



Trento Institute for
Fundamental Physics
and Applications



Preliminary search for Est-West effect

Event selection

Search for EW effect by comparing direction maps in different samples

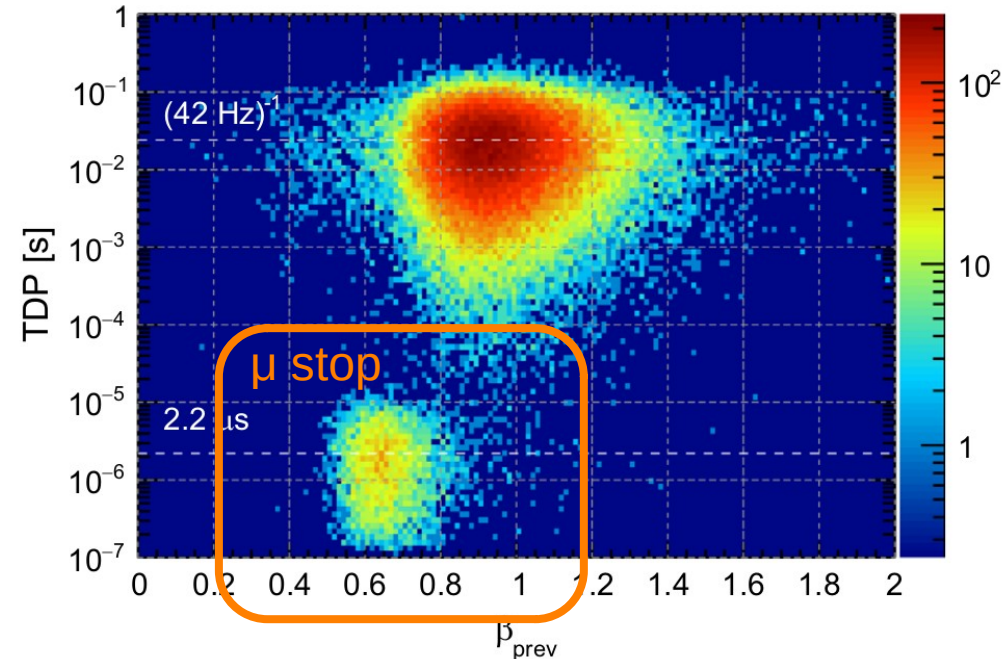
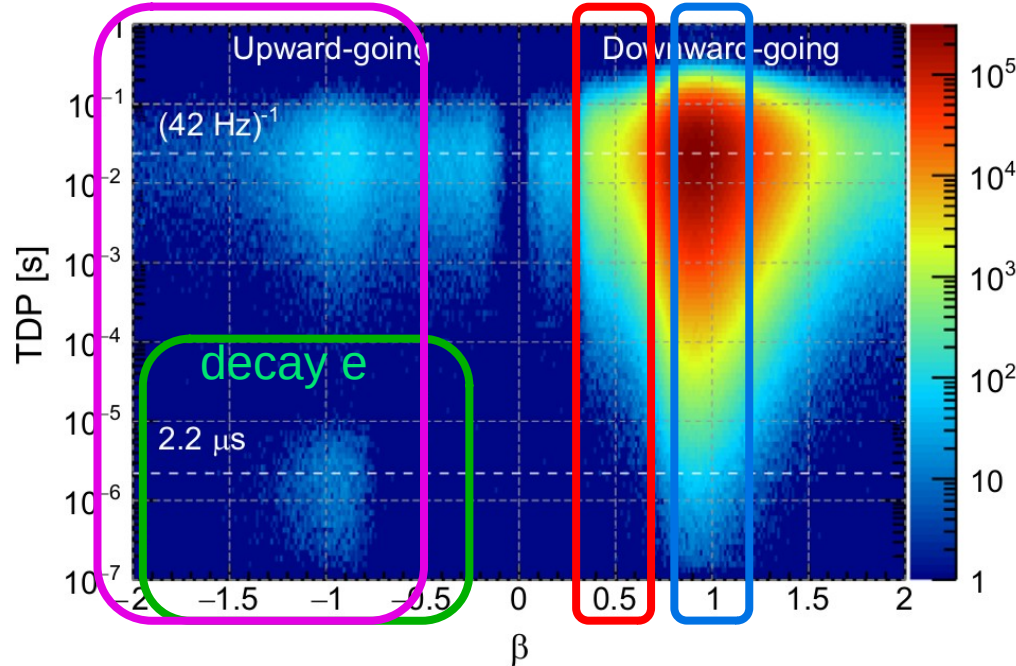
- Class 1: Fast down-going
- Class 2: Slow down-going

Class 3: Stopping downgoing (tagging the decay electron)

Class 4: Upgoing electrons (same events of class 3)

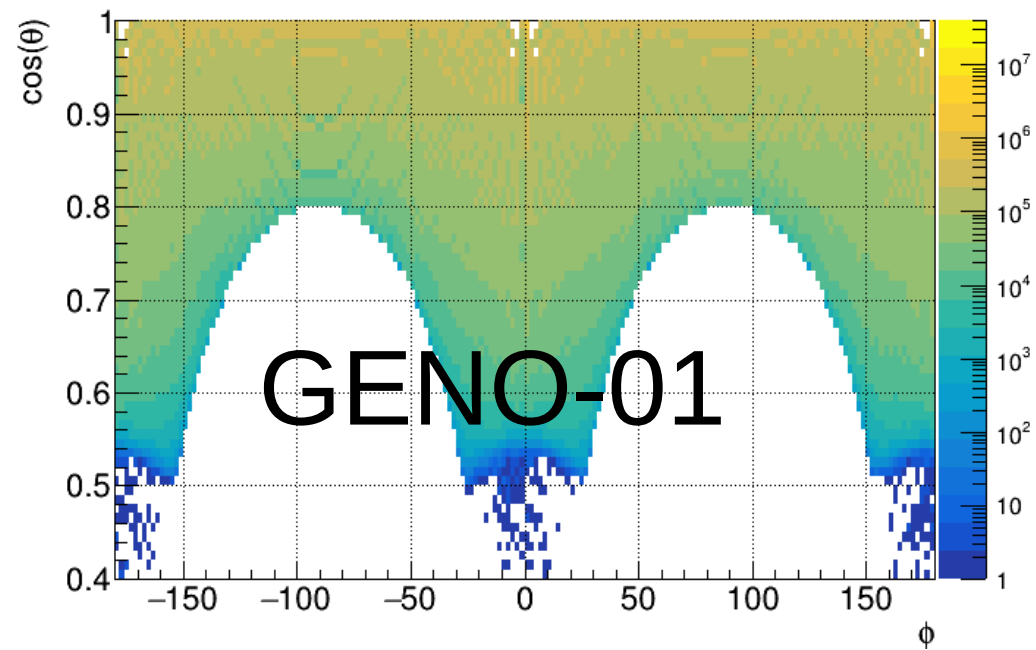
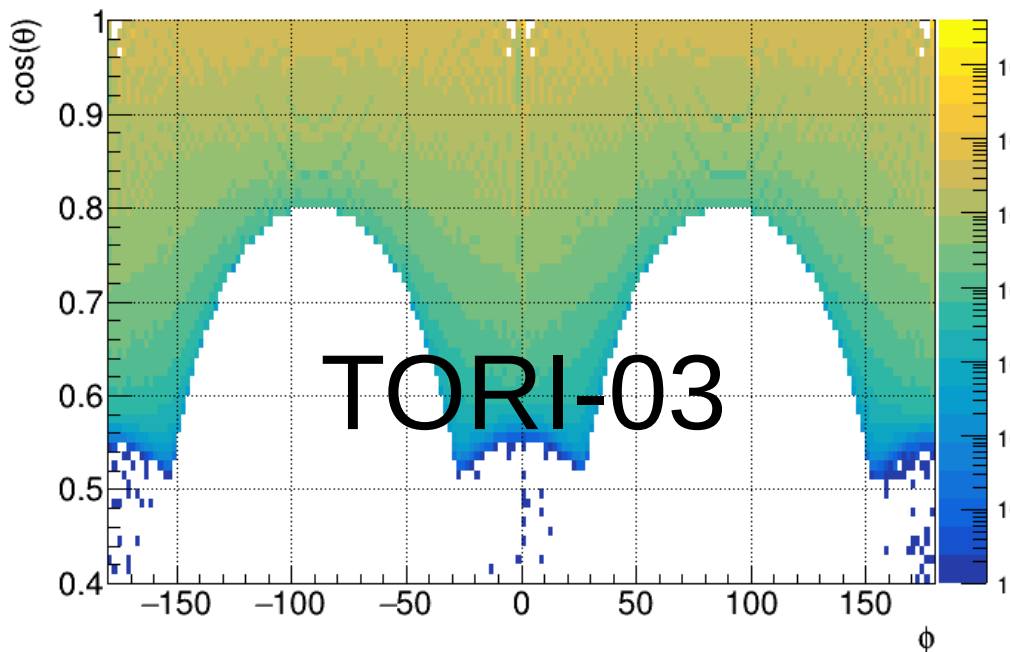
Class 5: 2-tracks Events

