



Tagger tracking

-update-

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Machine learning for reconstruction in tagger detectors

- Working machine learning was developed by the group to obtain original scattered electrons from detected tracks in tagger detectors
- Input layers consists of track parameters (position and angles in x and y)
- Output layer gives full kinematics of scattered electrons p' (energy and polar and azimuthal angles)

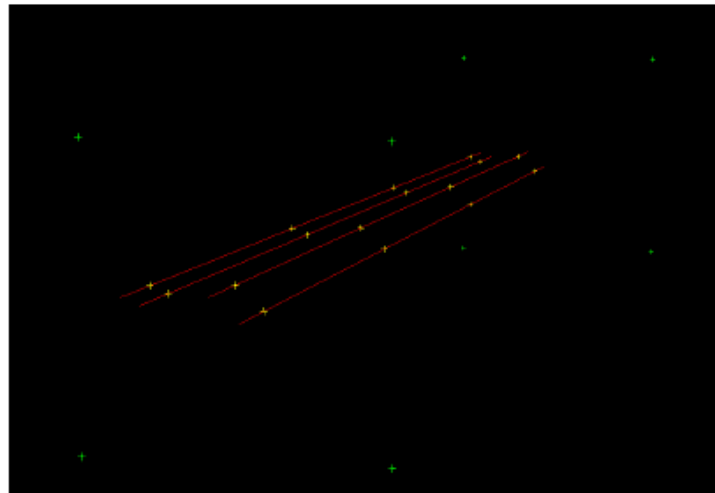


Figure: Detected tracks

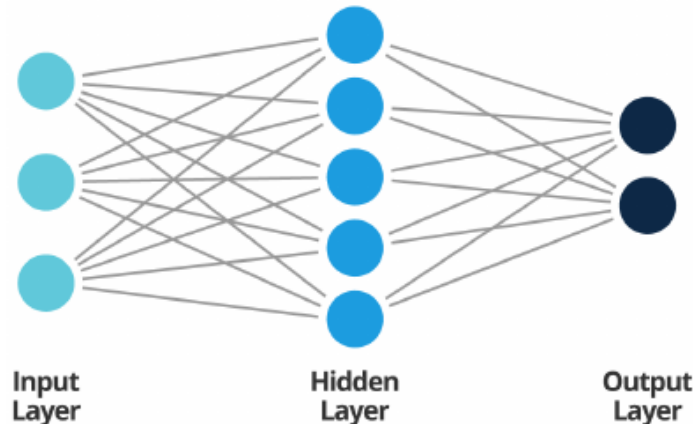


Figure: Artificial intelligence

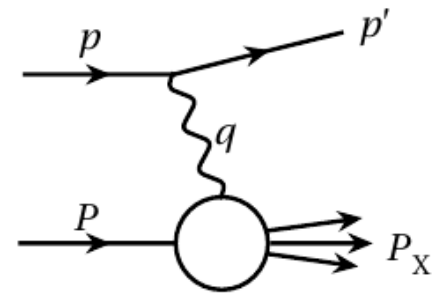


Figure: Original electron p'

Tracking implementation

- Points measured by planes are x_1, x_2, x_3 and x_4 in x and similar y_{1-4} in y
- In [Nucl.Instrum.Meth. 203 \(1982\) 291-297](#) it is shown for track slope and intercept:

$$x_0 = \frac{1}{4} (x_1 + x_2 + x_3 + x_4)$$

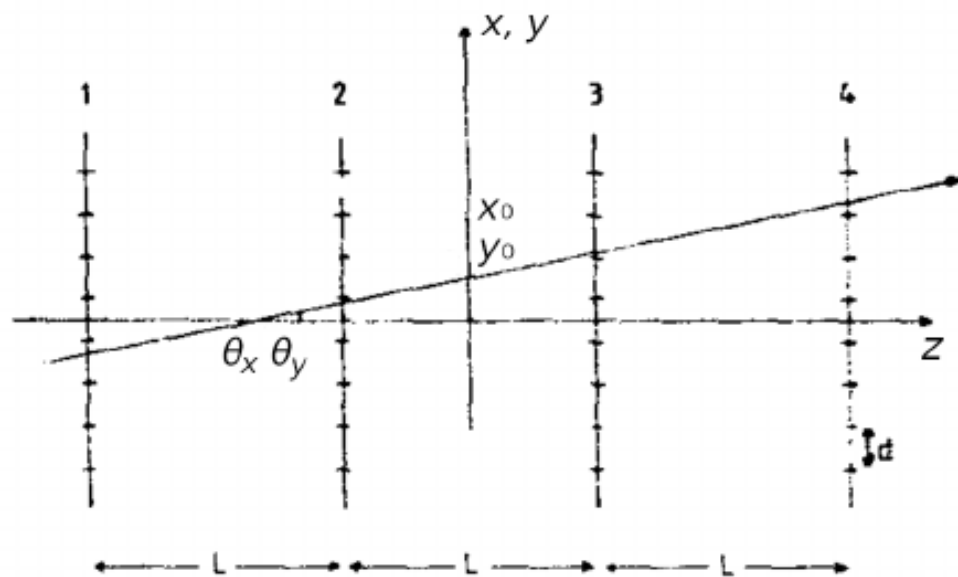
$$\tan \theta_x = \frac{1}{10L} (-3x_1 - x_2 + x_3 + 3x_4)$$

- Similar formula hold for y_0 and $\tan \theta_y$ out of y_{1-4}
- The fit has 2 degrees of freedom in x and y (4 points for 2 track parameters)

- Track as a straight line:

