

EICRecon Status and Plans

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EIC RNC 2/14/2023

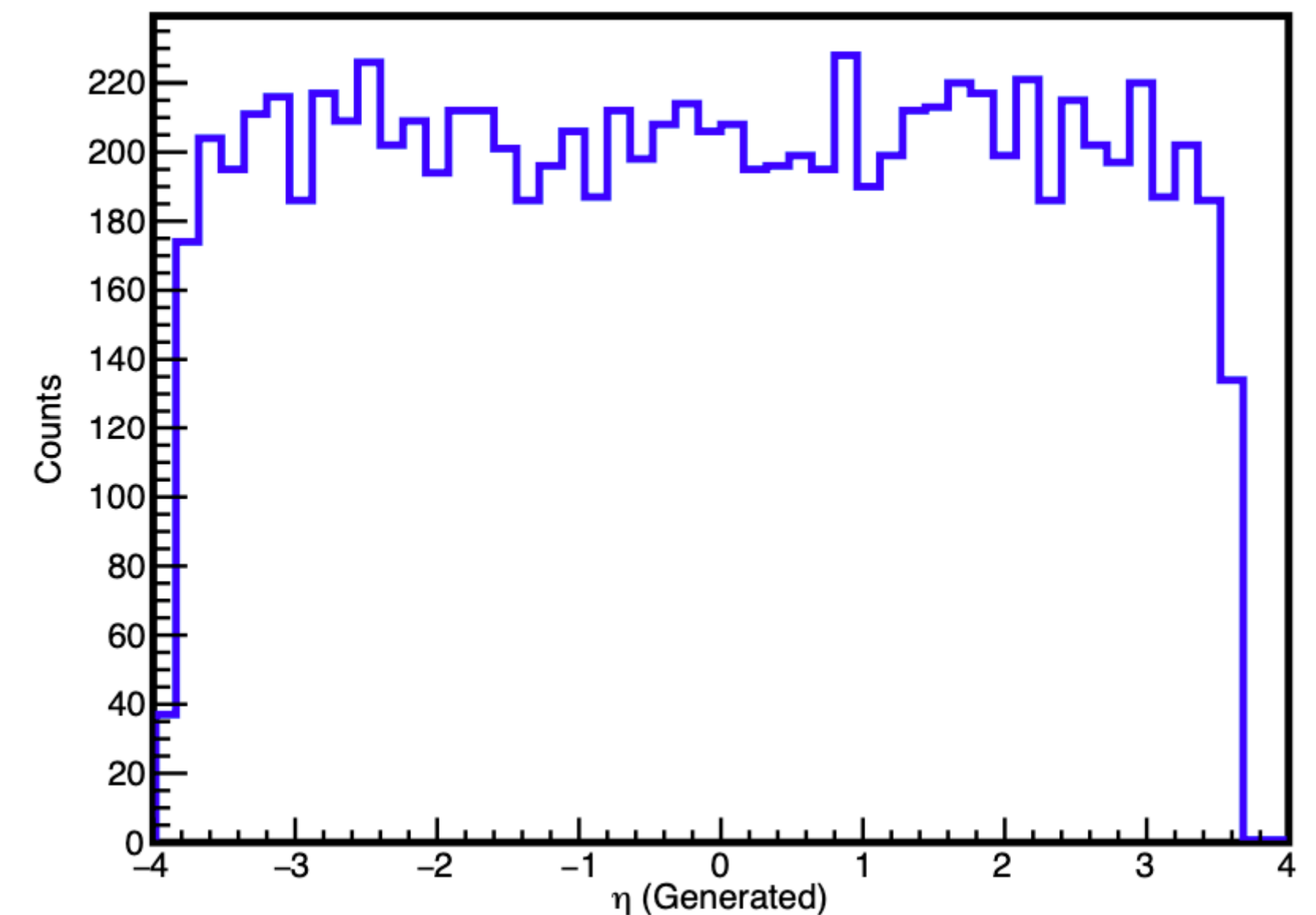
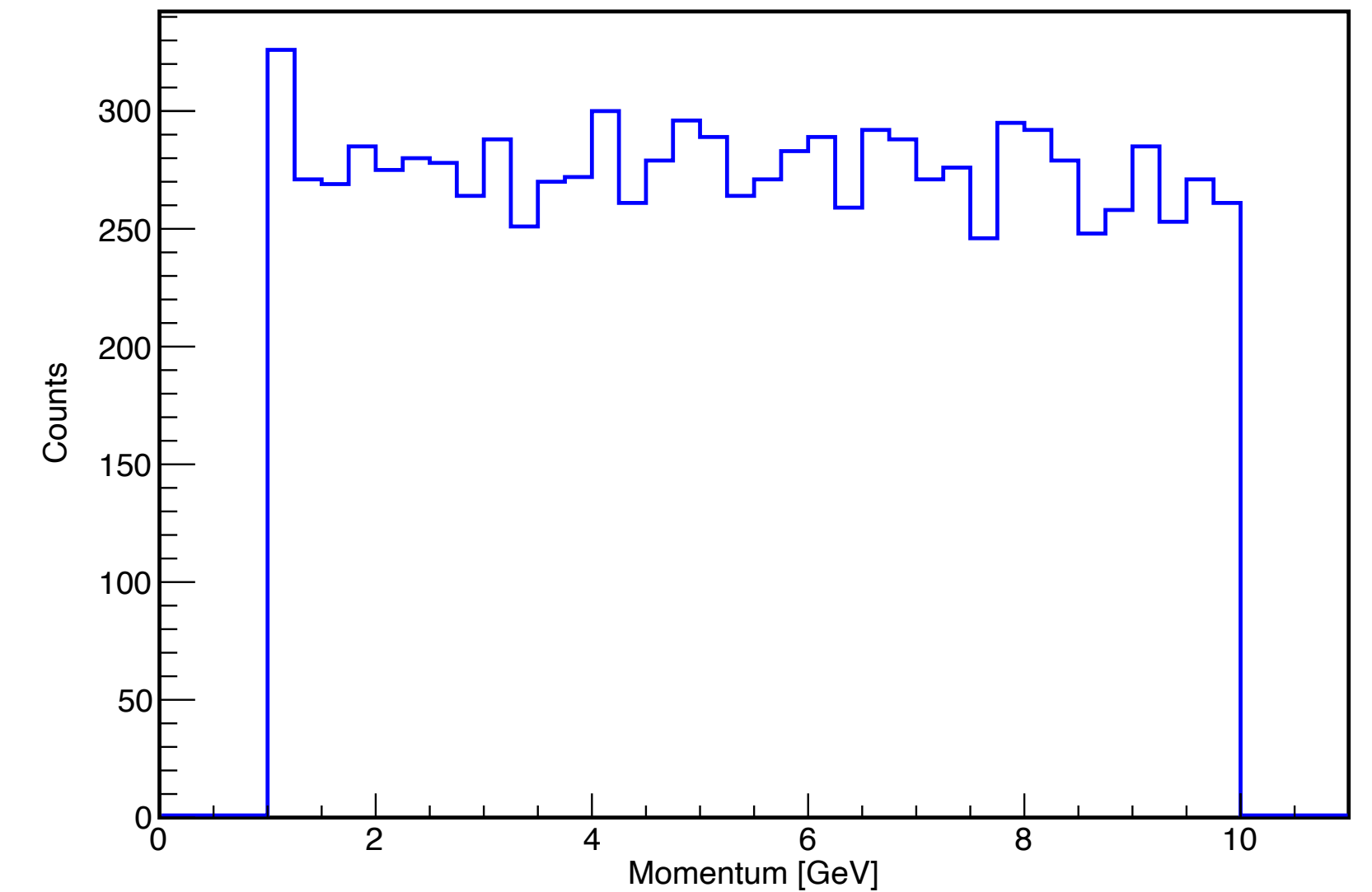
Current Work

- Generated 10,000 e^- events
 - $1 < p < 10$ GeV
 - $-4 < \eta < 4$ (flat distribution in η)
- Reconstruction is currently using **truth seeding**