Class 6: Upgoing Events $\beta > -0.5$



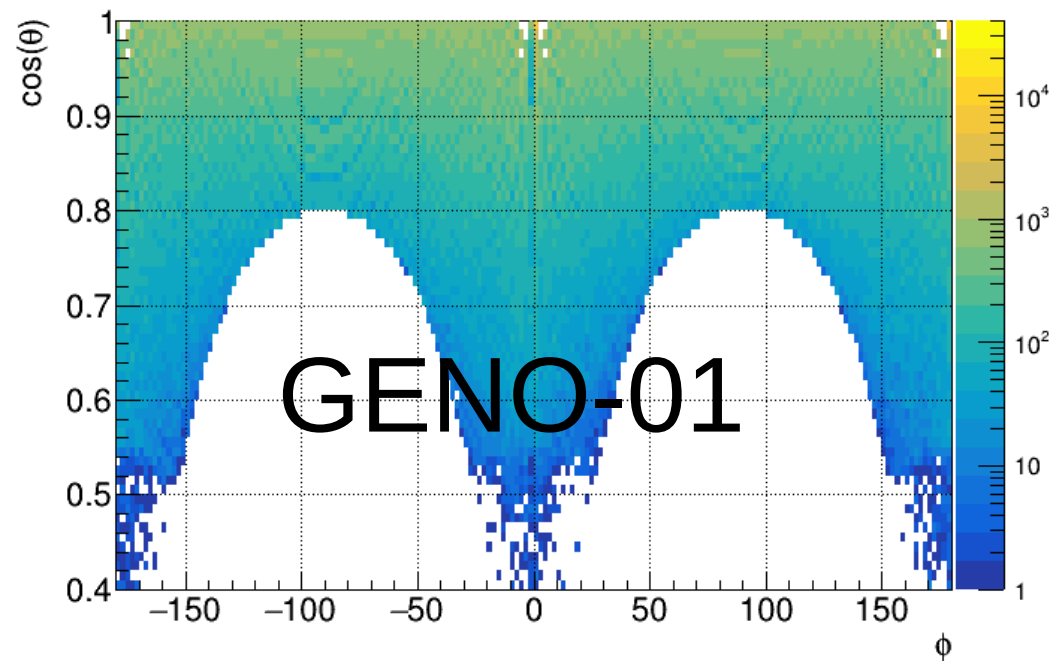
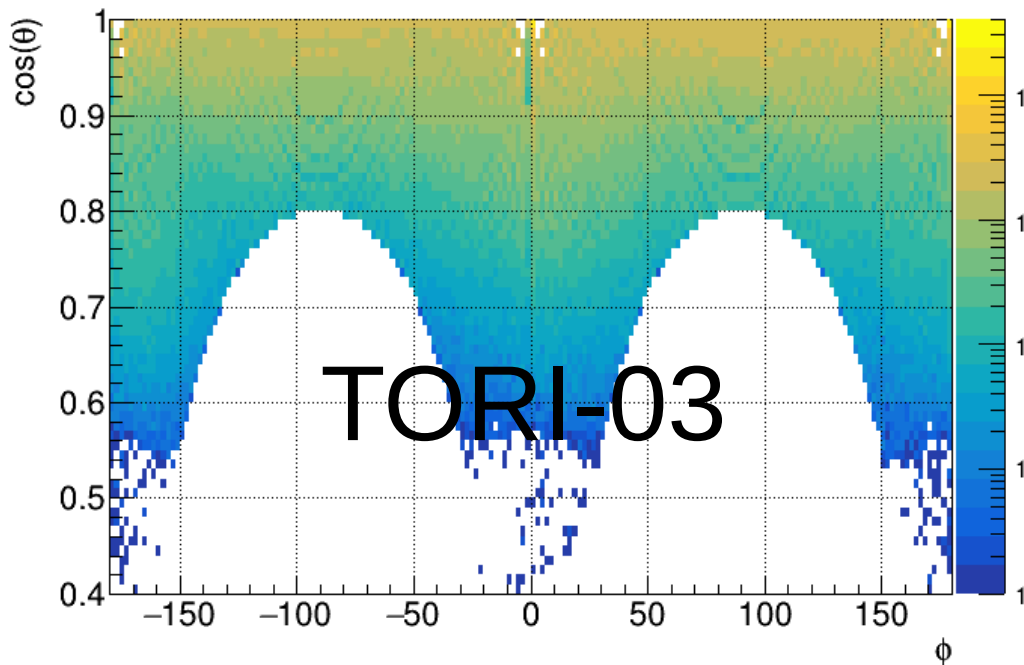
Class 1 direction map for 2019

Fast down-going: $0.8 < \beta < 1.2$ & $\text{ChiSquare} < 30$ & $\text{Ntracks} == 1$



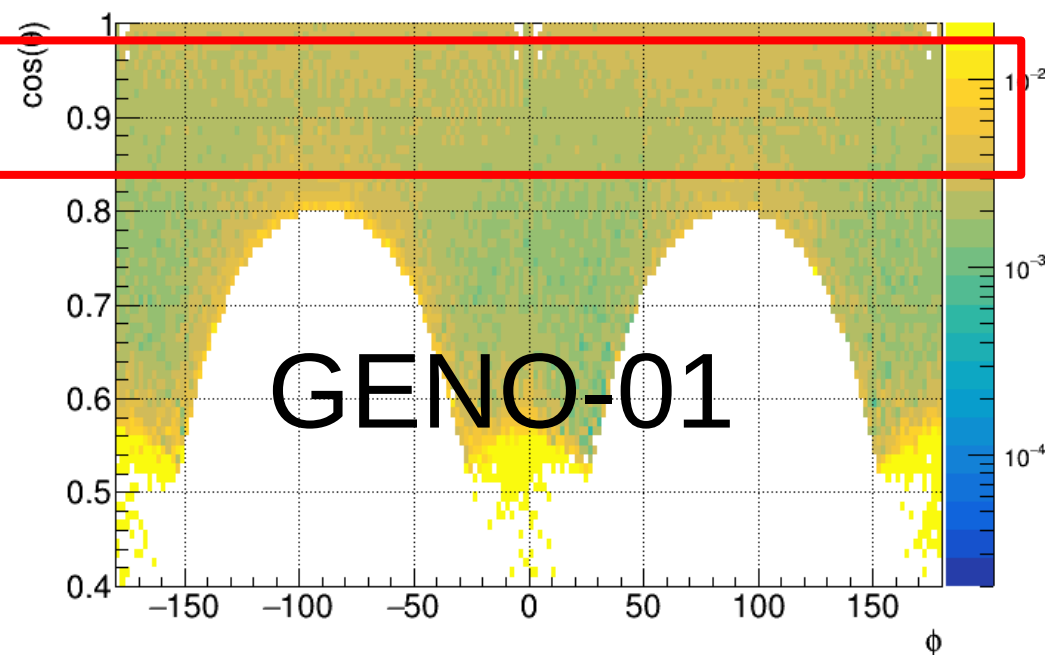
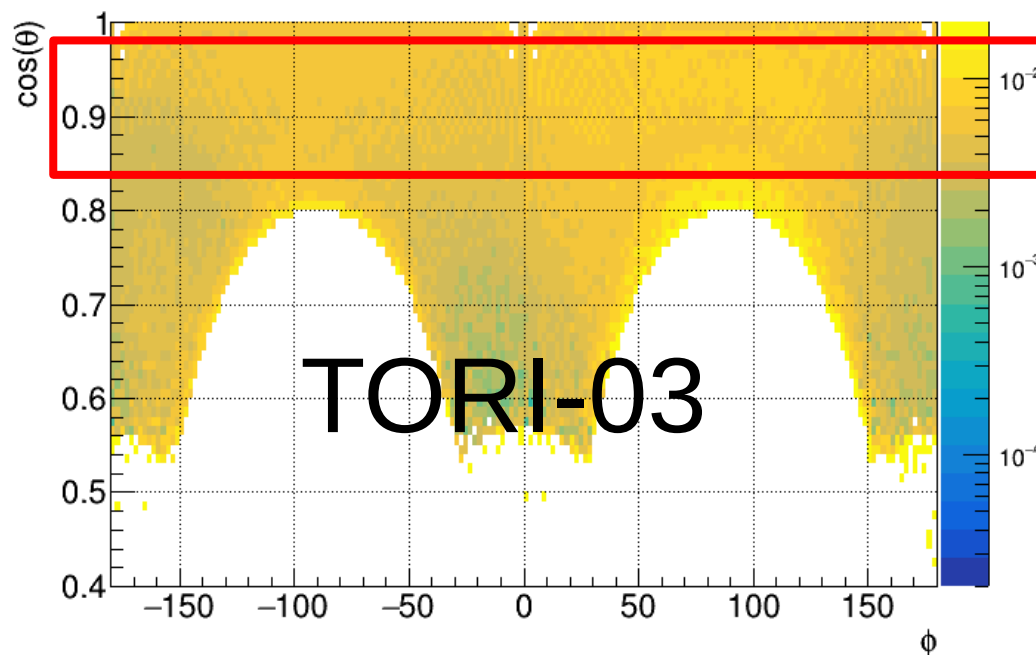
Class 2 direction map for 2019

slow down-going: $0.4 < \beta < 0.6$ & $\text{ChiSquare} < 30$ & $\text{Ntracks} = 1$