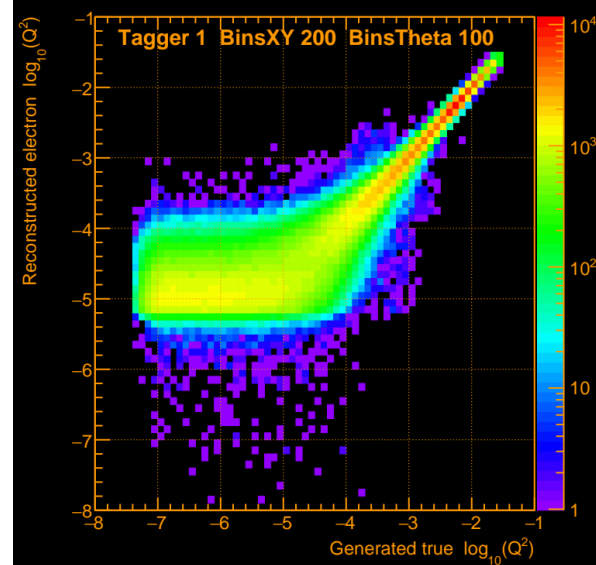
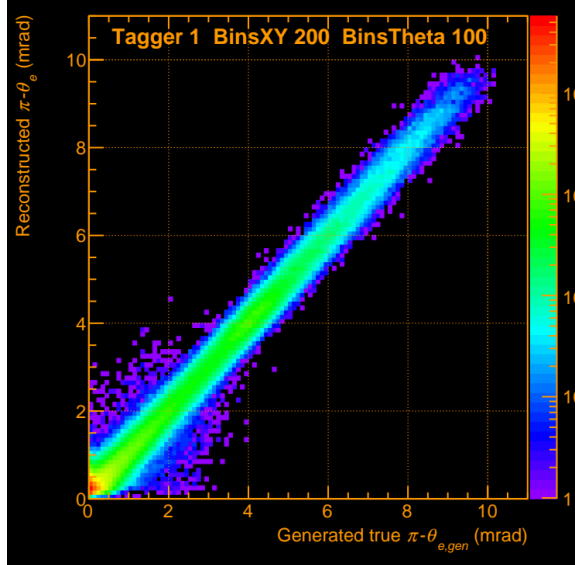
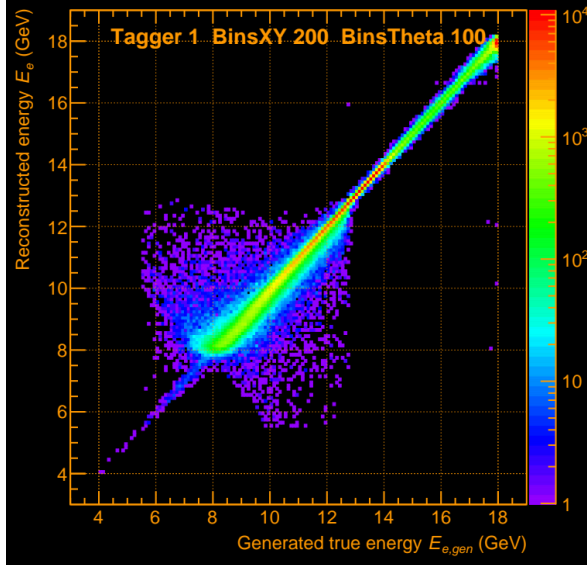
$$x = x_0 + z \times \tan \theta_x$$

$$y = y_0 + z \times \tan \theta_y$$

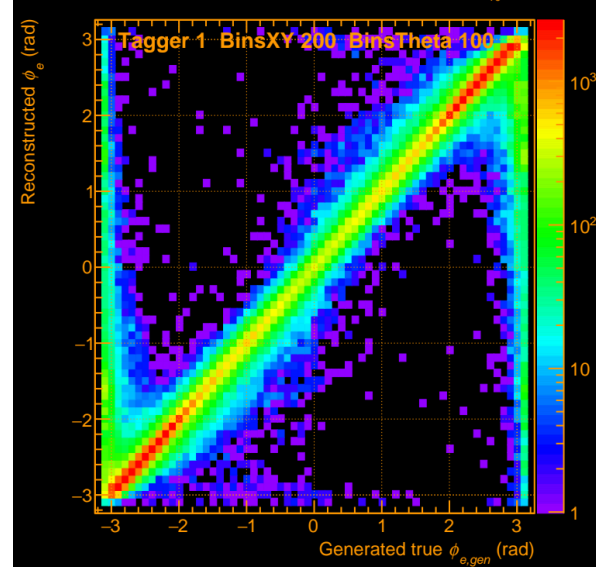
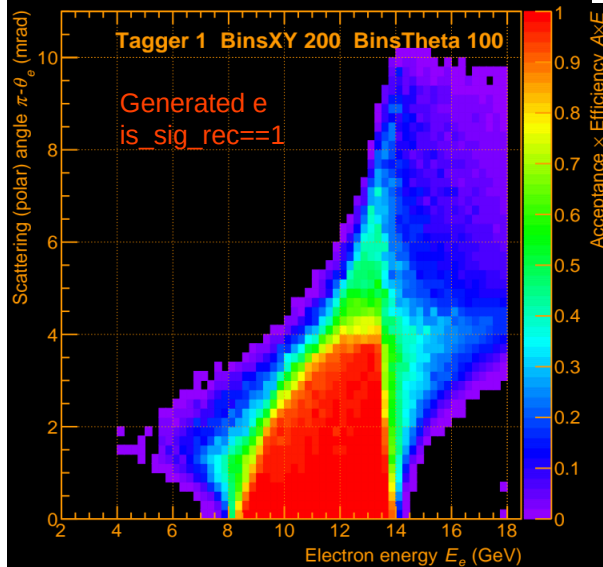