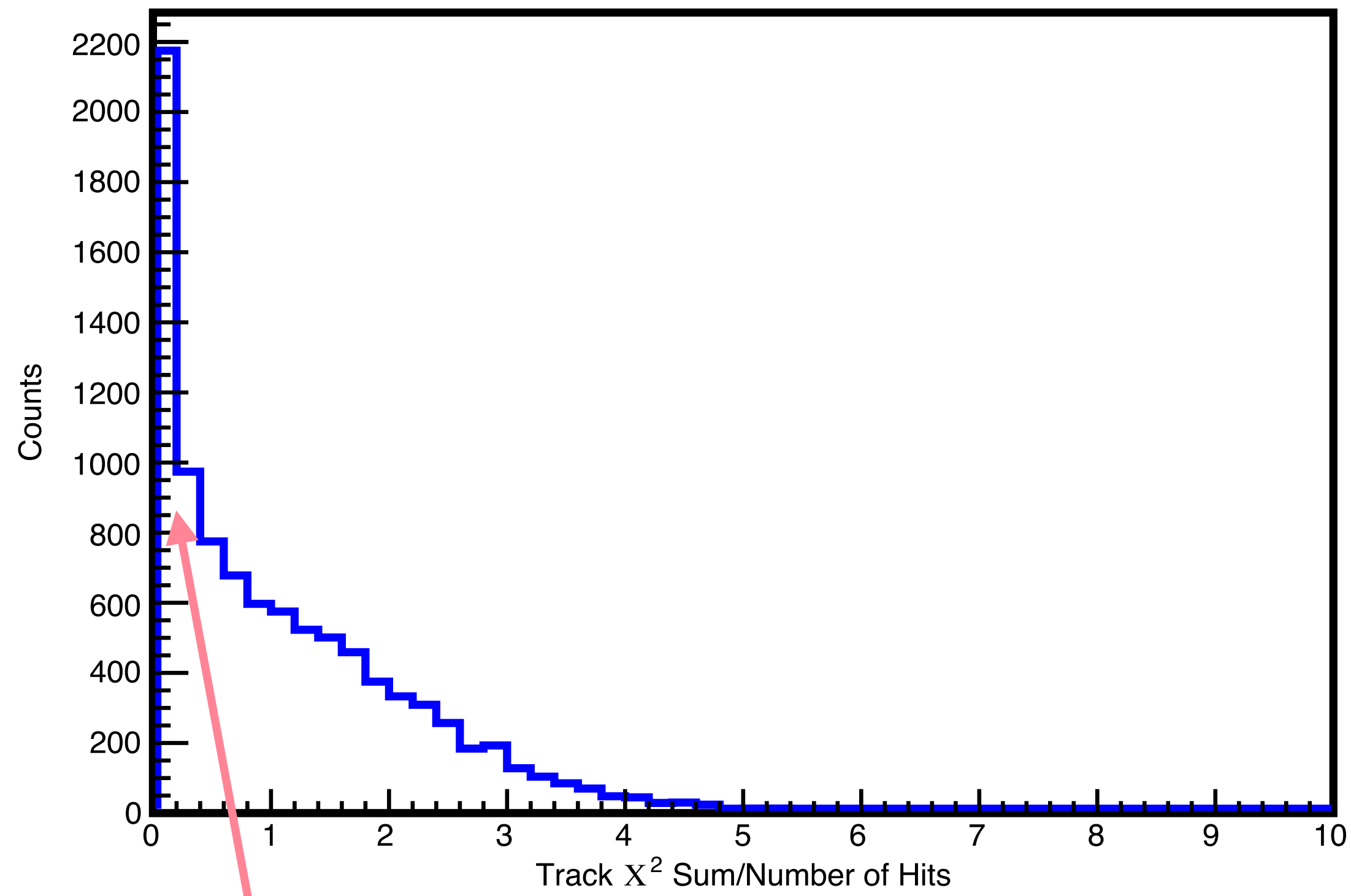
*note: this was generated using

$\theta_{\max} = 3.1$ rad and $\theta_{\min} = 0.036$ rad which corresponds to

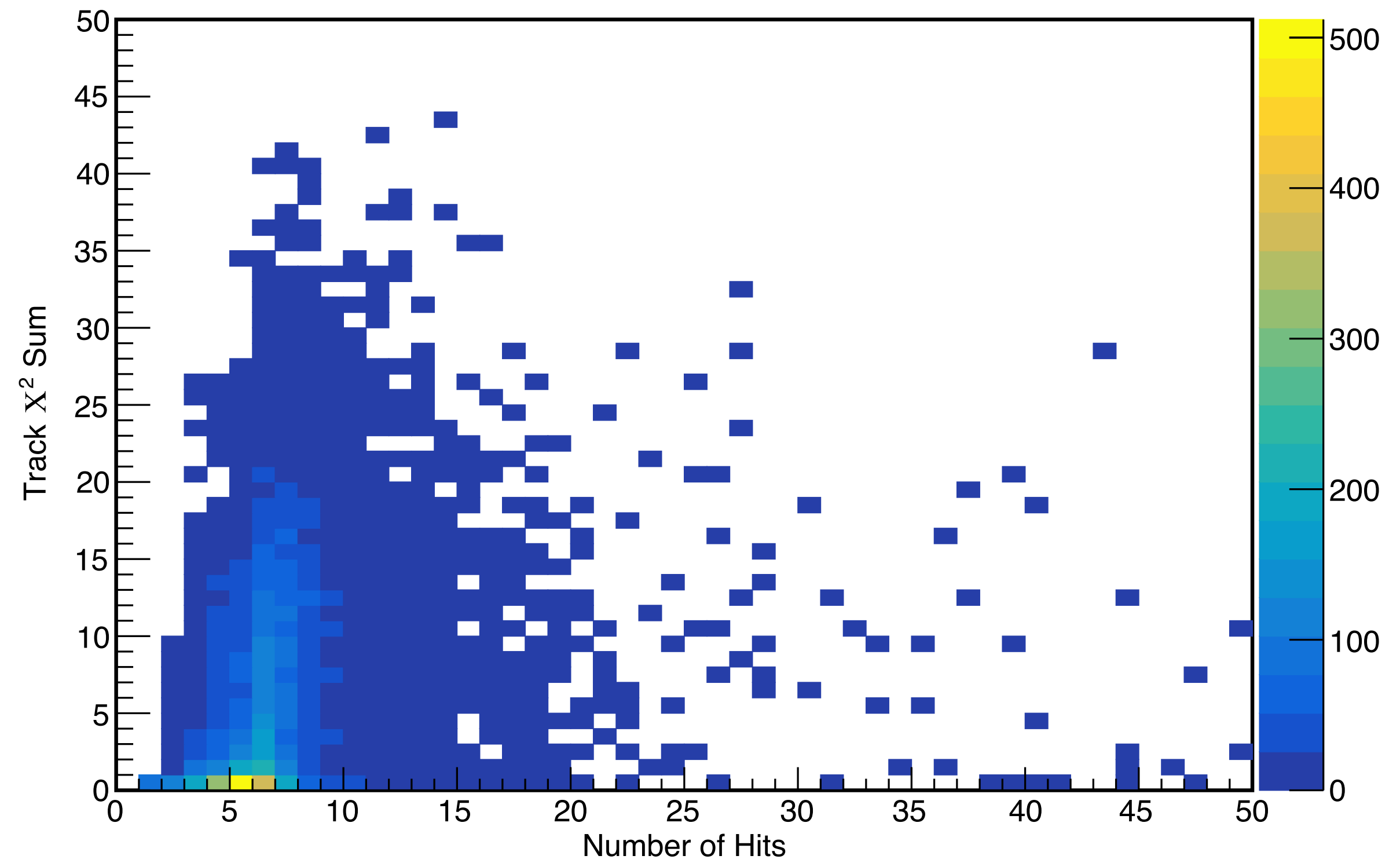
$\eta_{\max} = -3.873$ and $\eta_{\min} = 4.017$



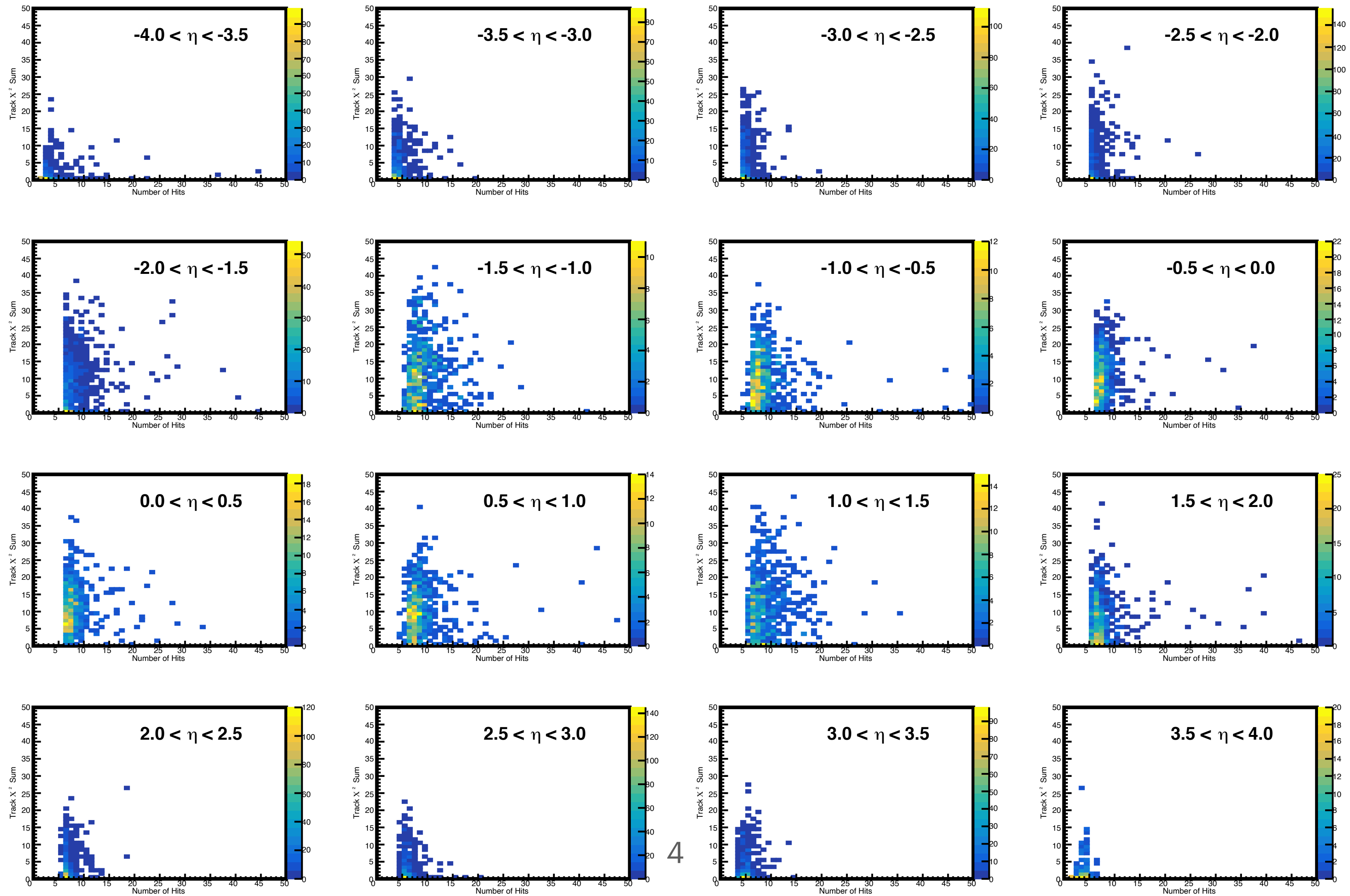
Track χ^2 Sum



What is causing the peak at 0?



