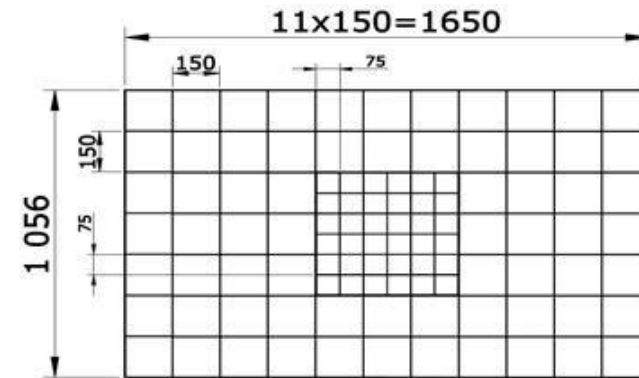


# Zero Degree Calorimeter (ZDC) at BM@N

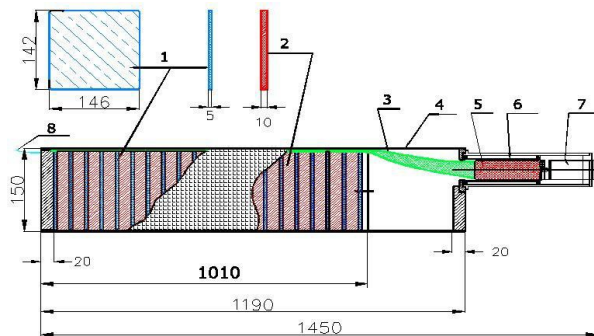


## ZDC modules



Central part with 36 modules 7.5 x 7.5cm<sup>2</sup>  
Outer part with 68 modules 15 x 15cm<sup>2</sup>

## ZDC module structure

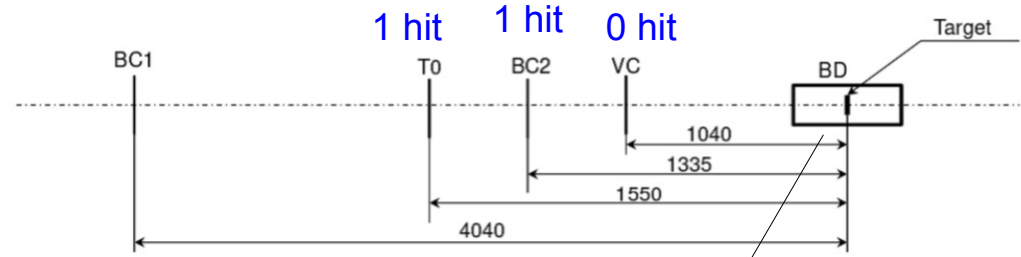


- ZDC modules based on old technologies of light collection by WLS plate and does not have a longitudinal segmentation.
- calibration: on cosmics only

64 layers of 5mm scint. + 10mm Pb

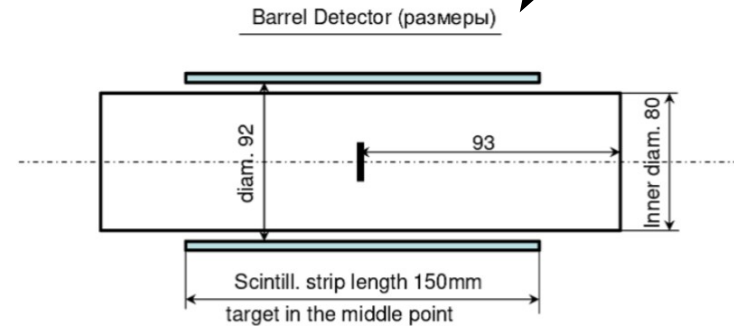
Experimental data:

- nHitsBC2 = 1, nHitsT0 = 1
- no fake trigger: nHitsVETO = 0
- hits BD >=2 (in trigger)