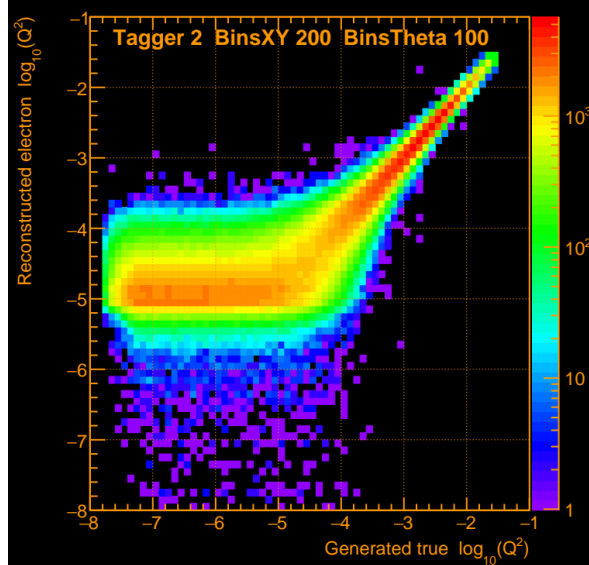
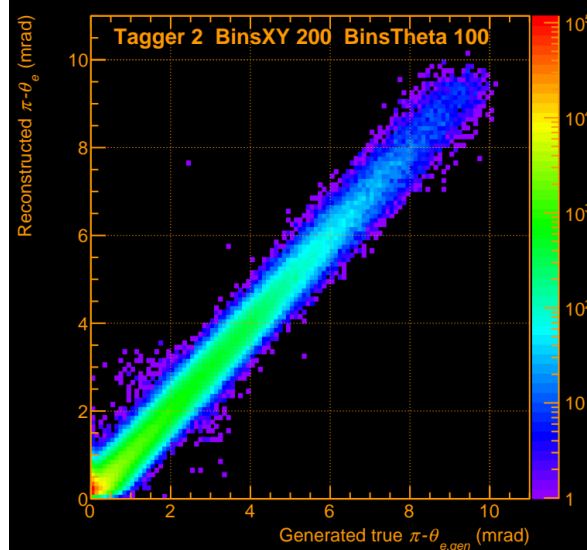
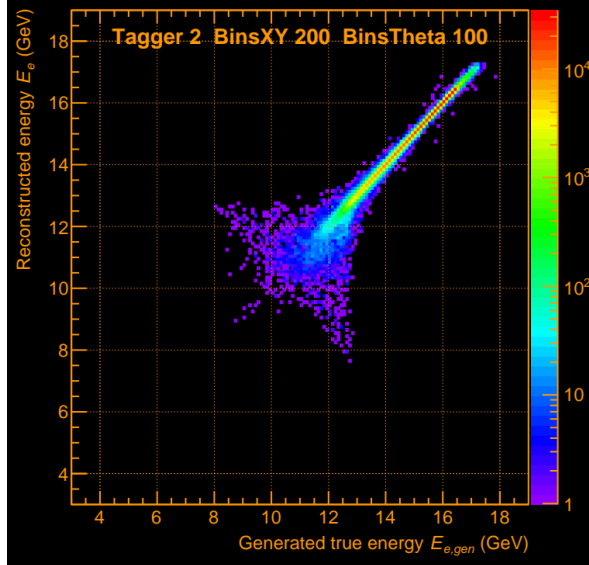
Previous report:

- geometry without beryllium window and calorimeter
- reco-variables related to truth MC particles

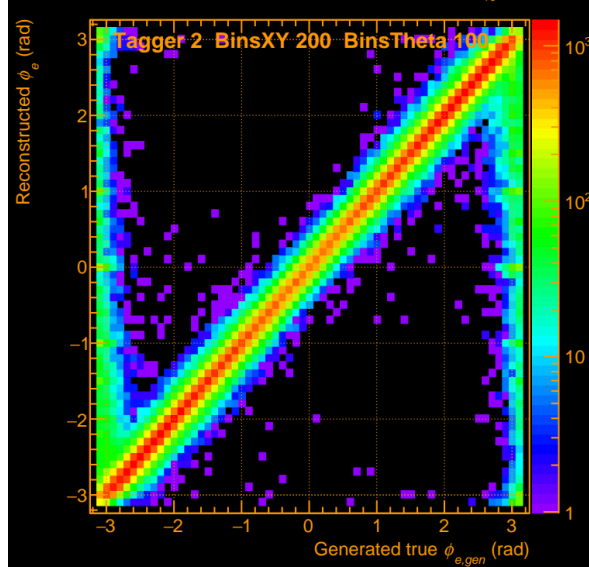
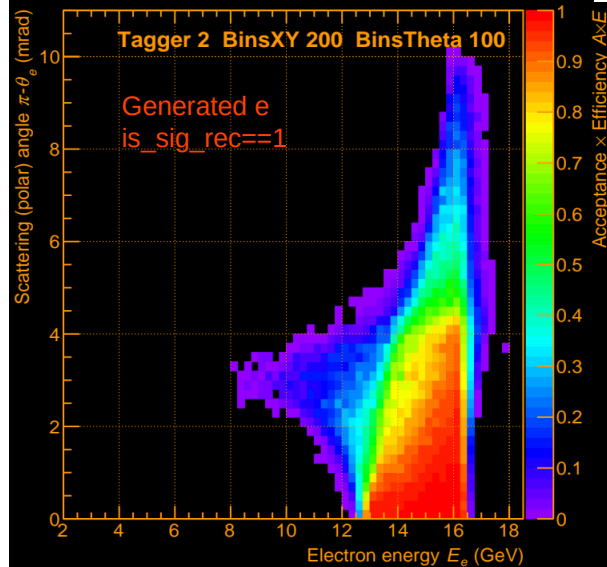