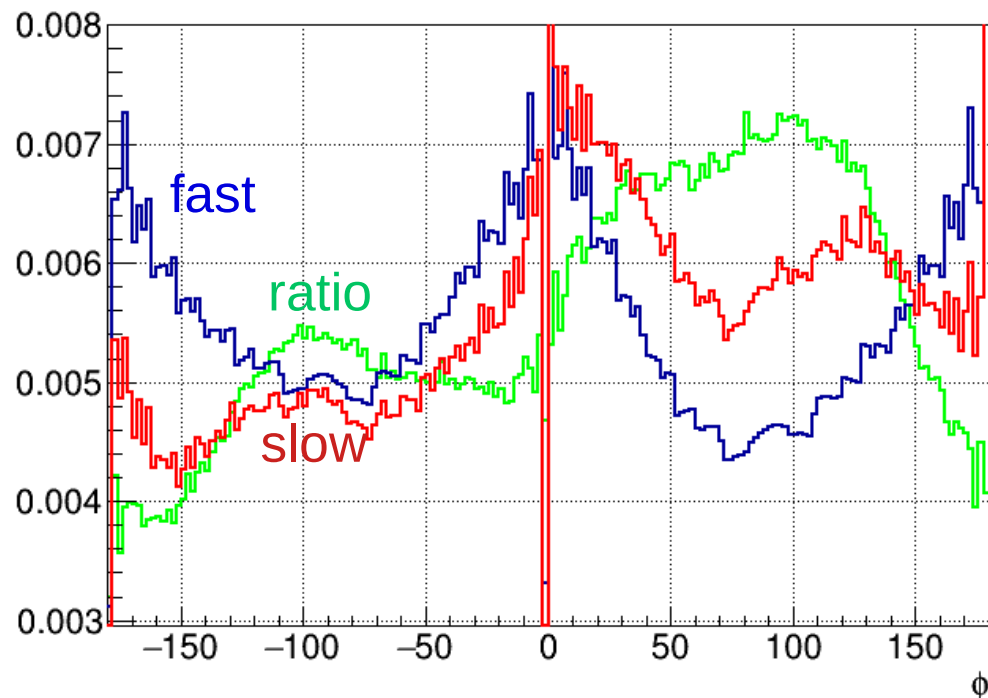
Class 2/Class 1 ratio for 2019

The common geometric acceptance effects should cancel-out

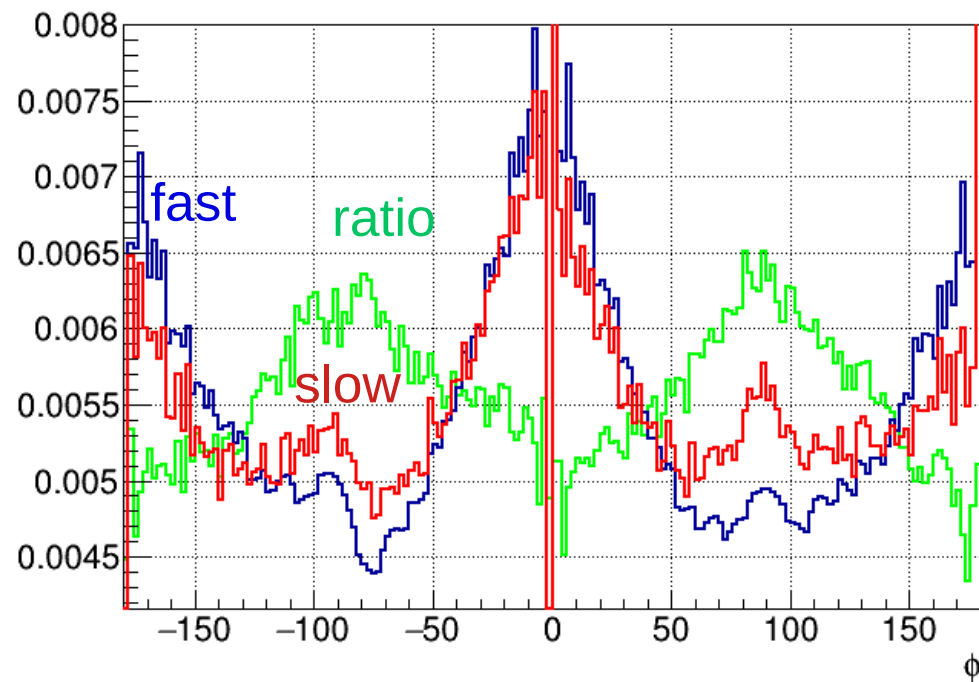


Normalized projections $0.84 < \cos(\theta) < 0.98$ for 2019

TORI-03

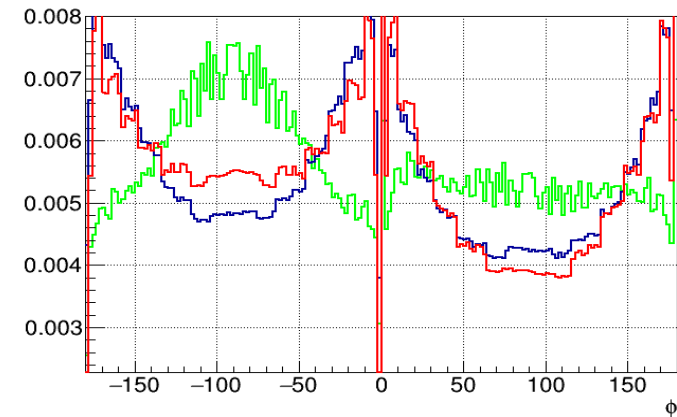


GENO-01

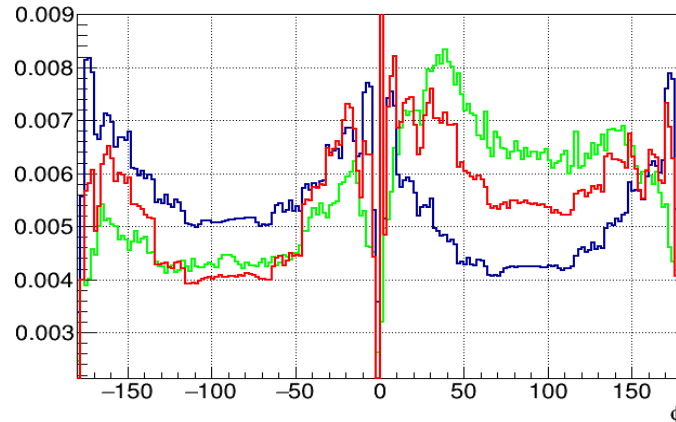


Normalized projections $0.84 < \cos(\theta) < 0.98$ for 2019

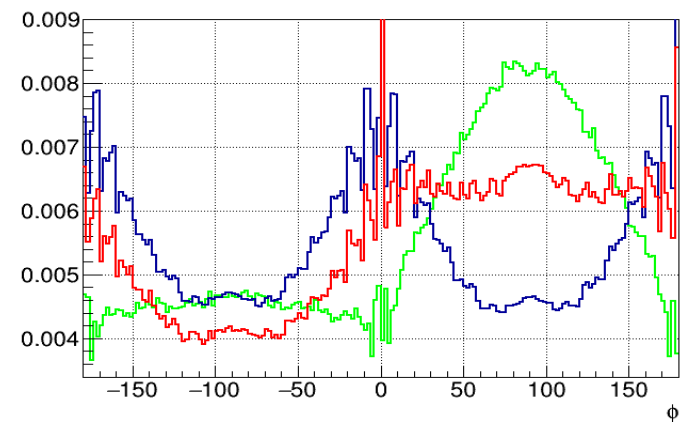
CERN-01