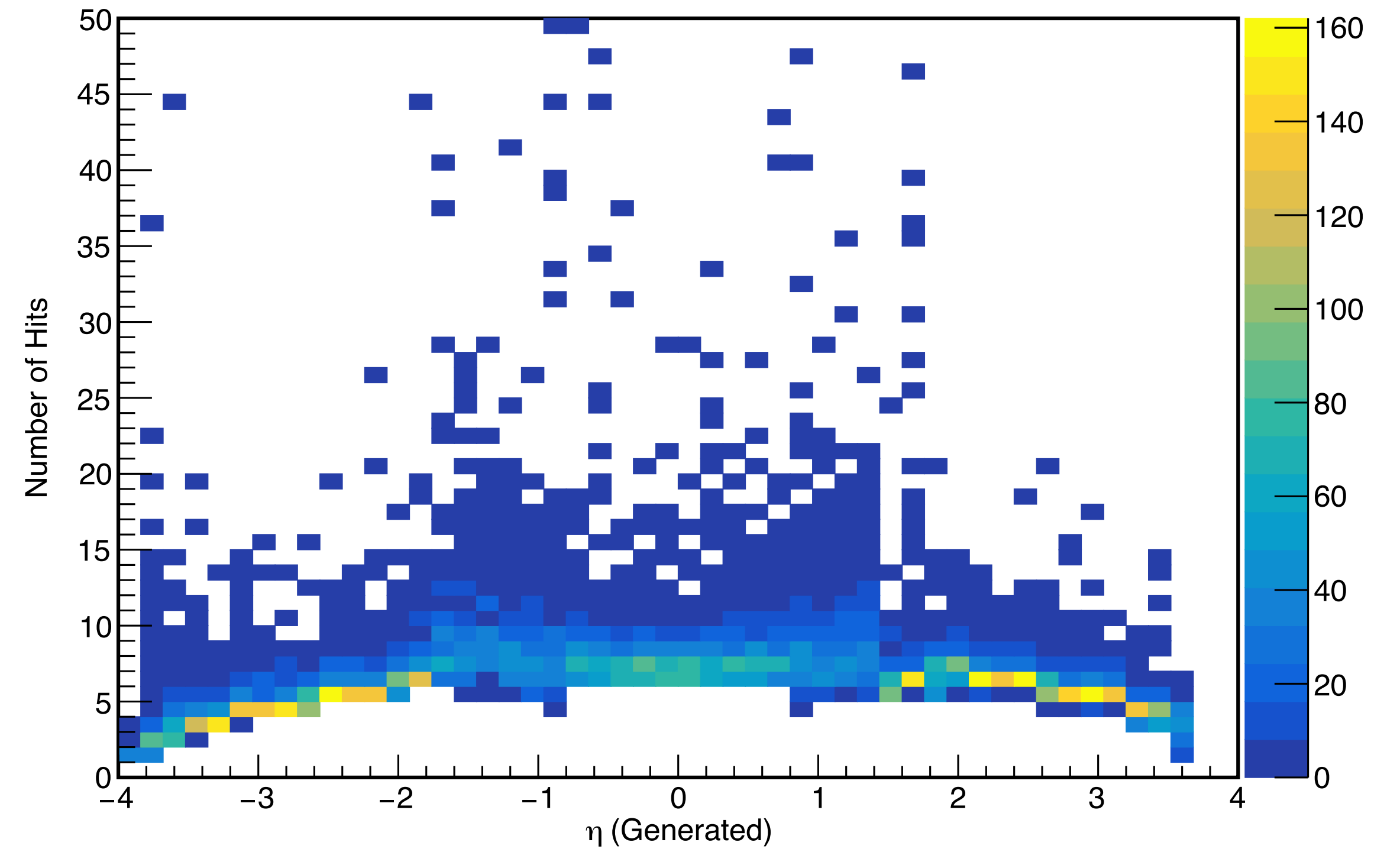
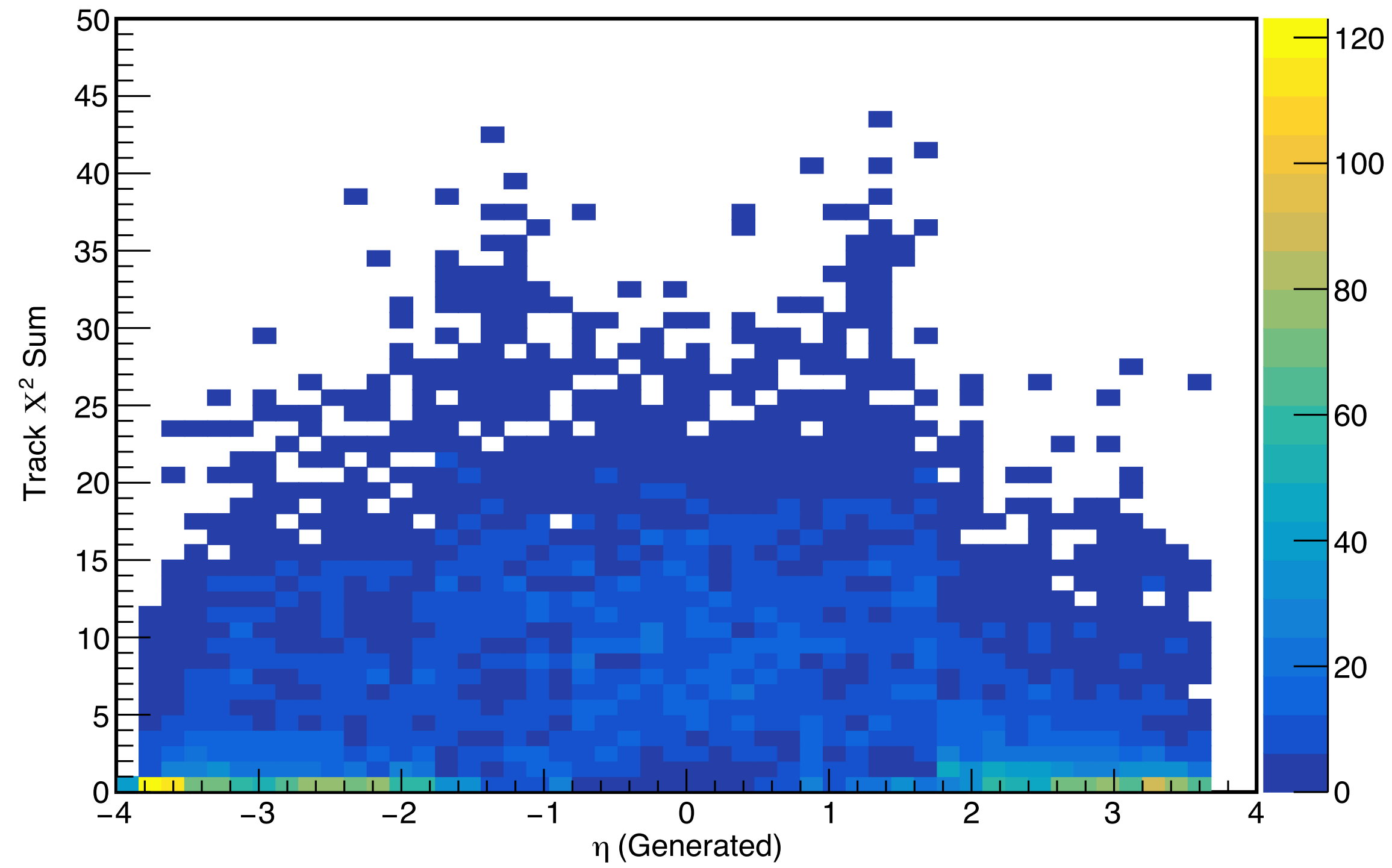
Track χ^2 Sum vs # of Hits in bins of η