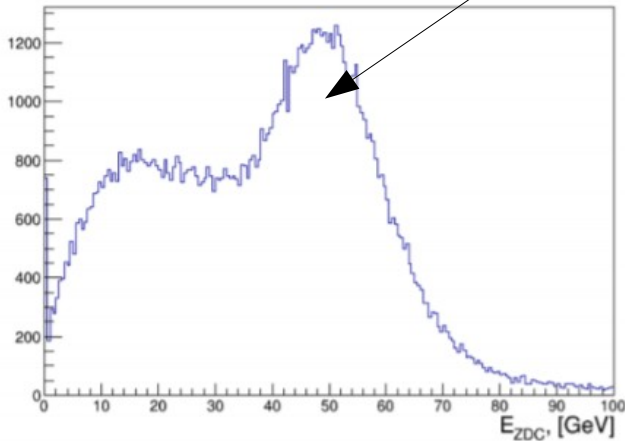


Simulation in GEANT4:

- all detectors in place (TOF + DCH)
- DCM-QGSM model, C+C@4 AGeV reaction
- event selection with BD detector (nHitsBD >= 2)

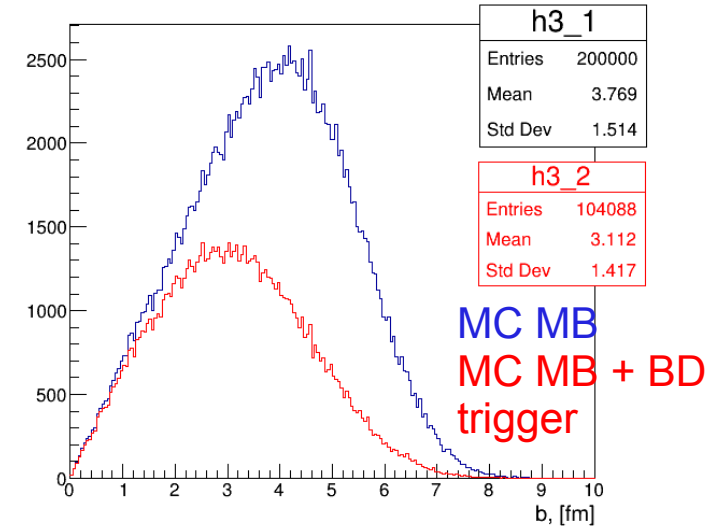
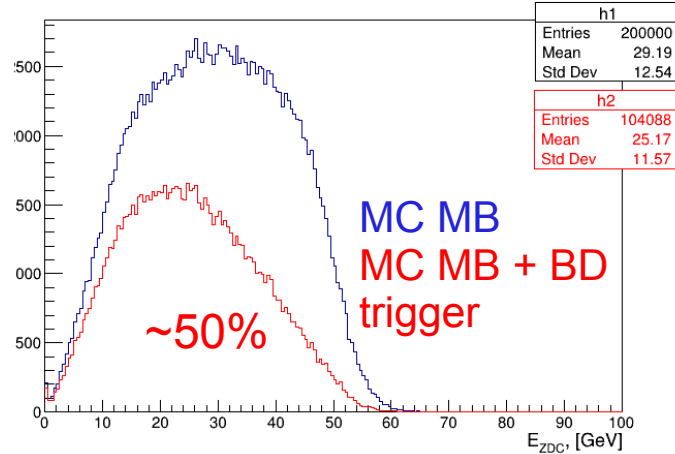