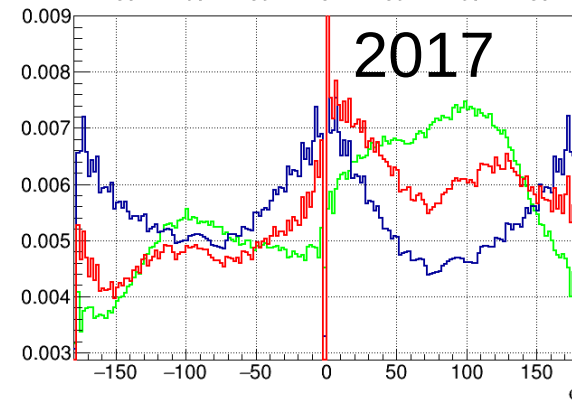
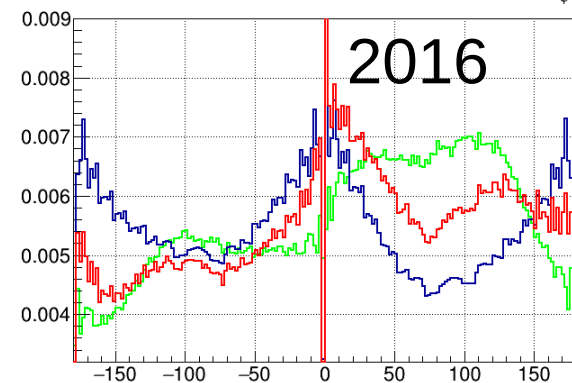
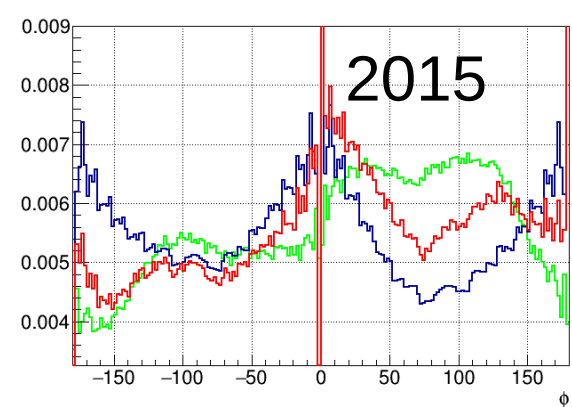
CERN-02



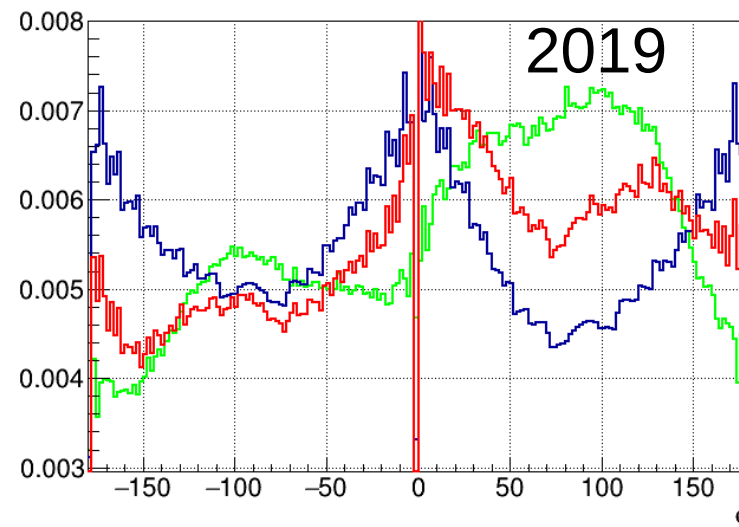
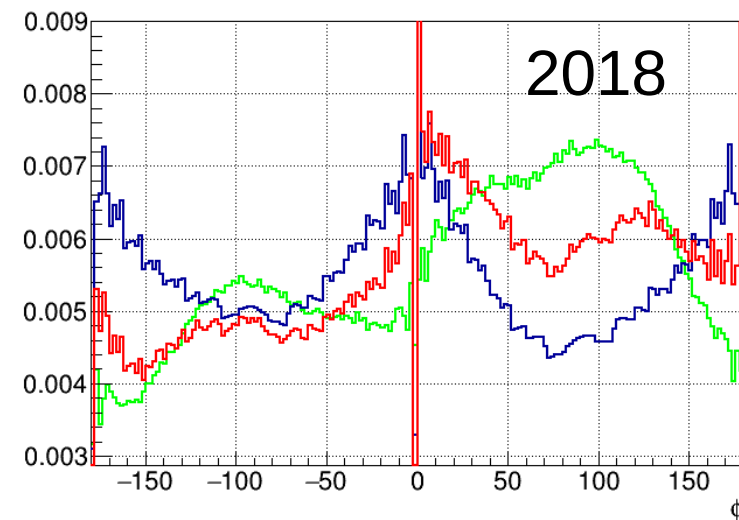
SAVO-01

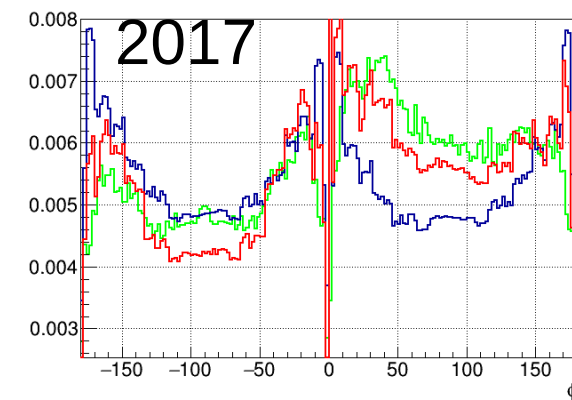
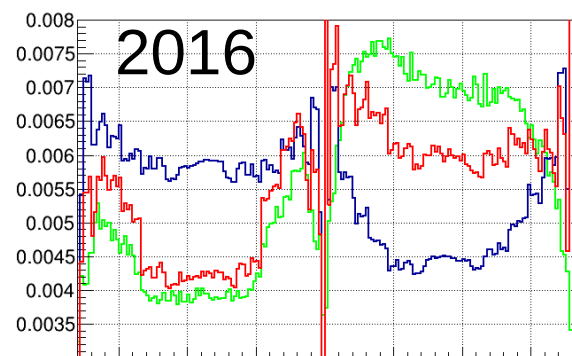
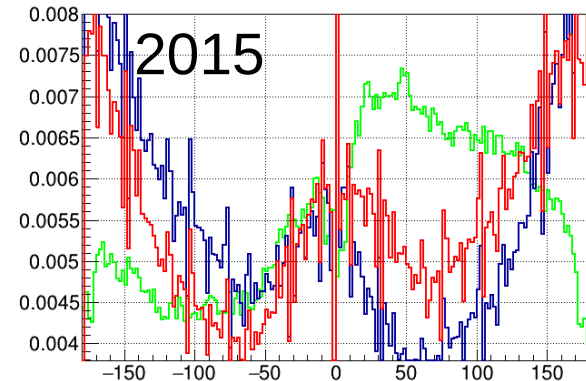


Where is East? Still to check if this is E-W effect

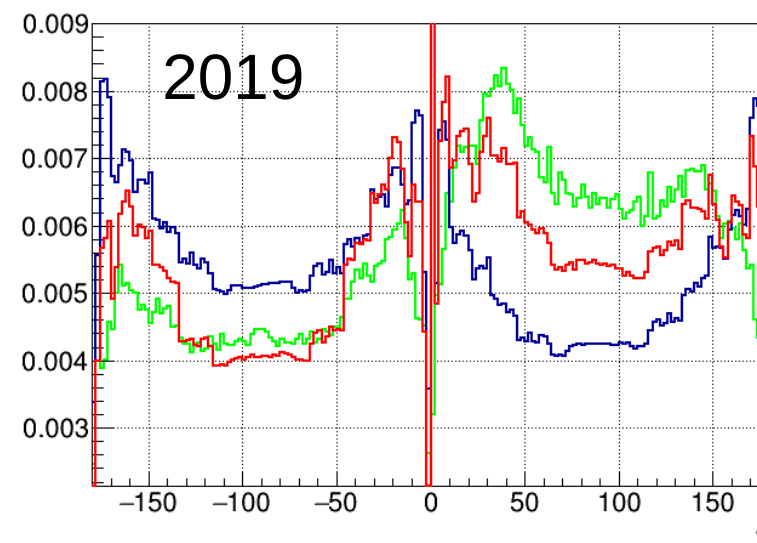
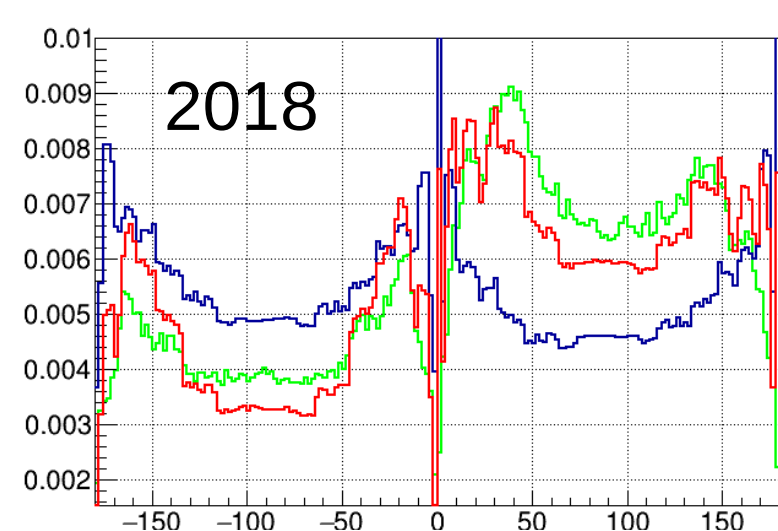