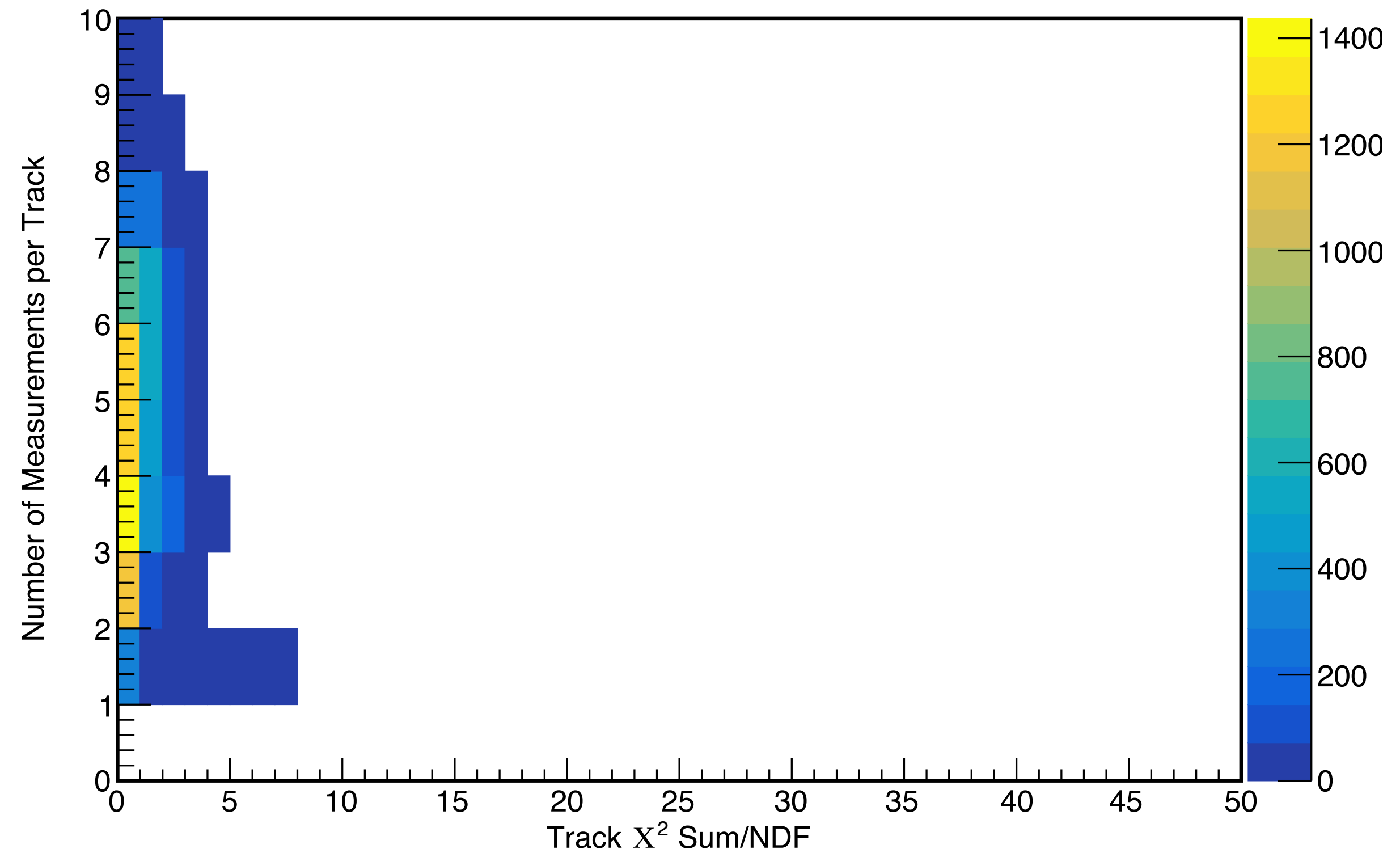
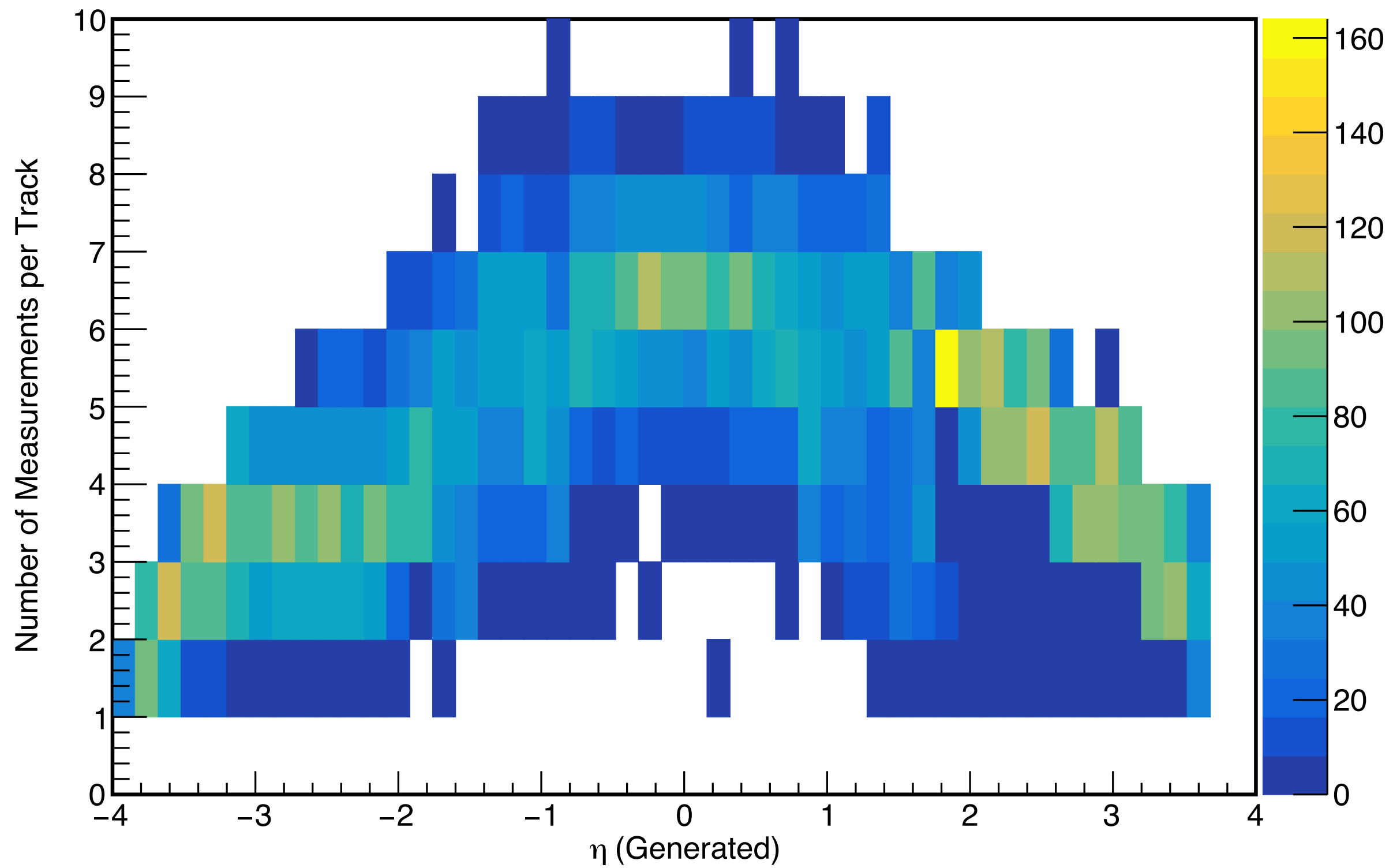
more hits in mid-rapidity