experimental data



C beam contamination

simulation



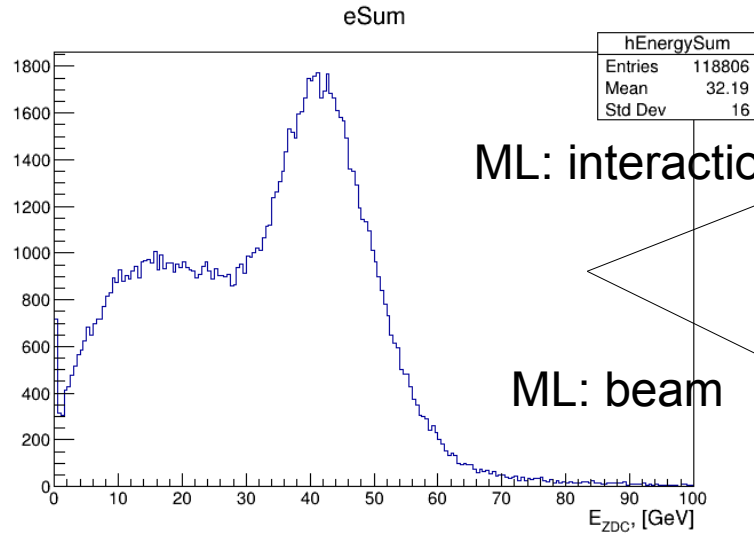
Exp. (multiplicity) trigger BD>=2 affects MB and selects ~ 50% most central events

# Machine Learning technique

NEW method:

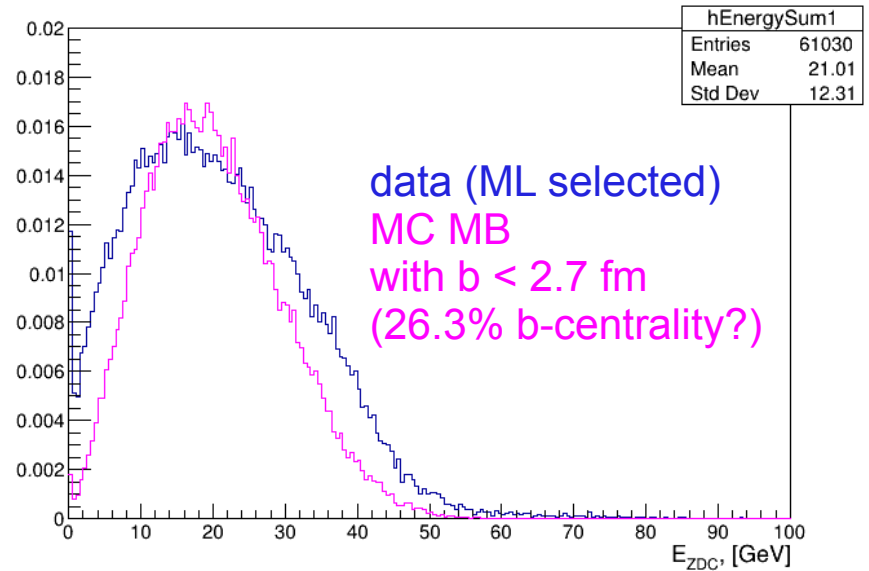
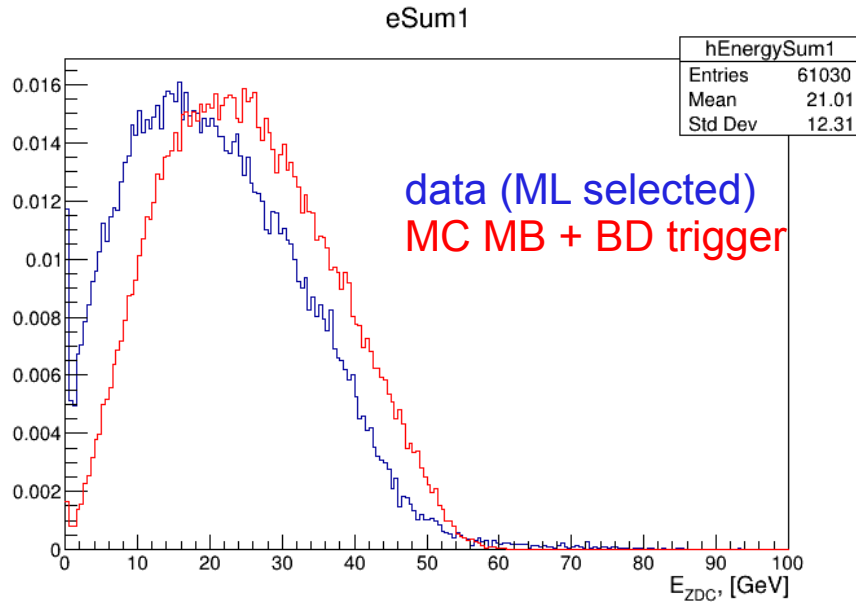
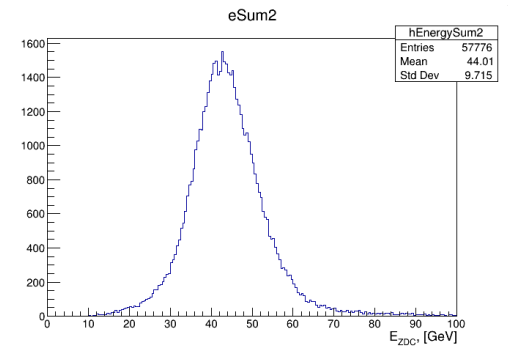
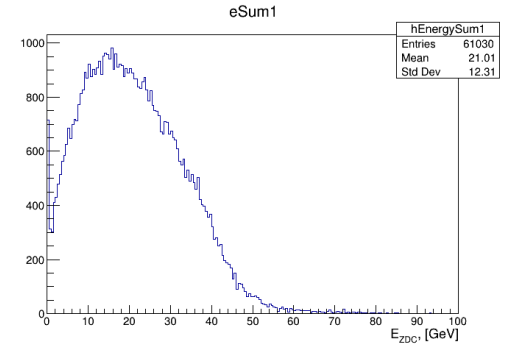
ML technique for event selection

