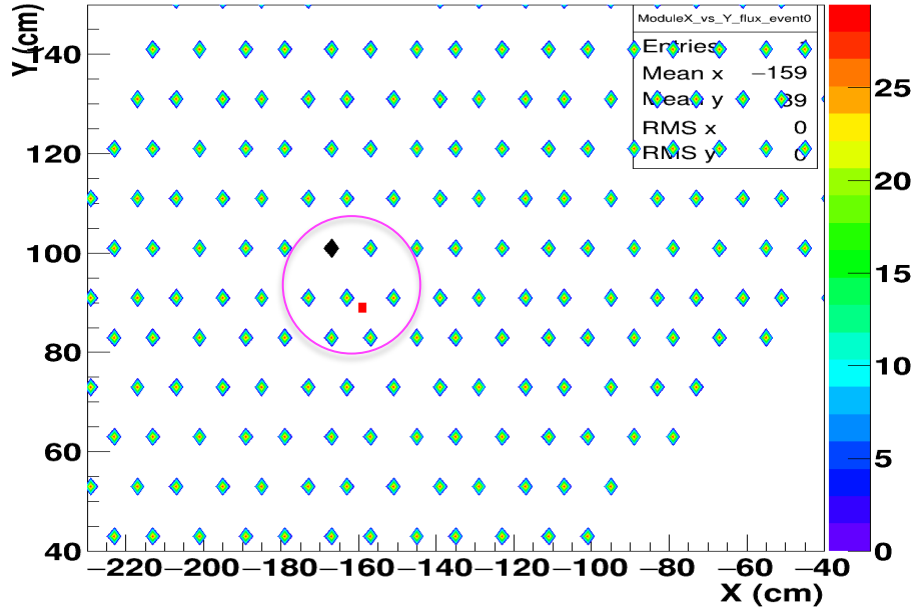
Rakitha's simulation results EM, HallD π^-, π^0, and π^+ Background