$3.5 < |\eta| < 4$
get # of hits < 5

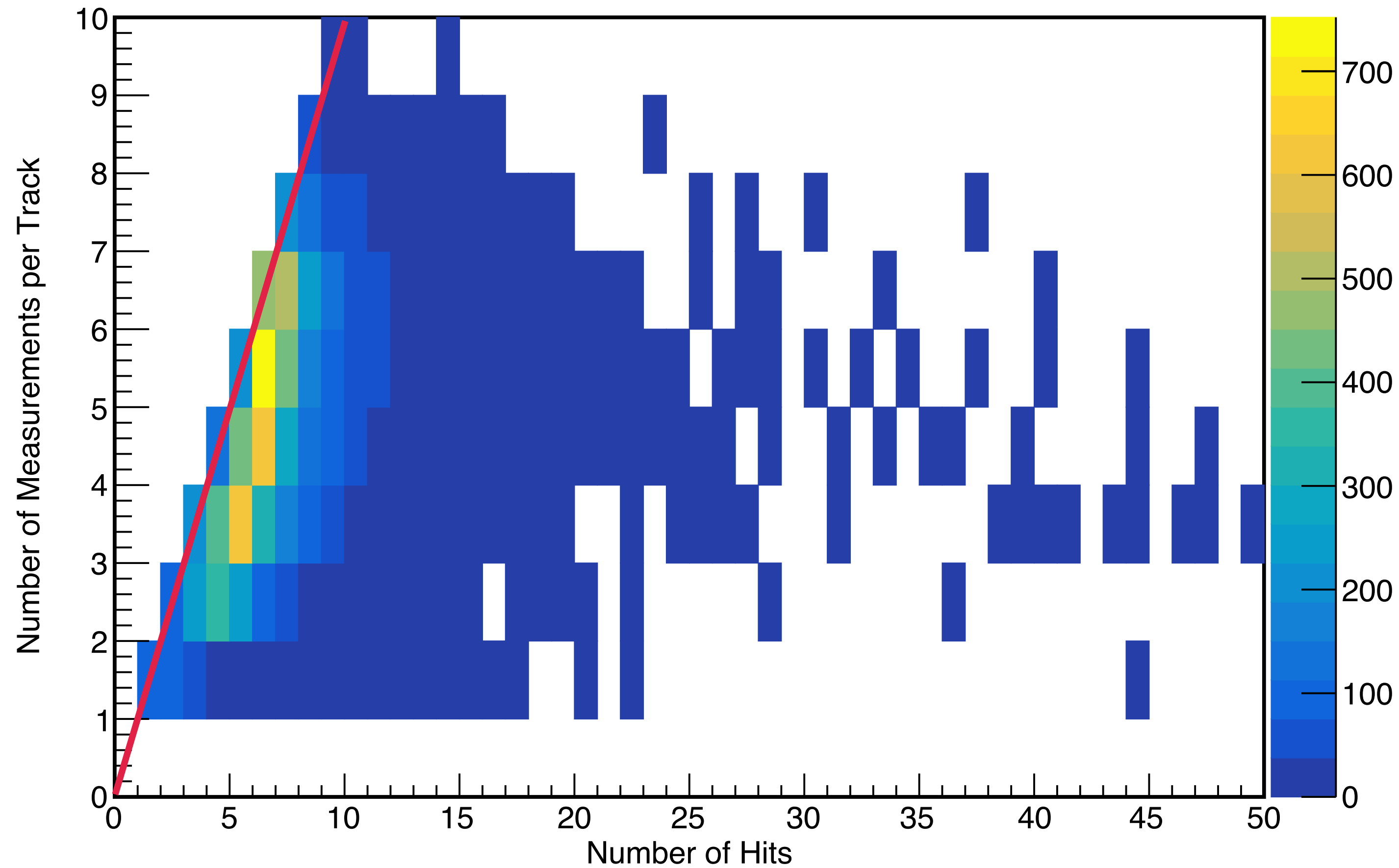
Track χ^2 Sum & # of Hits vs η



of Measurements per Track

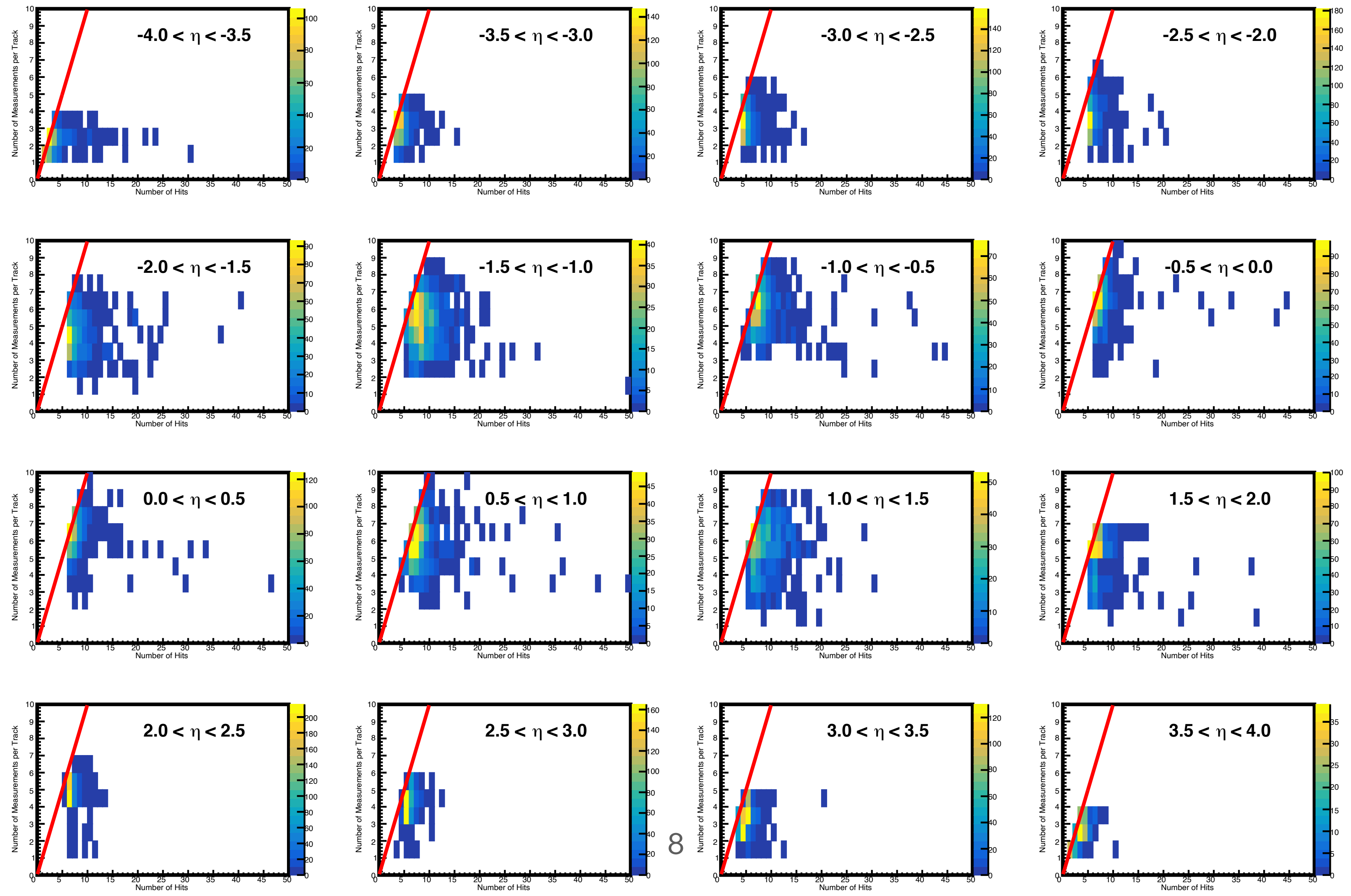


of Measurements per Track

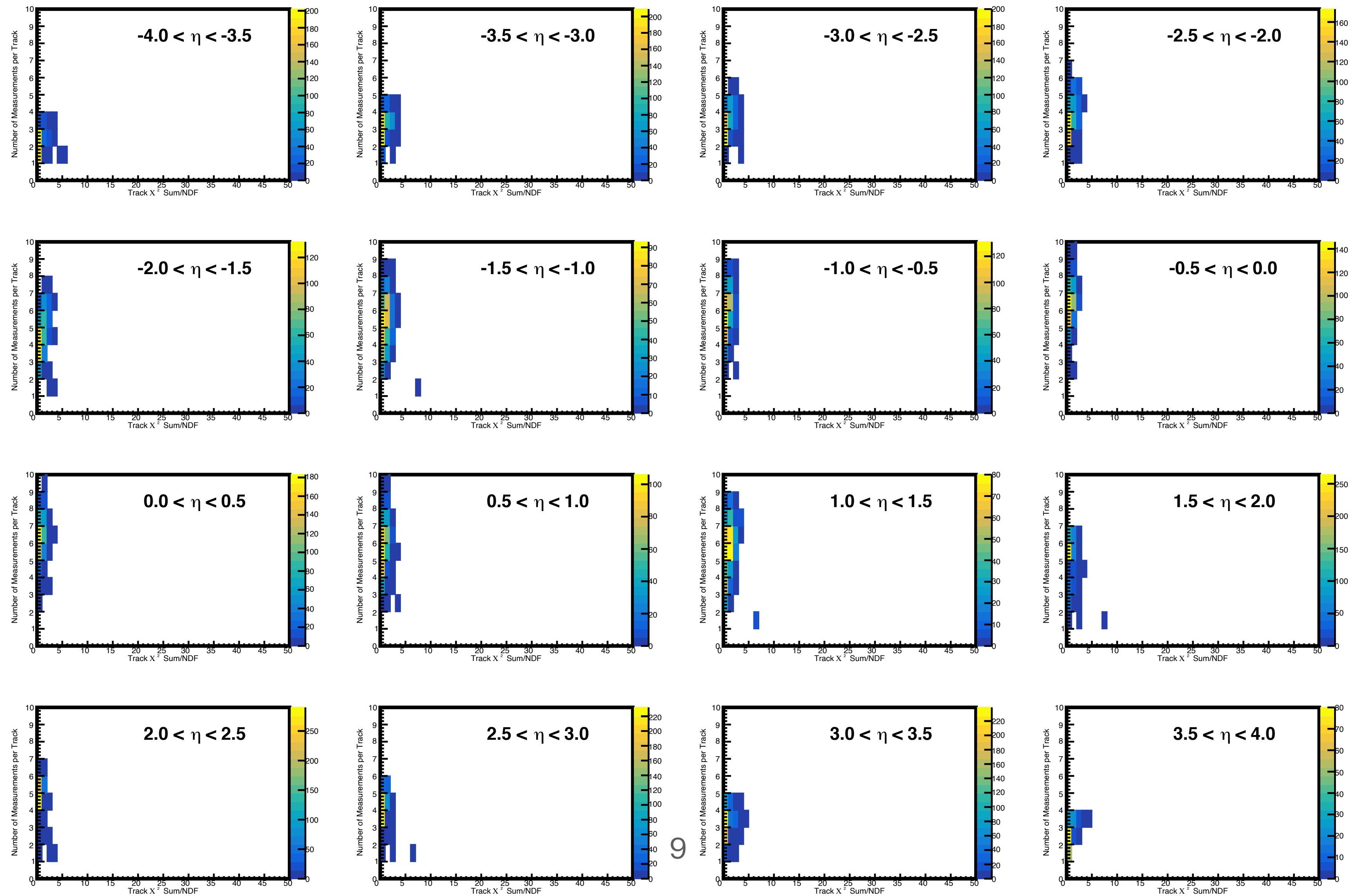


- Measurements per track = # of hits used in the trajectory
 - Questions:
 - Why are we seeing more hits than number of tracks?
 - Why do we see so many hits in some cases?
- > Look at the residuals