- train on empty target



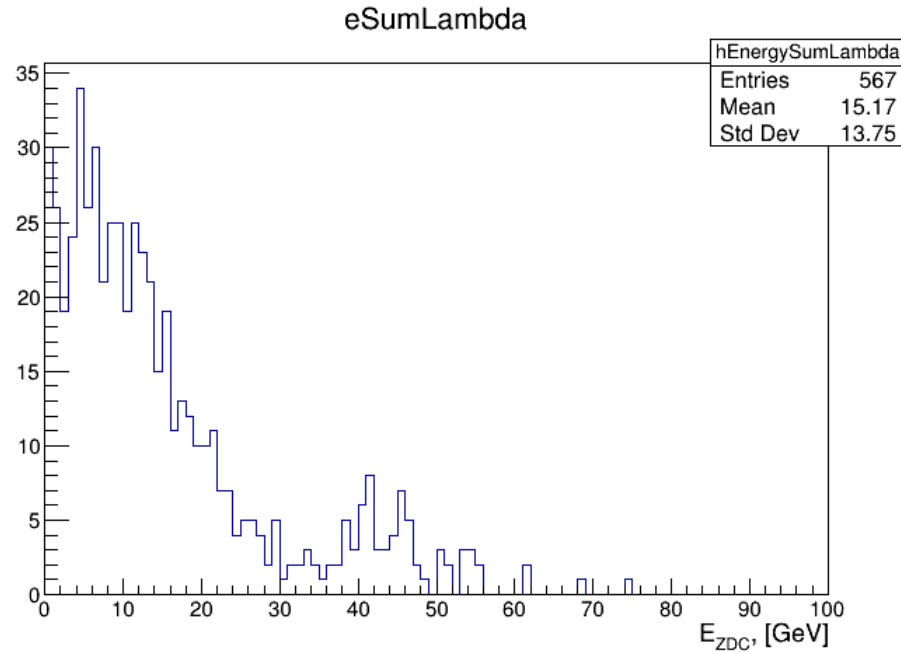
ML: interaction

ML: beam

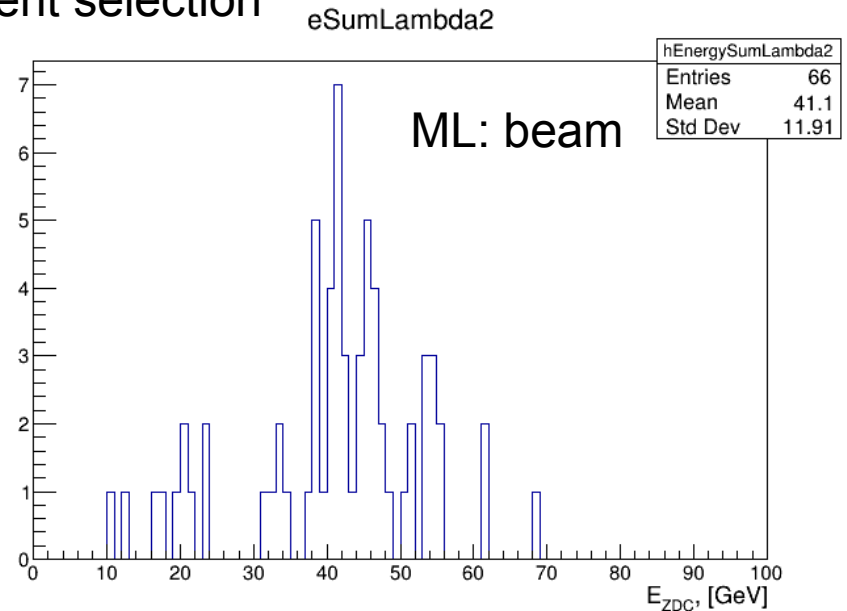