Tagger
1





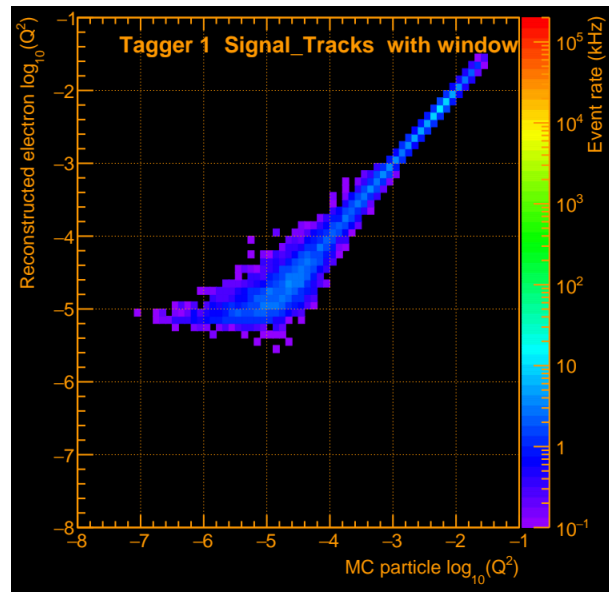
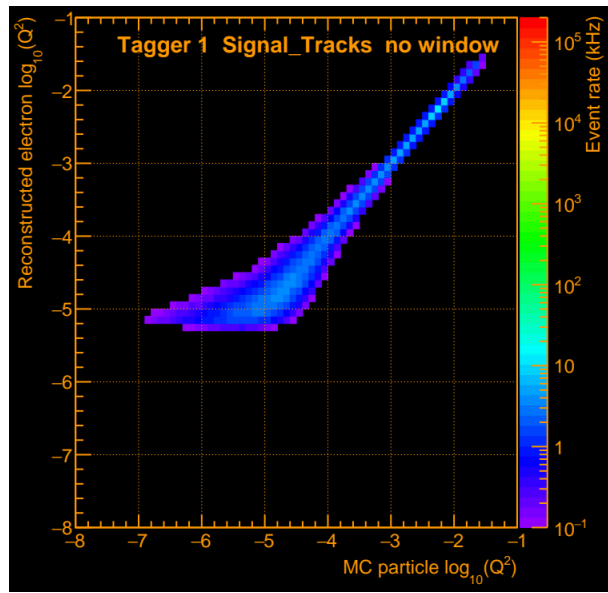
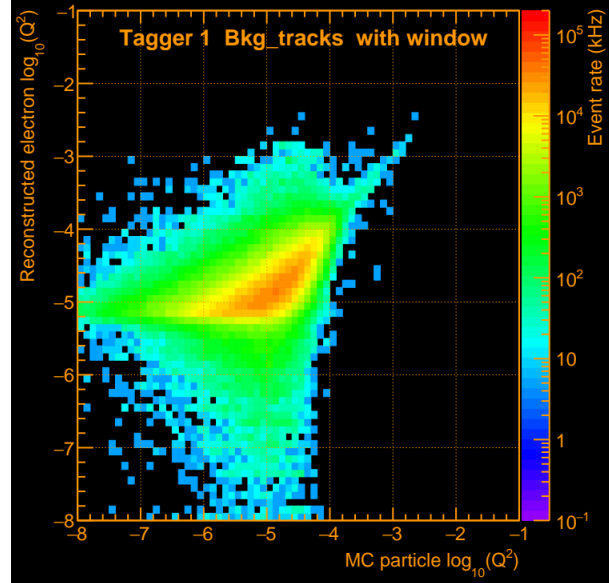
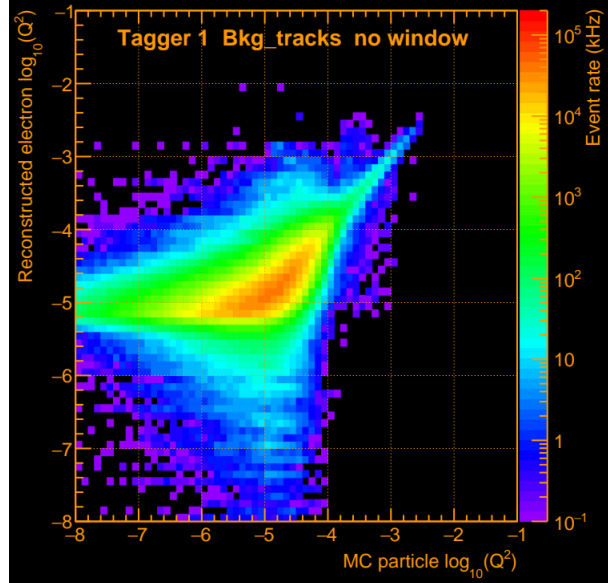
Tagger
2