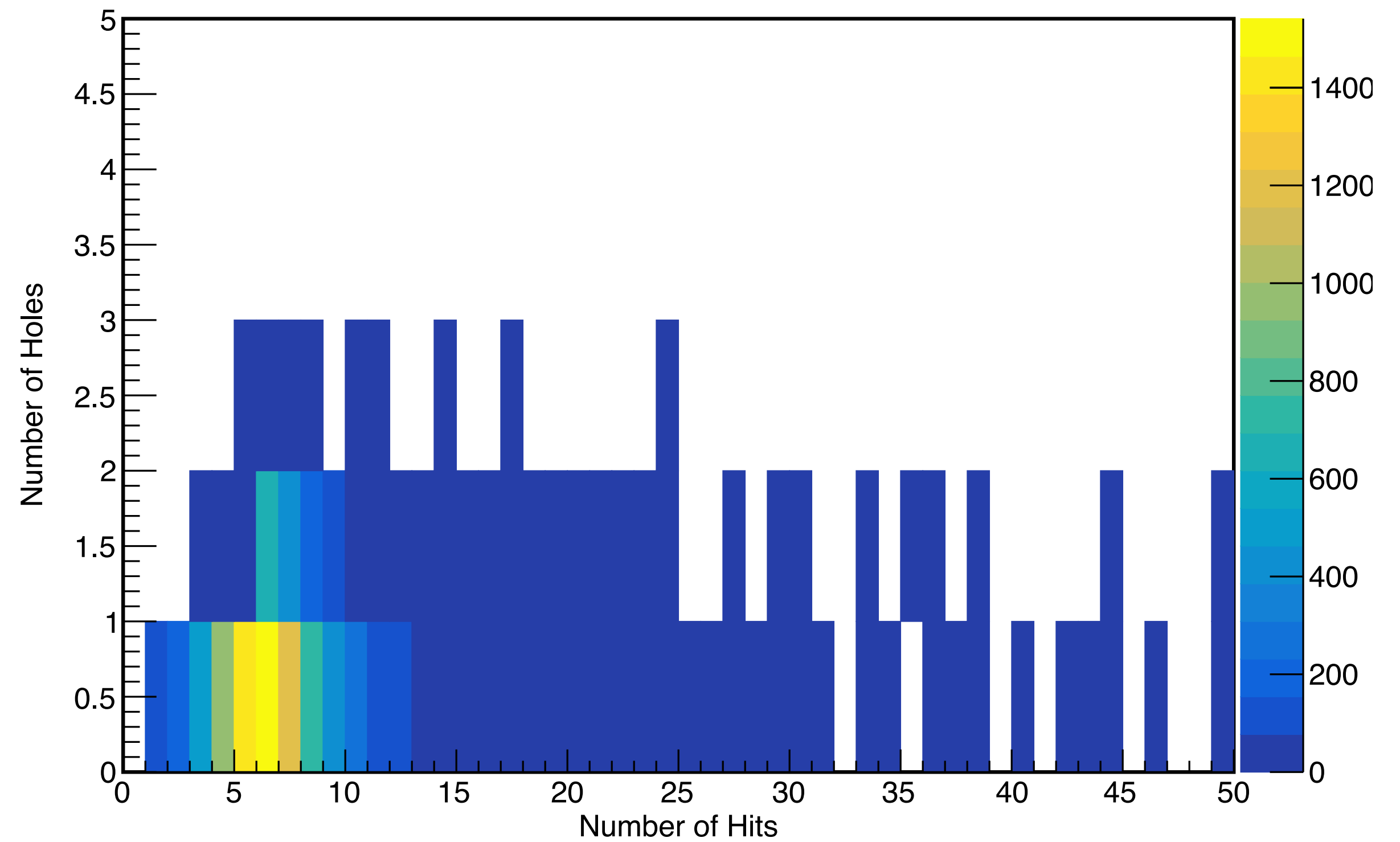
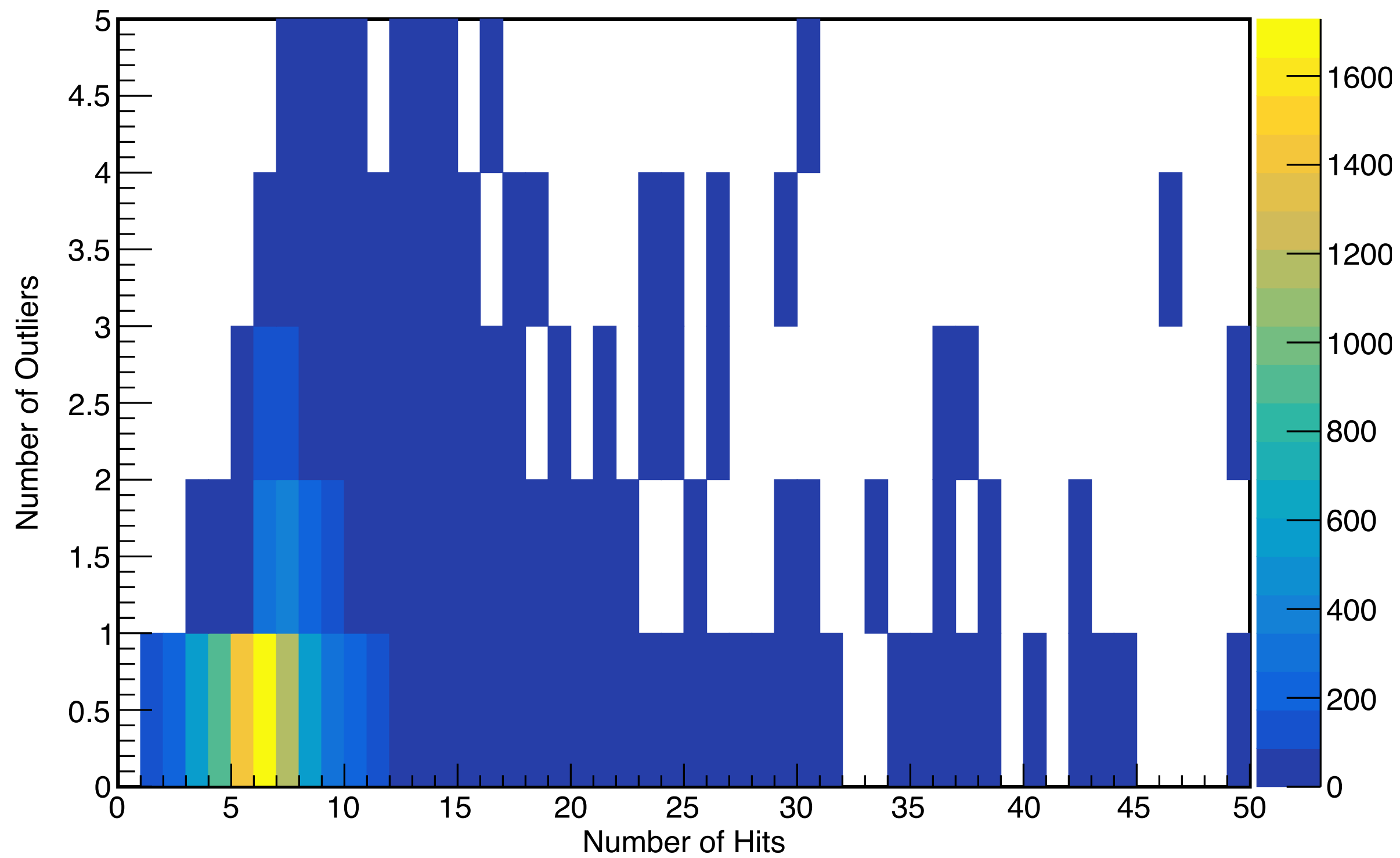
of Meas per Track vs # of Hits in bins of η