Random flat distributed electron case1

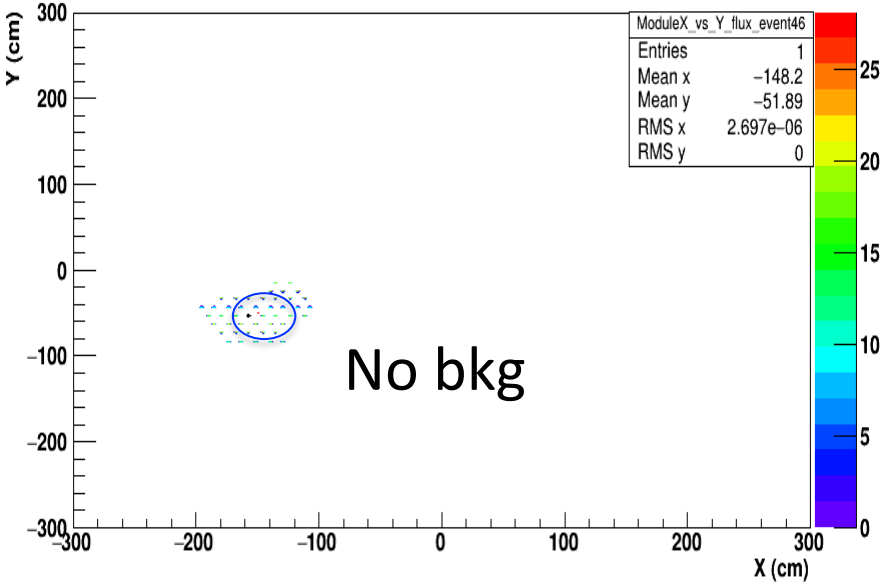


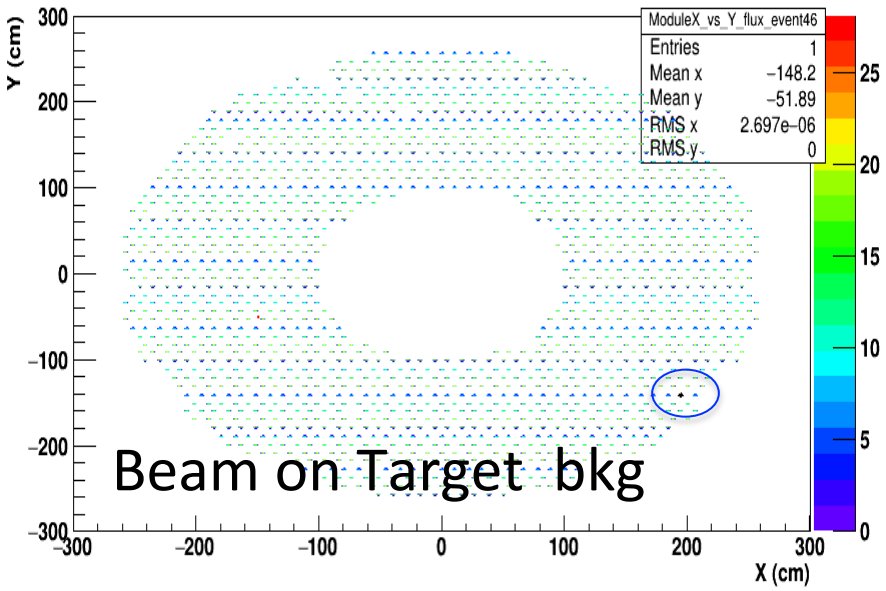


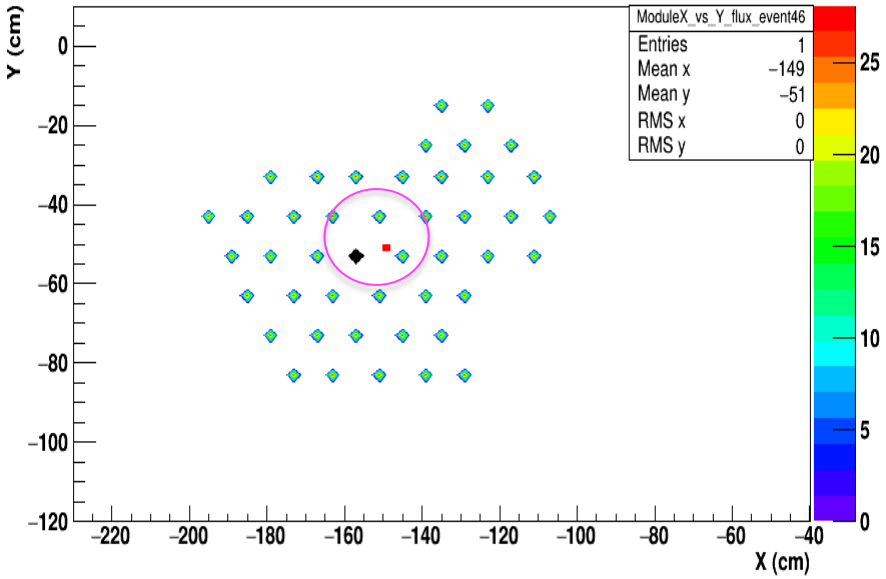


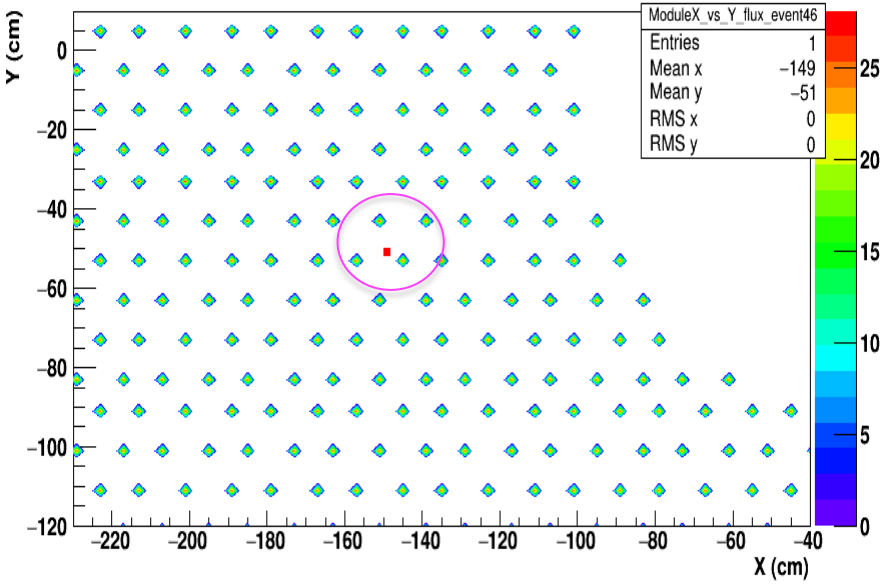


Random flat distributed electron case2









Random flat distributed electron case3