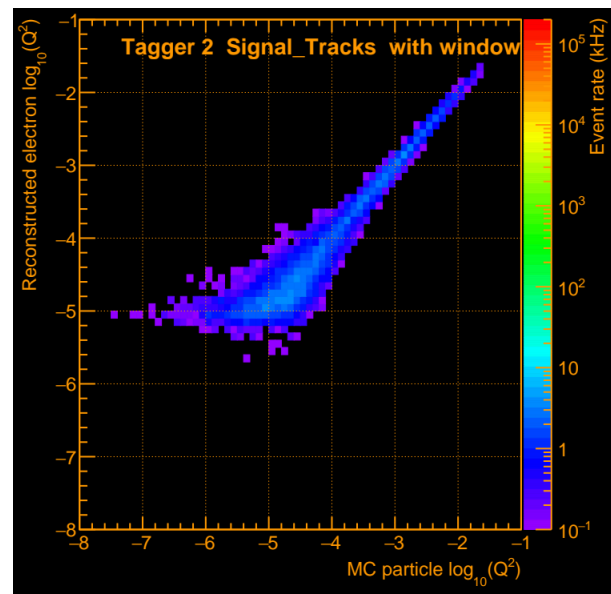
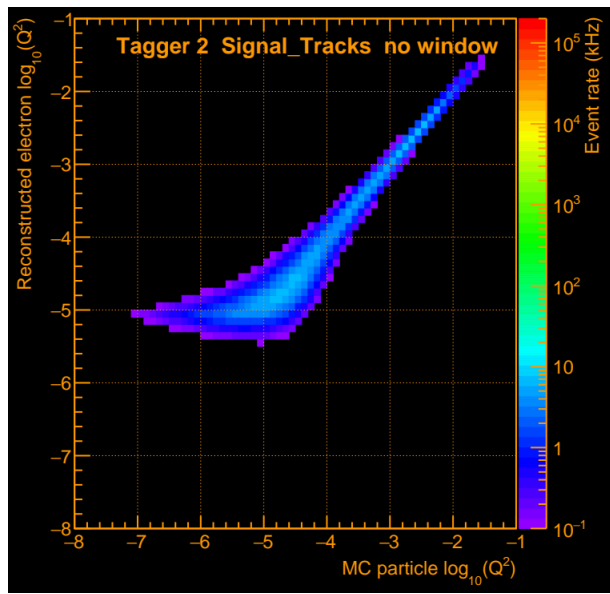
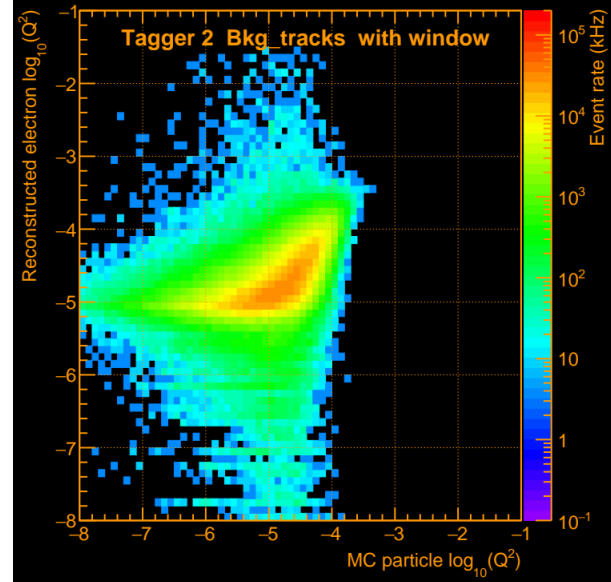
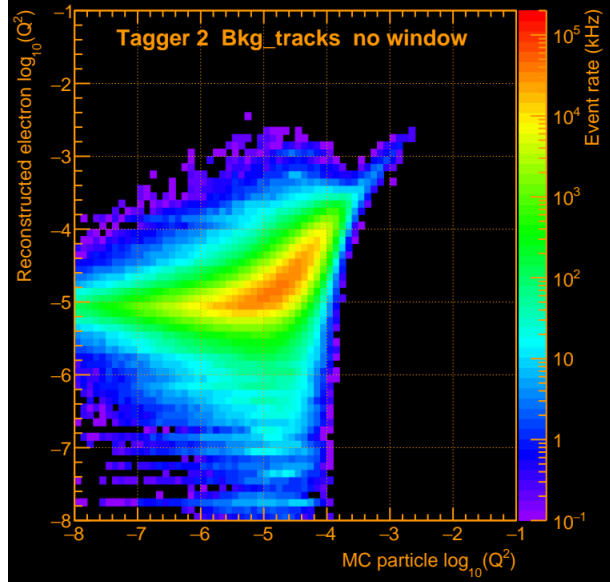


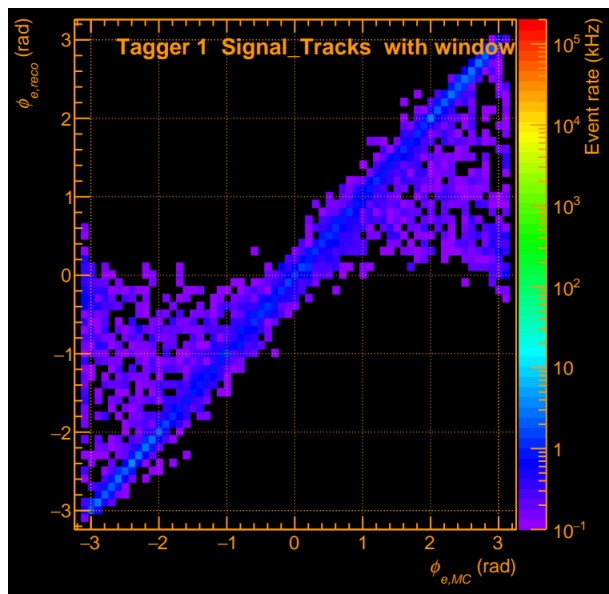
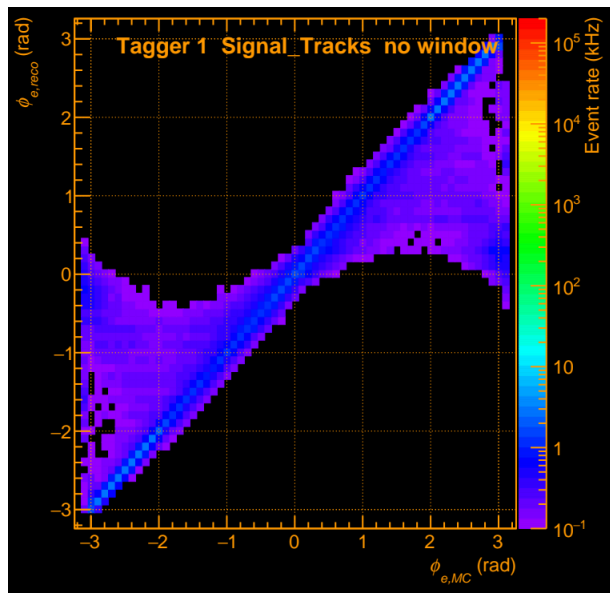
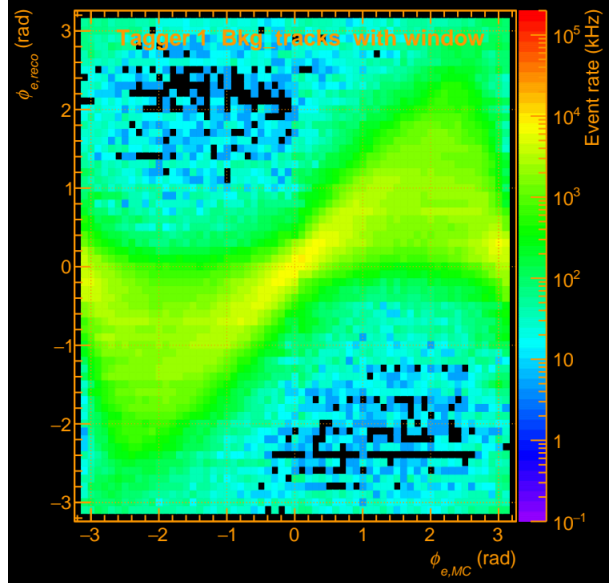
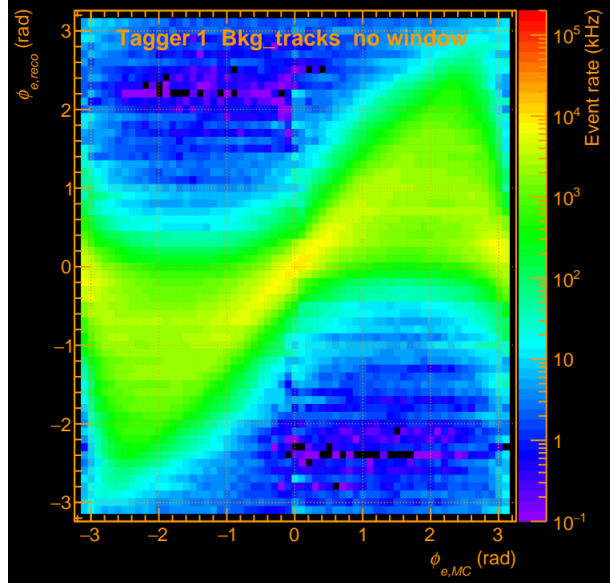
Today:

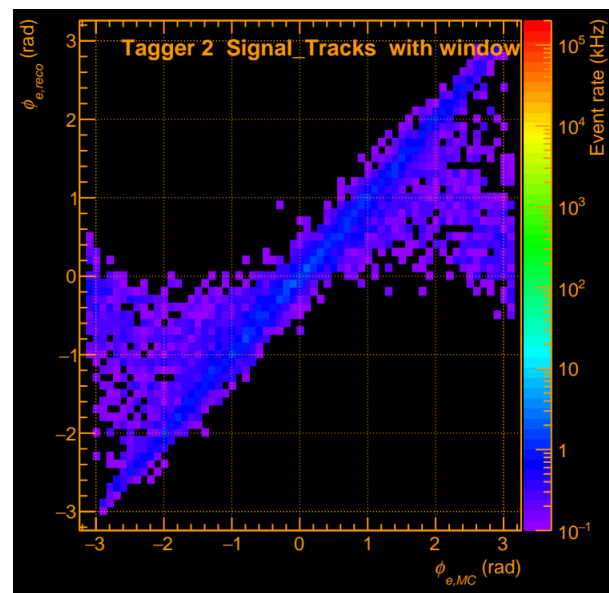
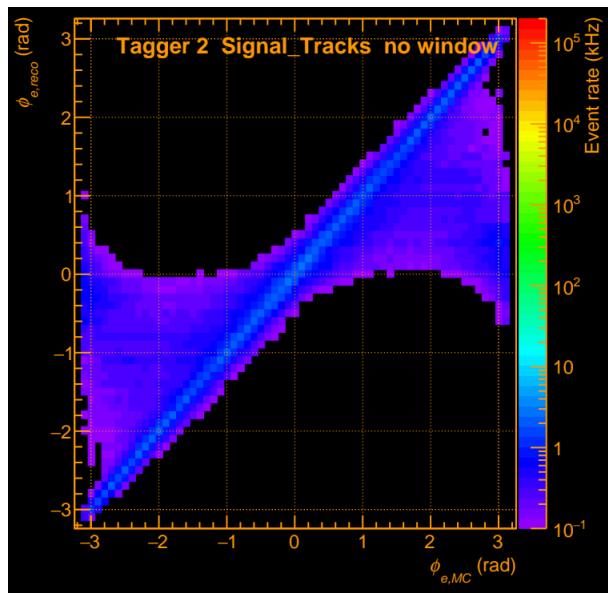
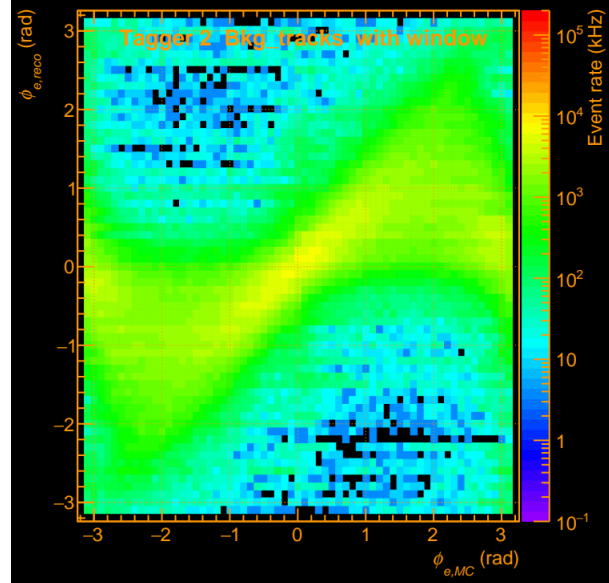
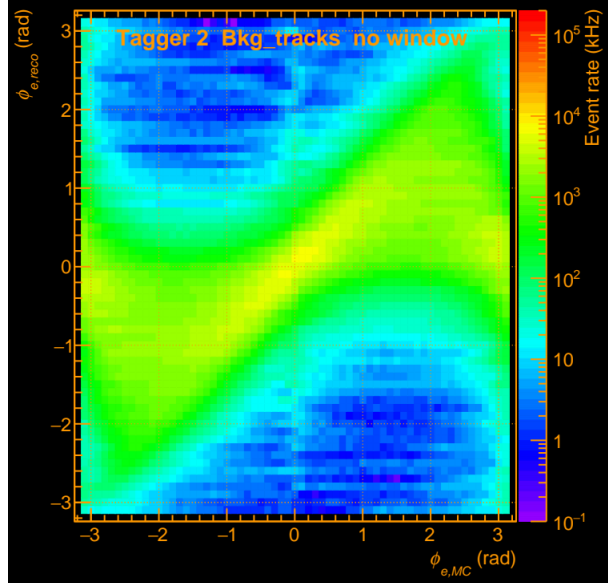
- geometry with and without beryllium window
 - + calorimeter behind tagger 1
- reco-variables related to MC particle