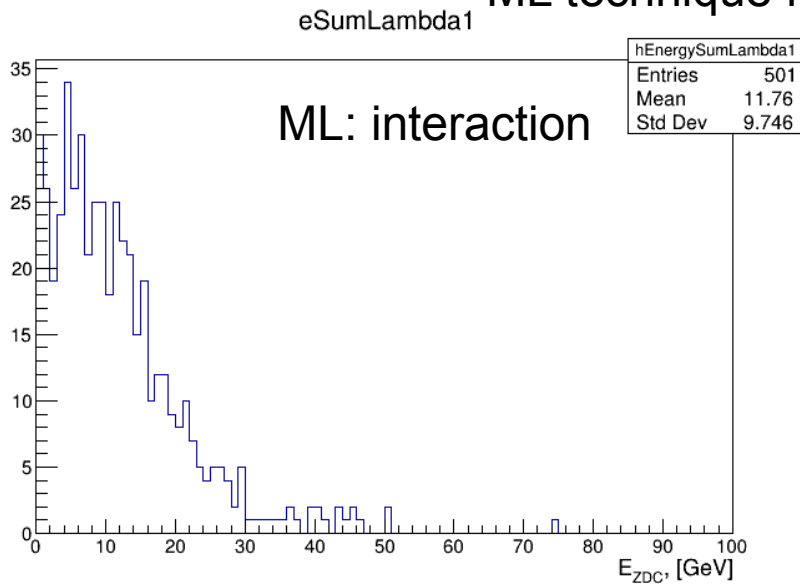


- significant difference in data and MC

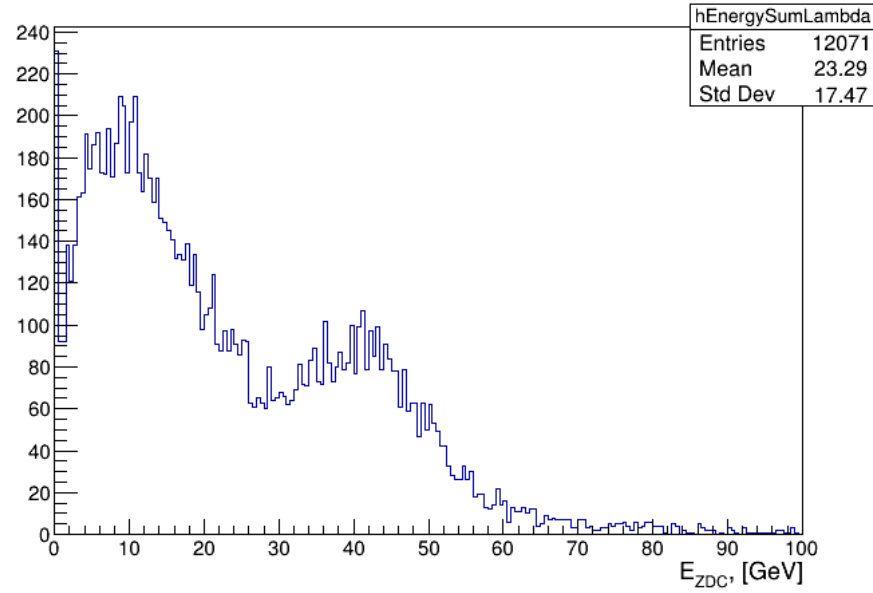
lambda events:  
mass cut + kinematic cut