of Meas per Track vs Track χ^2 Sum in bins of η



of Outliers and # of Holes

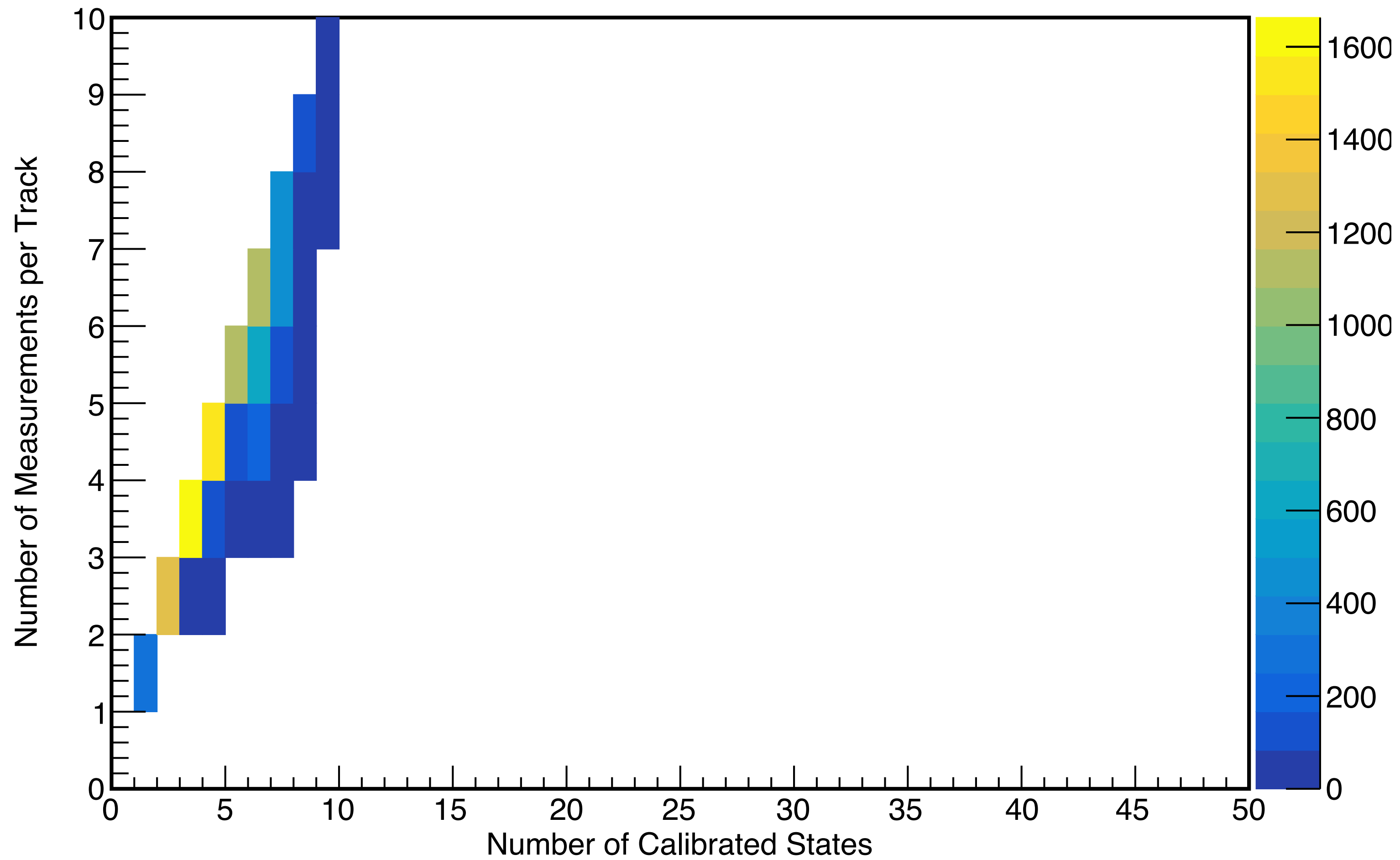


Next Steps

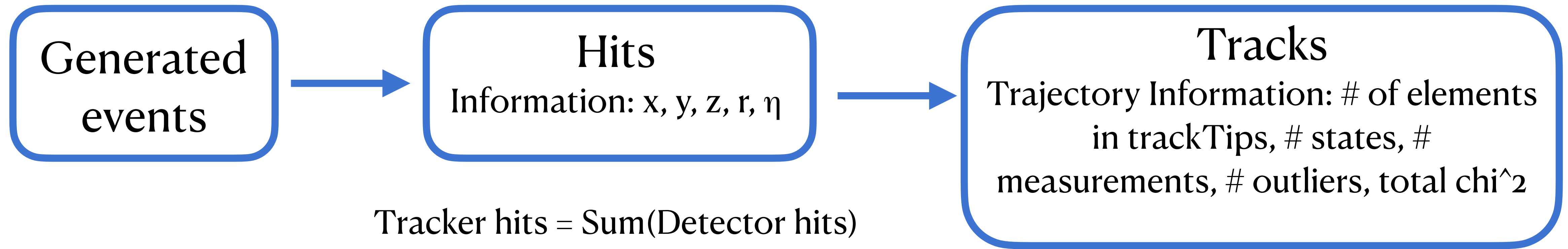
- Look at the individual hit data (residuals)
- Look into calibrated + uncalibrated states
- Try with realistic seeding
- Push additions to github

Backup

Calibrated States



Summary of Provided Information



Each track has some number of states

- These states can be calibrated or not calibrated
- Each state has information: location, angles, q/p, errors

ACTS Track Variables

https://acts.readthedocs.io/en/latest/api/struct/struct_acts_1_1_multi_trajectory_helpers_1_1_trajectory_state.html

struct TrajectoryState

Struct for brief trajectory summary info.

Public Members

double **chi2Sum** = 0

std::vector<double> **measurementChi2** = {}

std::vector<unsigned int> **measurementLayer** = {}

std::vector<unsigned int> **measurementVolume** = {}

size_t **NDF** = 0

size_t **nHoles** = 0

size_t **nMeasurements** = 0

size_t **nOutliers** = 0

size_t **nSharedHits** = 0

size_t **nStates** = 0

std::vector<double> **outlierChi2** = {}

std::vector<unsigned int> **outlierLayer** = {}

std::vector<unsigned int> **outlierVolume** = {}

https://acts.readthedocs.io/en/latest/api/struct/struct_acts_1_1_gain_matrix_updater_1_1_internal_track_state.html

struct InternalTrackState

Public Members

double ***calibrated**

double ***calibratedCovariance**

unsigned int **calibratedSize**

TrackStateTraits<MultiTrajectoryTraits::MeasurementSizeMax, false>::Parameters **filtered**

TrackStateTraits<MultiTrajectoryTraits::MeasurementSizeMax, false>::Covariance **filteredCovariance**

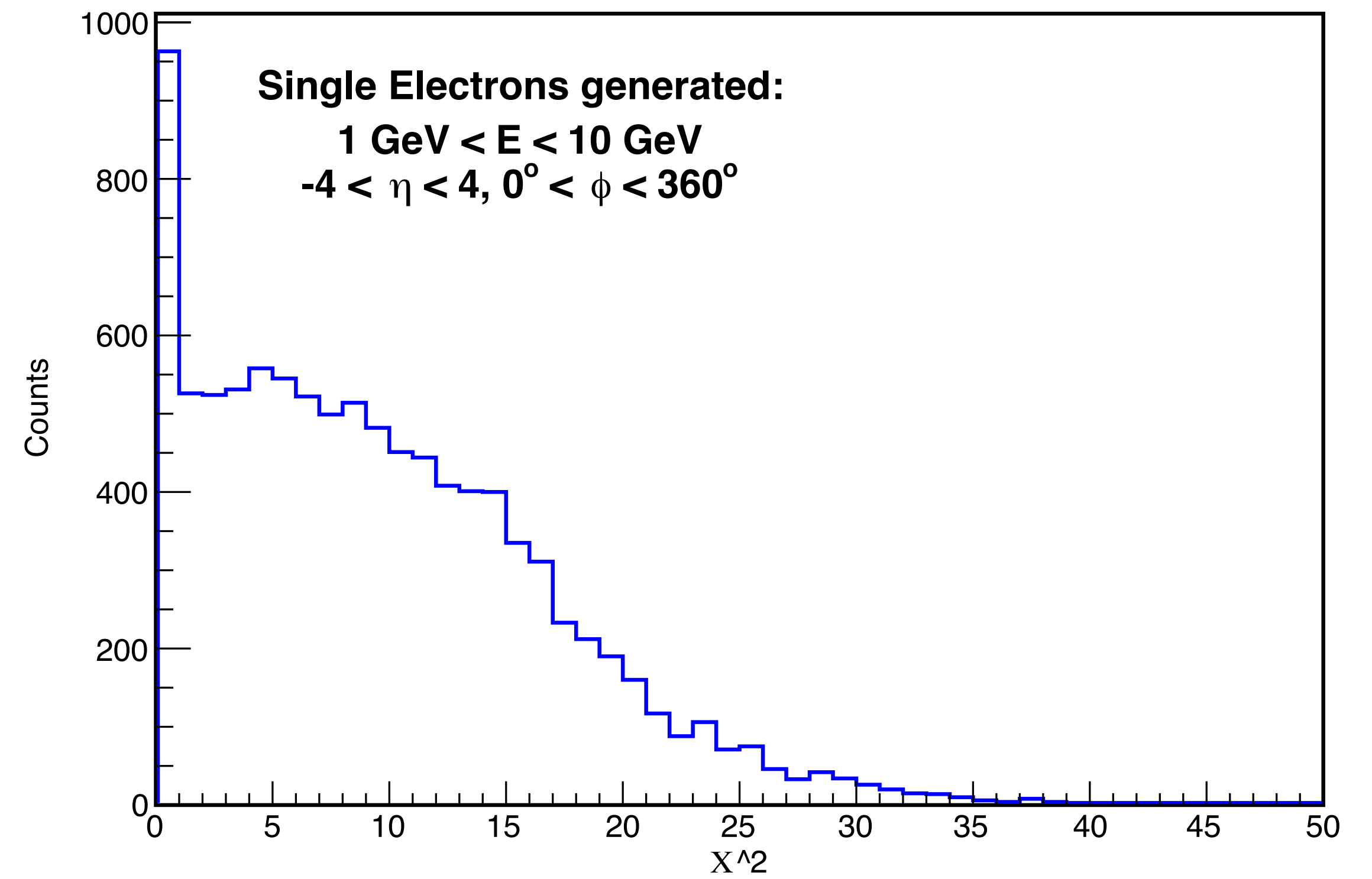
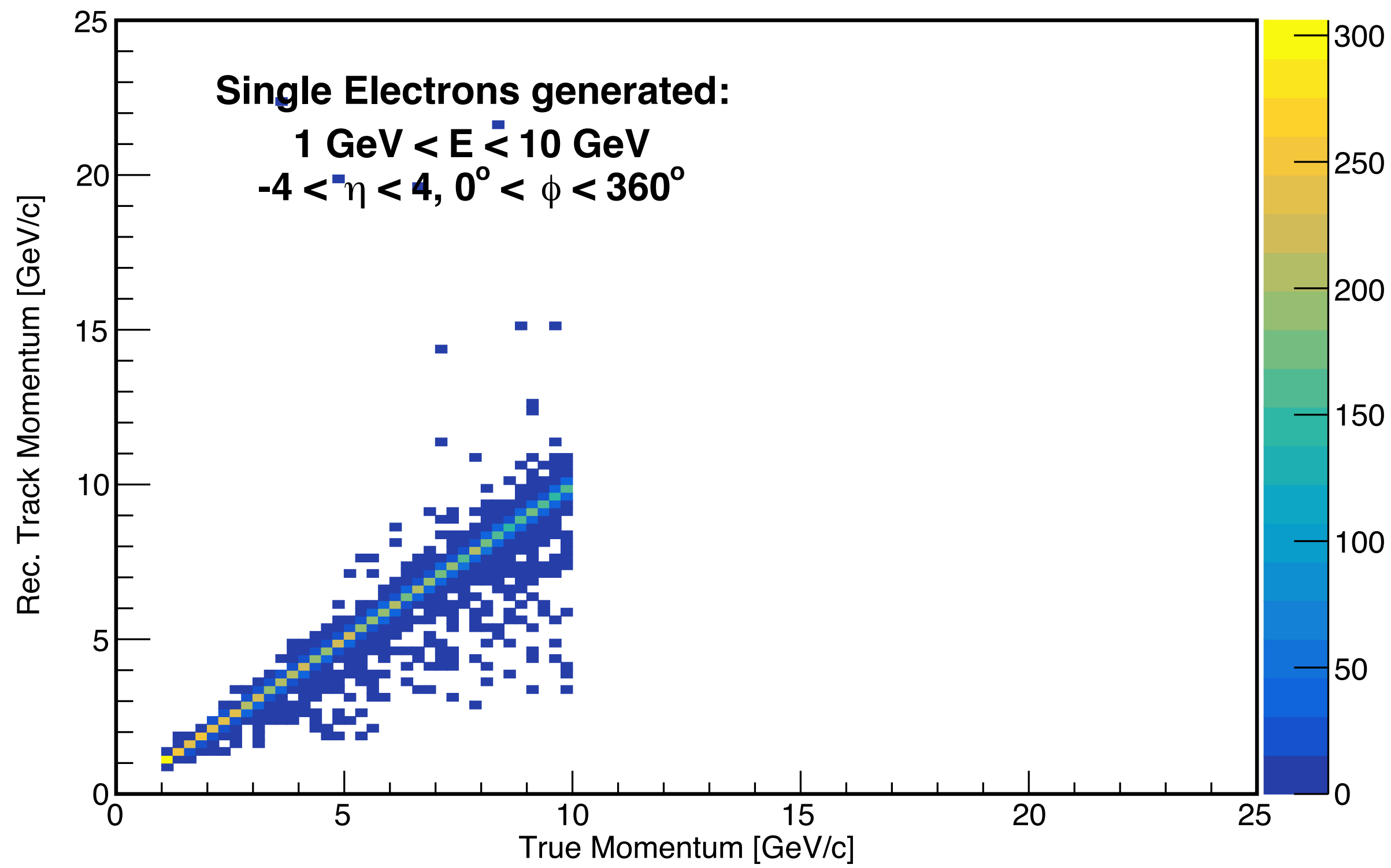
TrackStateTraits<MultiTrajectoryTraits::MeasurementSizeMax, false>::Parameters **predicted**