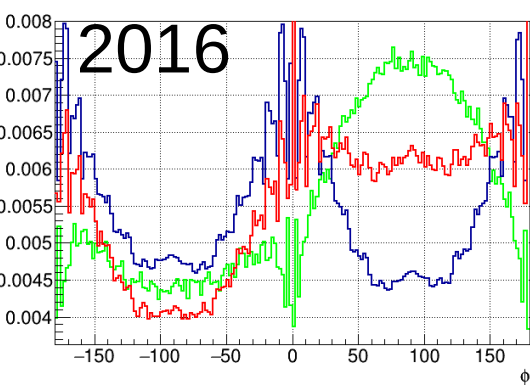
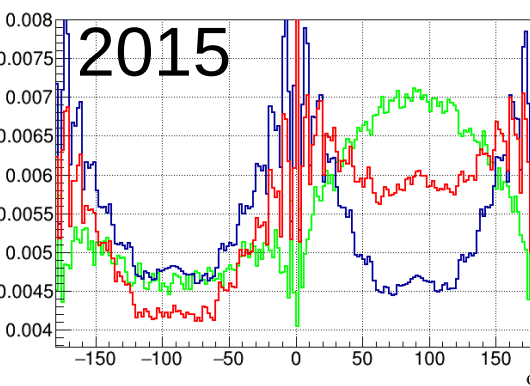
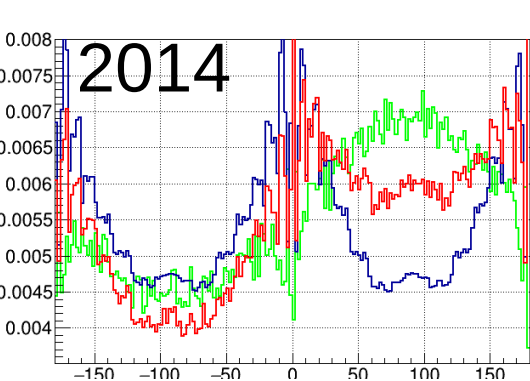
Different year
comparison for
TORI-03



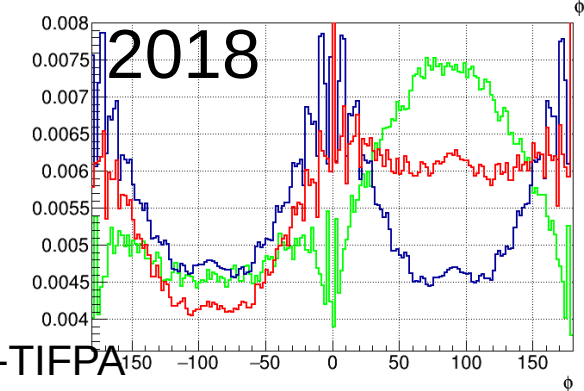
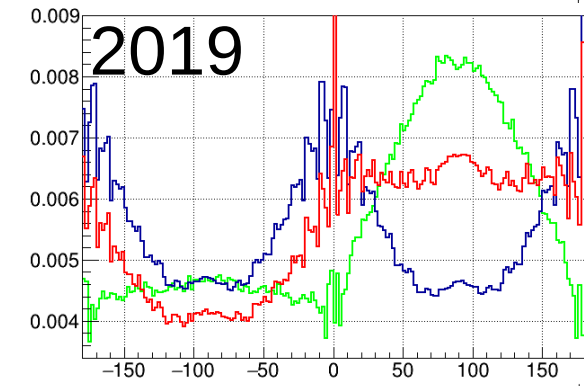
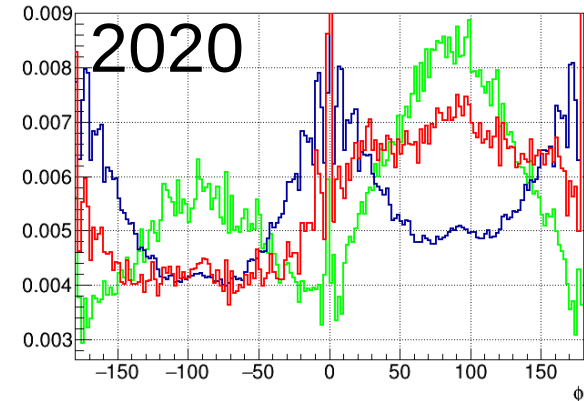
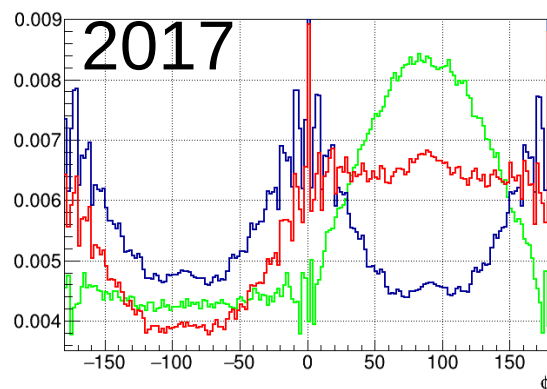


Different year
comparison
for CERN-02

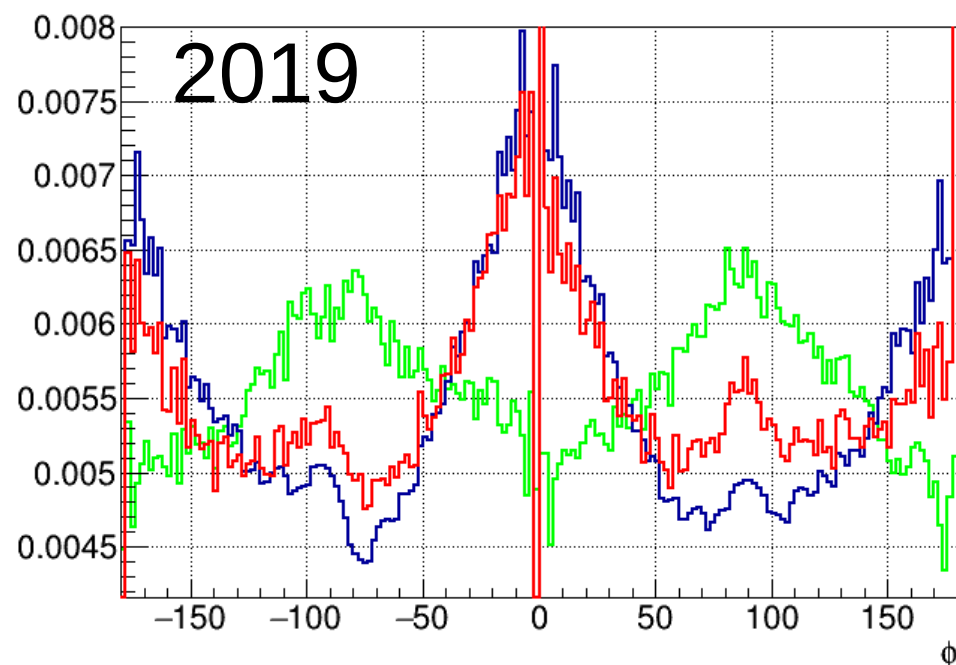
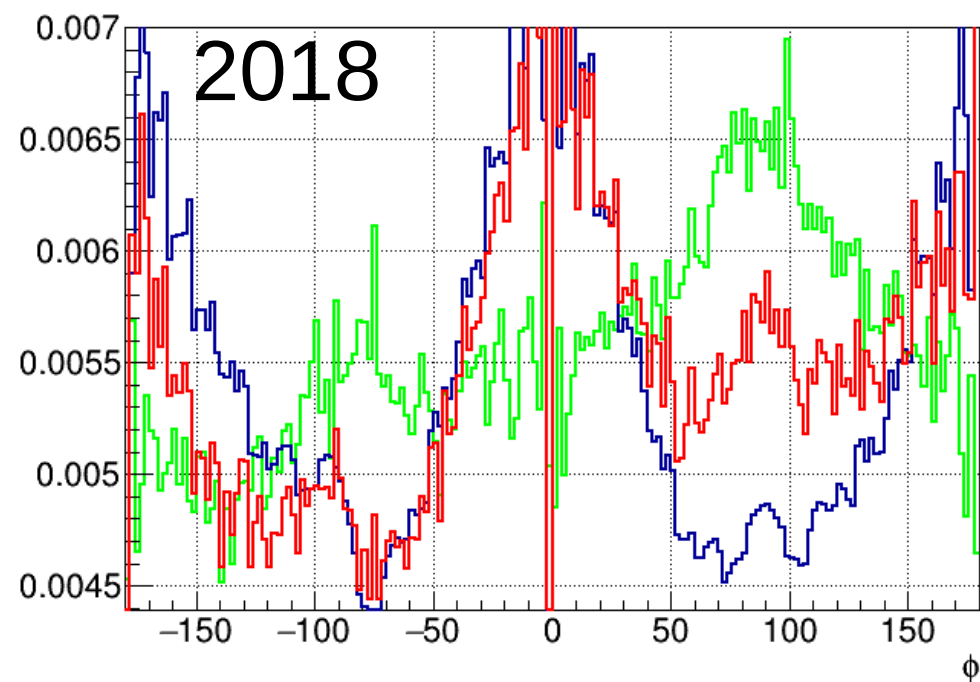