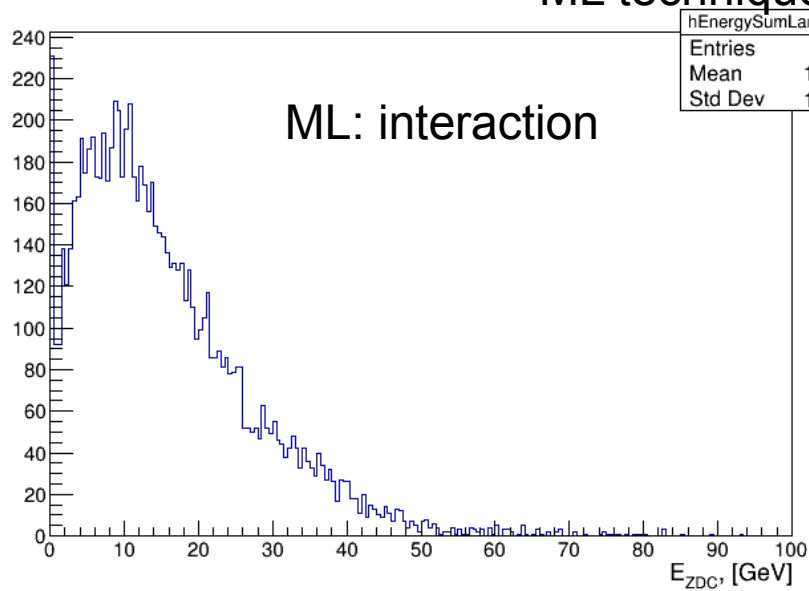
ML technique for event selection



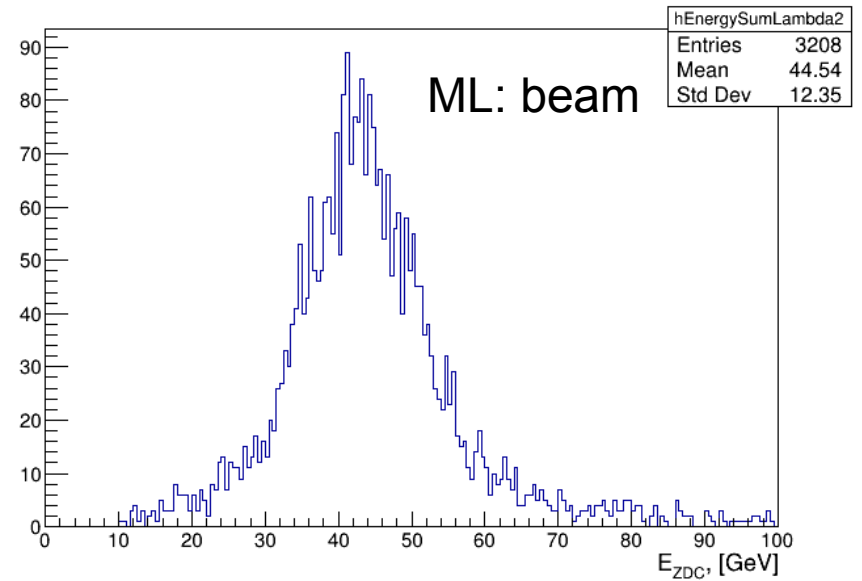
lambda events:  
mass cut (only)



### ML technique for event selection



ML: interaction



ML: beam