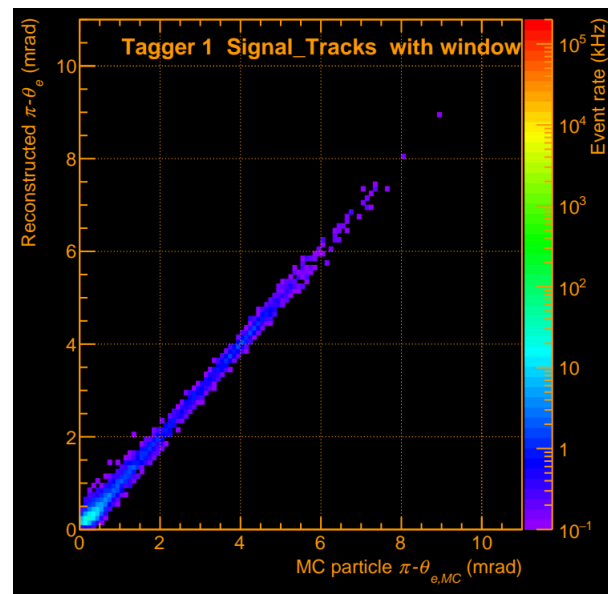
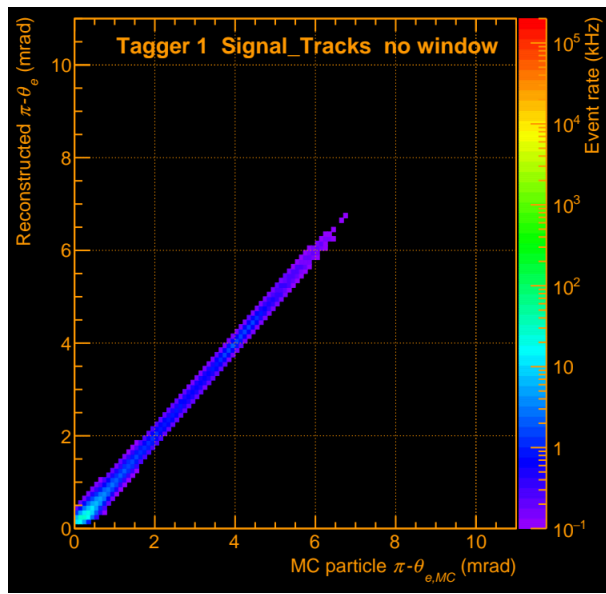
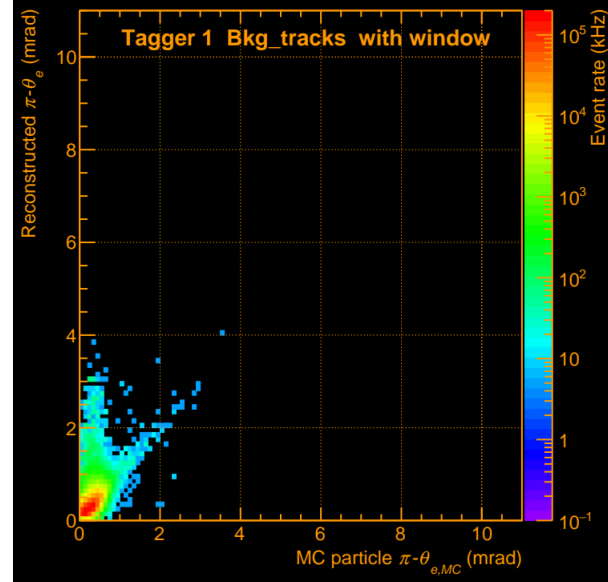
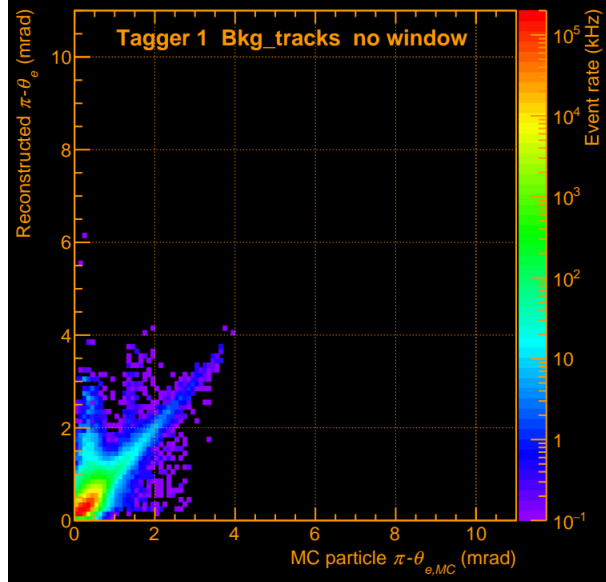
- plots scaled to cross section / production rate
 - to compare signal / bkg rates