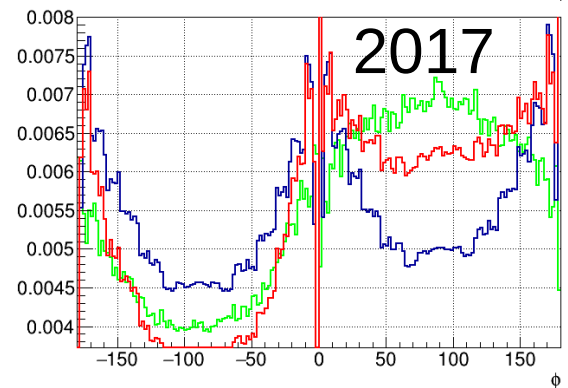
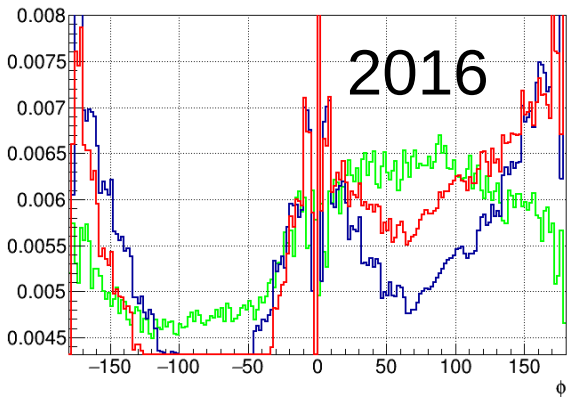
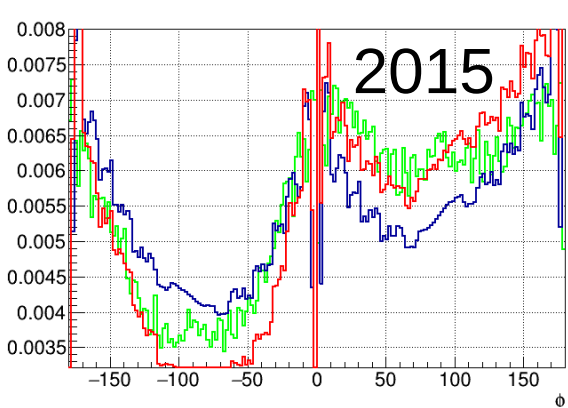


Different year comparison for SAVO-01



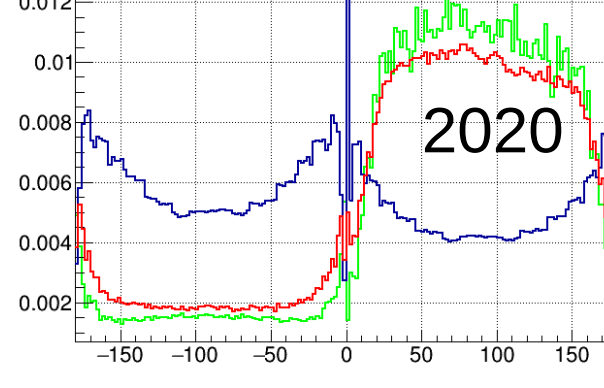
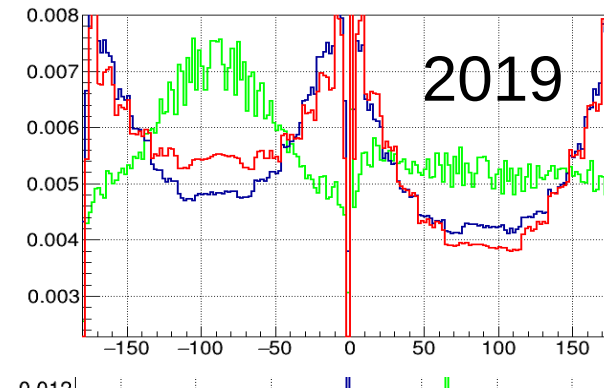
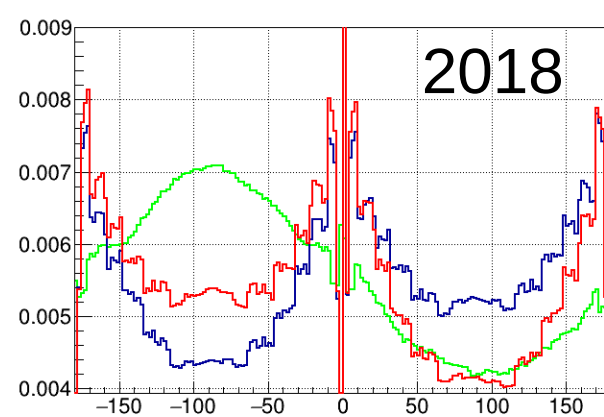
Different year comparison for GENO-01





Different year
comparison for
CERN-01

quite puzzling flip
pointing out some
systematic effect
(what happens in
2018/19 to CERN-01?)



TO-DO list

- comparing to “known” East directions
- understand GENO-01 (mountain effect?)
- understand CERN-01 (why flip?)

If true E-W effect:

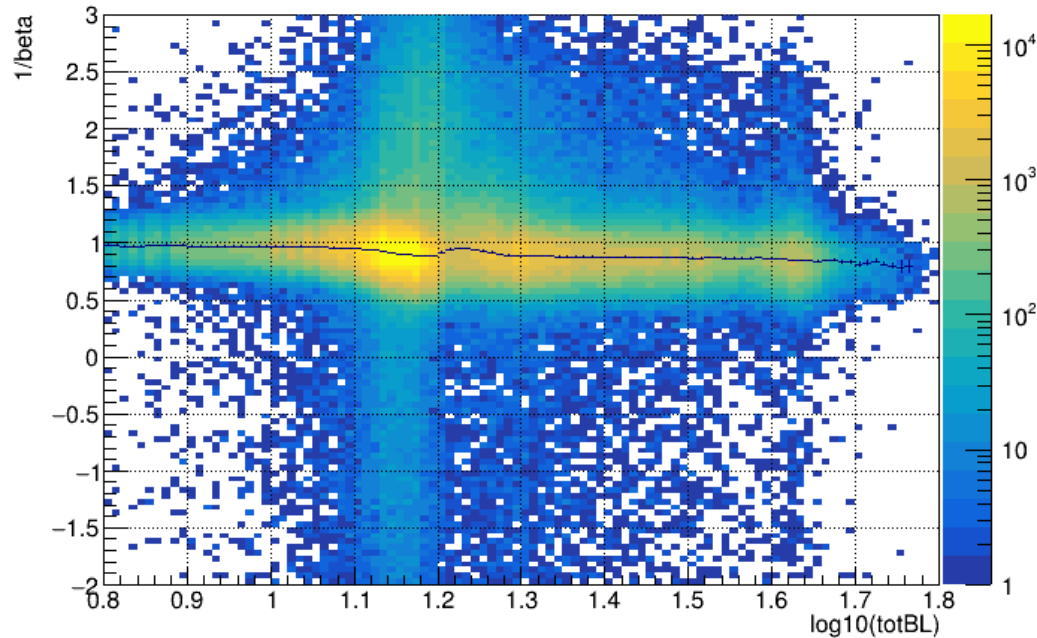
- determine its magnitude (comparison with MC)
- study magnitude vs time vs location