TrackStateTraits<MultiTrajectoryTraits::MeasurementSizeMax, false>::Covariance **predictedCovariance**

TrackStateTraits<MultiTrajectoryTraits::MeasurementSizeMax, false>::Projector **projector**

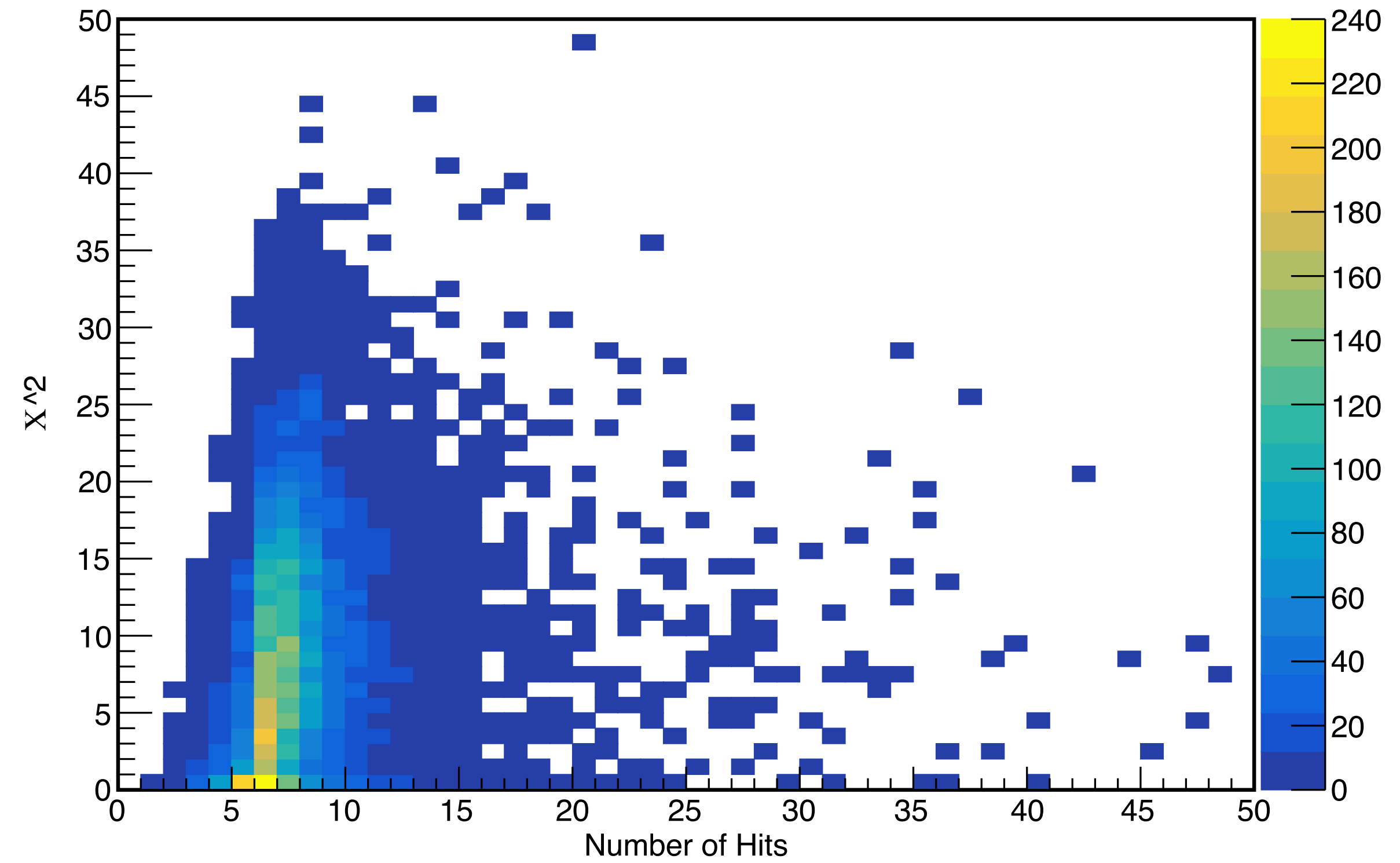
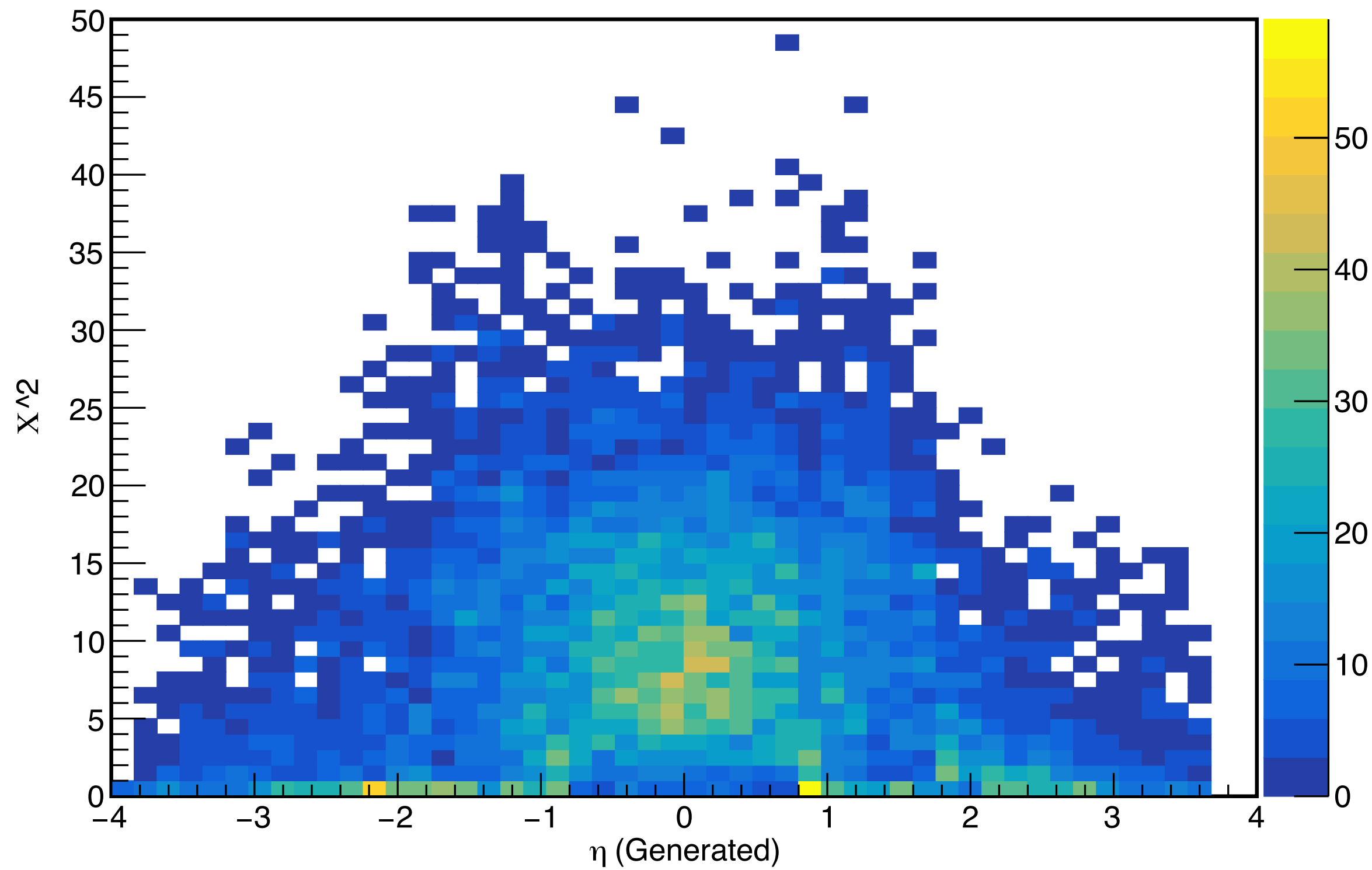
Current Work (cont.)

uniform distribution in θ



Some plots of χ^2

uniform distribution in θ



Looking at # of Hits & # of Tracks

uniform distribution in θ