Note: we try also to optimize beta resolution with ToT
(to improve beta selections) we have few slides

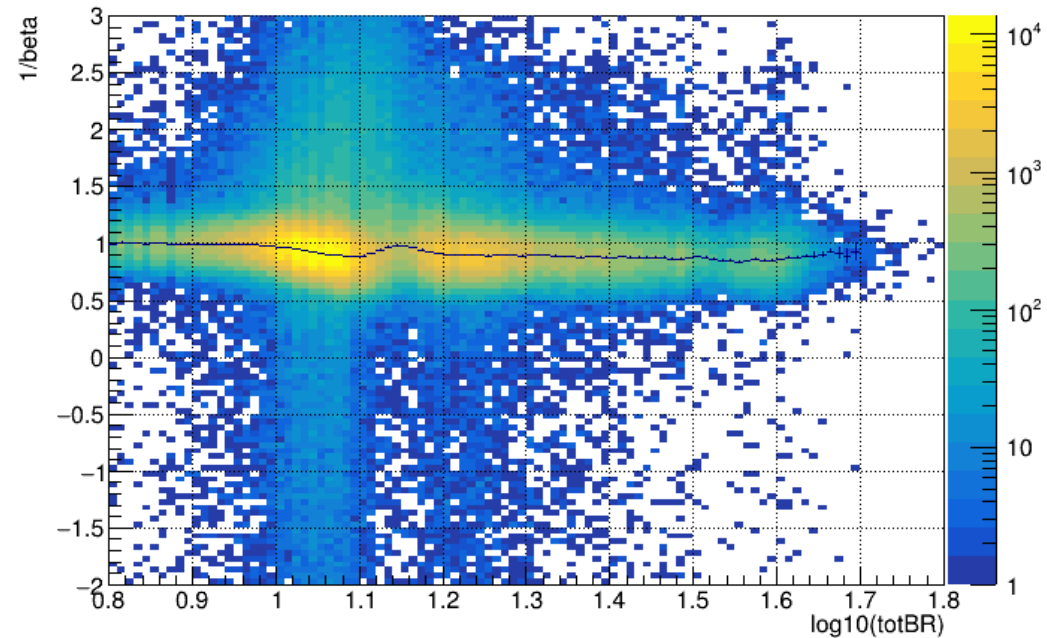
Beta resolution optimization

Useful selection of data: $\text{chisquare} < 30$ & $\text{Ntracks} == 1$ &
 $5 < \text{PosXBot} < 150$ & $5 < \text{PosXMid} < 150$ & $5 < \text{PosXTop} < 150$

1/beta vs Tot Bottom Left

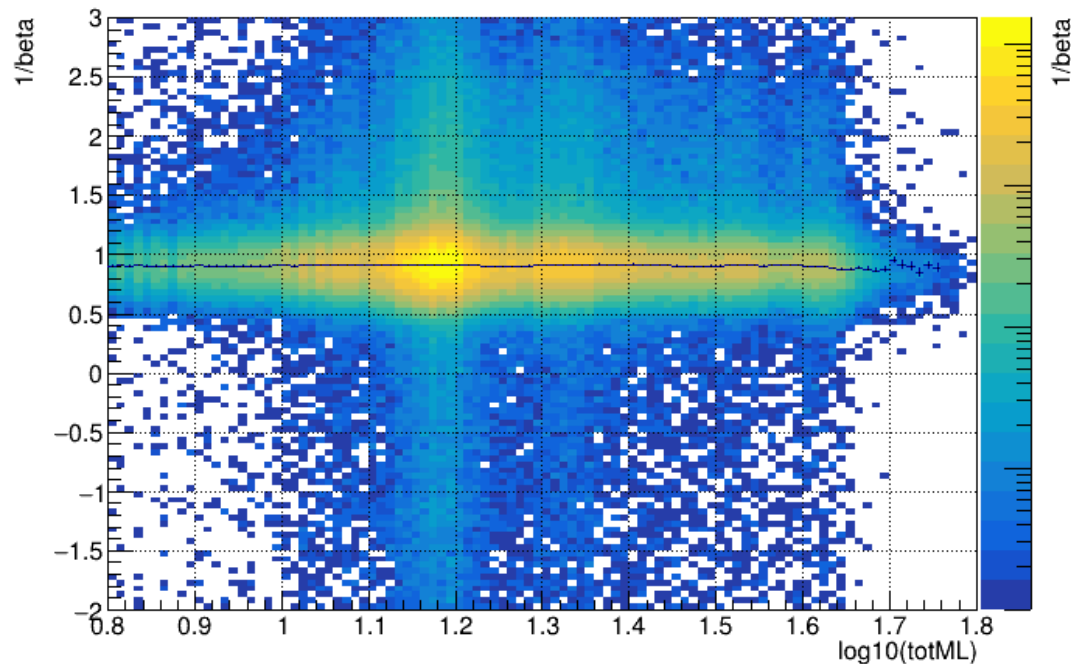


1/beta vs Tot Bottom Right

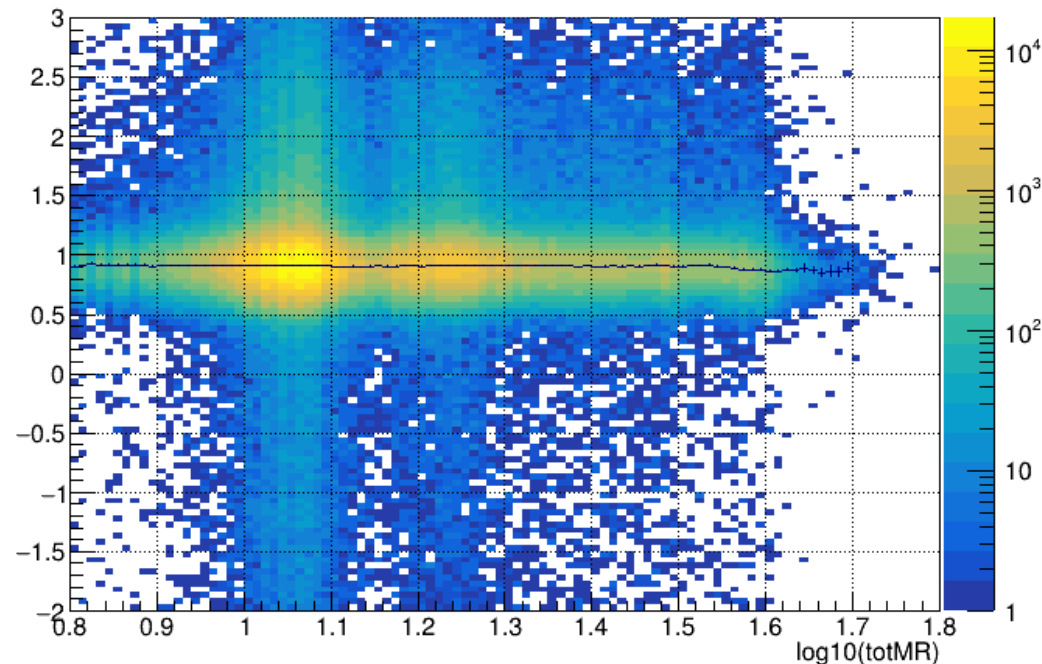


Useful selection of data: $\text{chisquare} < 30$ & $\text{Ntracks} == 1$ &
 $5 < \text{PosXBot} < 150$ & $5 < \text{PosXMid} < 150$ & $5 < \text{PosXTop} < 150$

1/beta vs Tot Middle Left

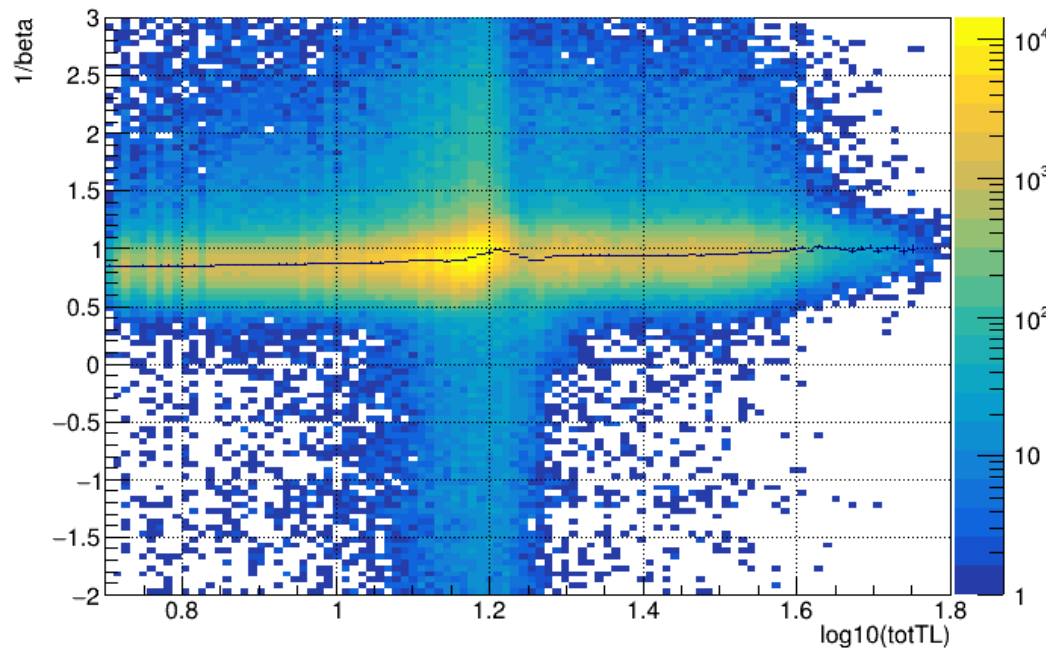


1/beta vs Tot Middle Right

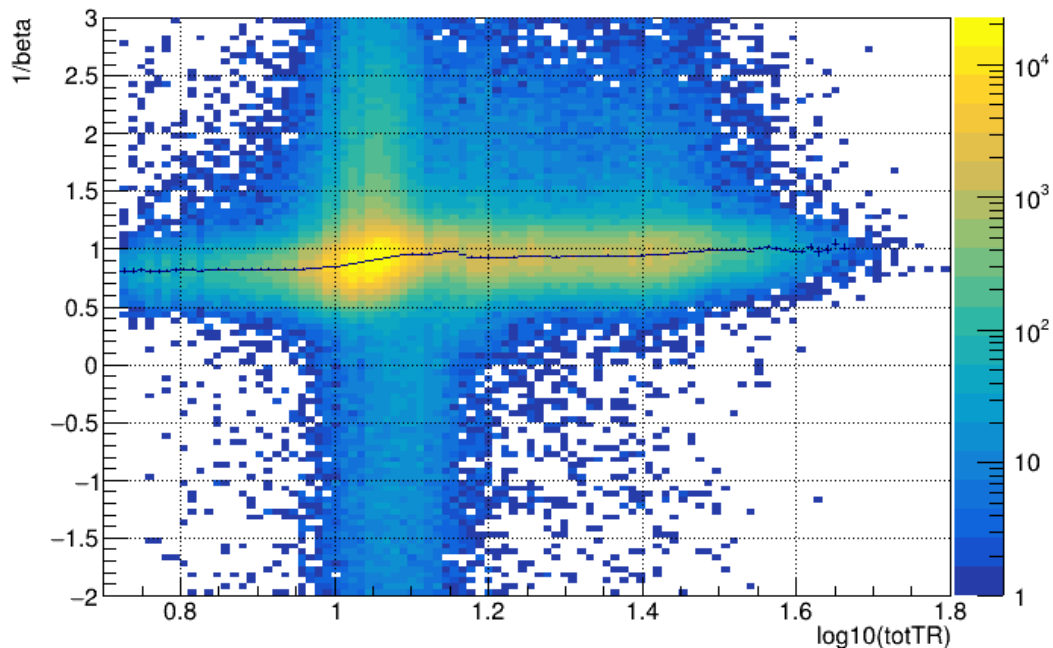


Useful selection of data: $\text{chisquare} < 30$ & $\text{Ntracks} == 1$ &
 $5 < \text{PosXBot} < 150$ & $5 < \text{PosXMid} < 150$ & $5 < \text{PosXTop} < 150$

1/beta vs Tot Top Left



1/beta vs Tot Top Right

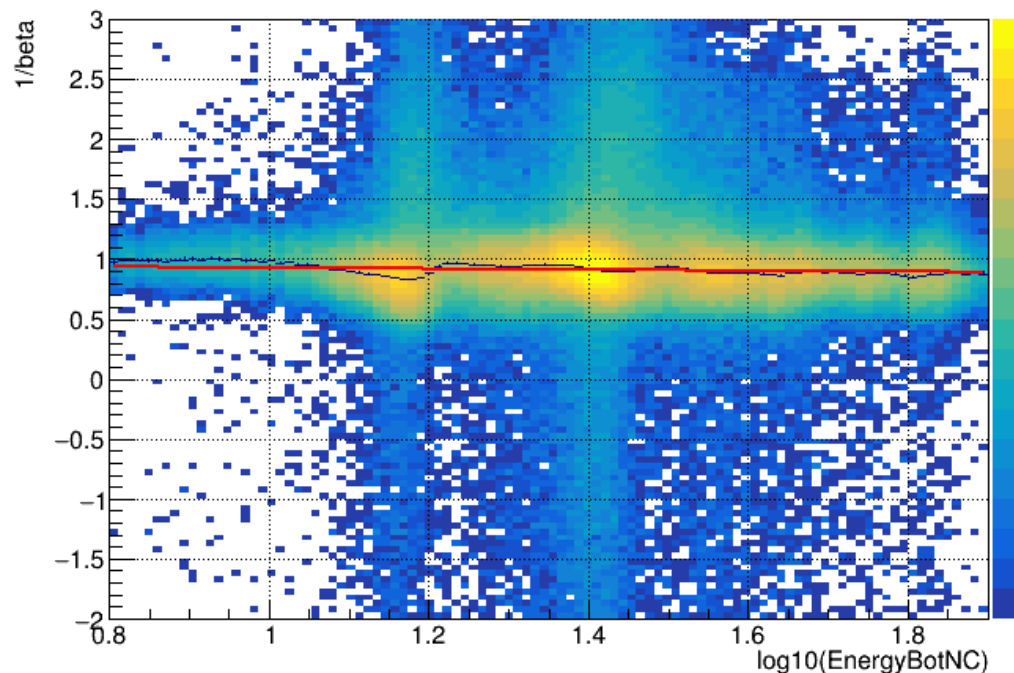


EnergyBotNC = totBL+totBR

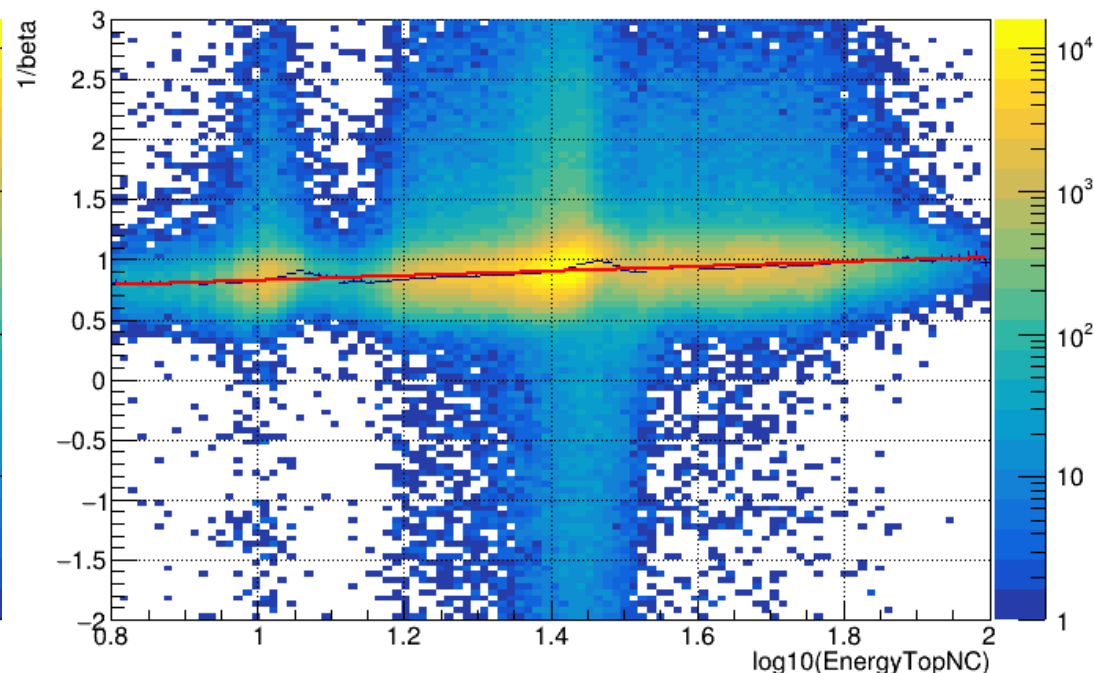
EnergyTopNC = totTL + totTR

Linear fit: decreasing correlation for Bottom and increasing for Top – Middle is constant

1/beta vs EnergyBotNC + fit



1/beta vs EnergyTopNC + fit



ToT correction in Top, Mid and Bot Chambers