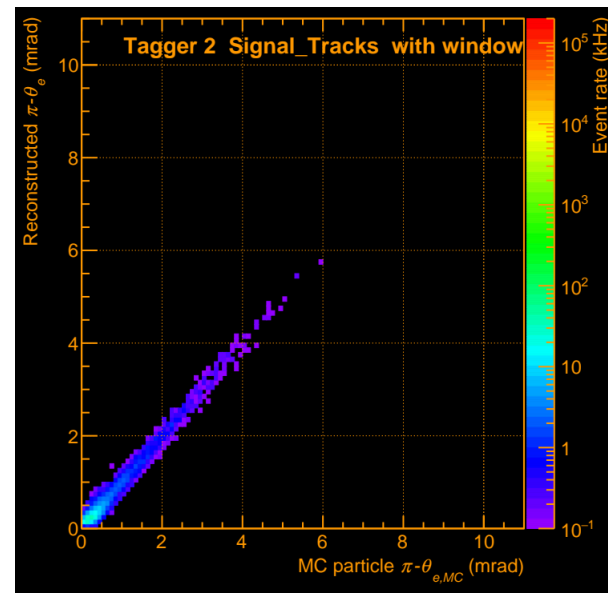
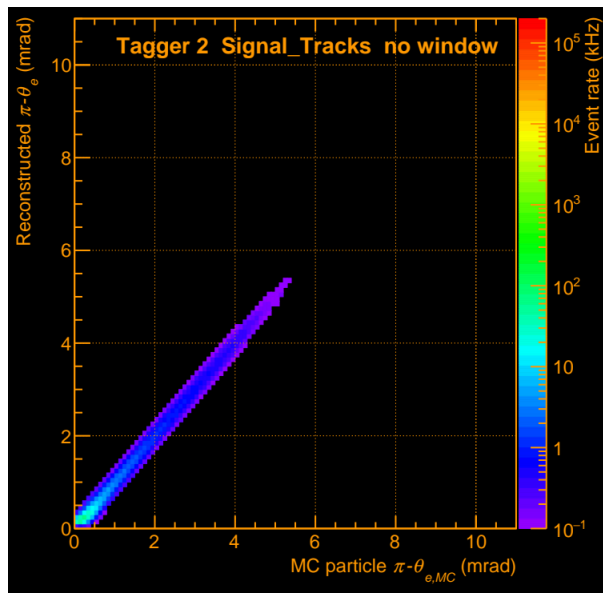
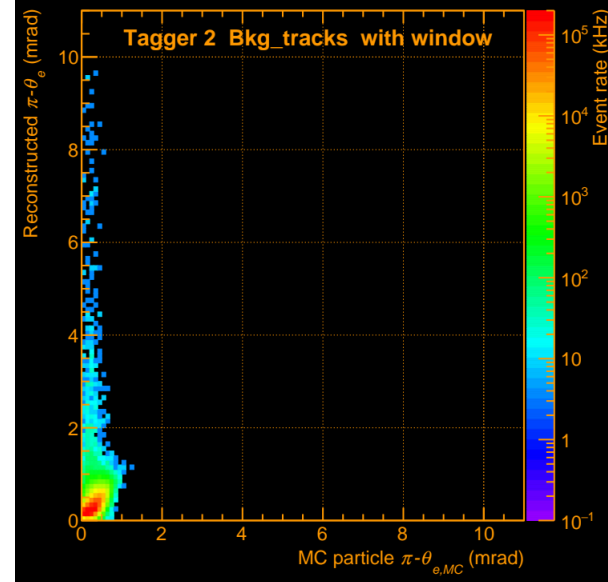
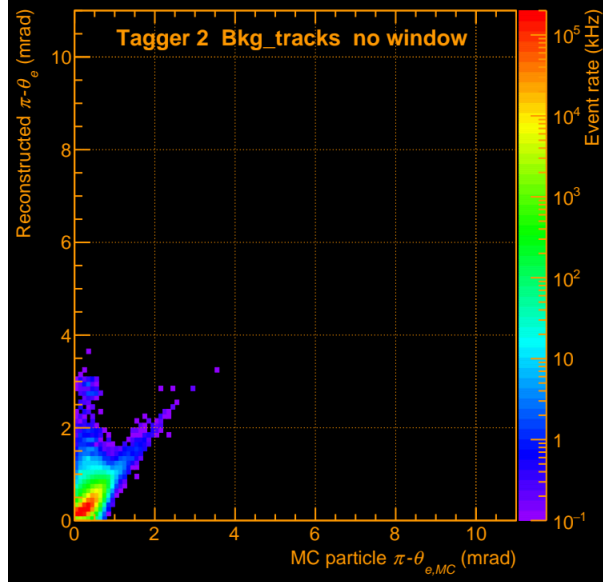


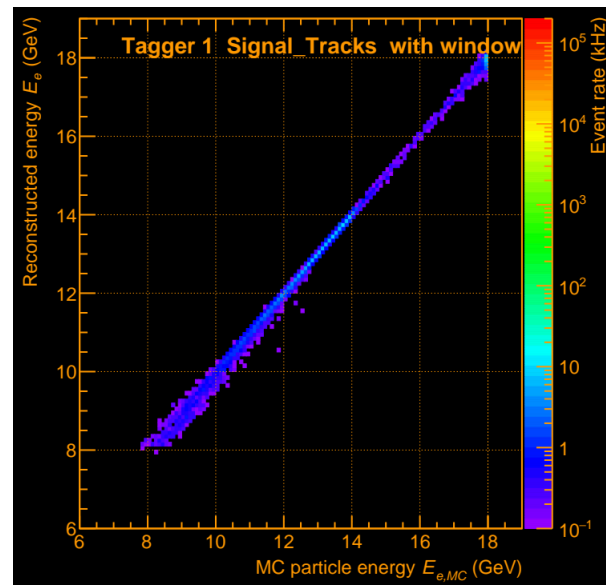
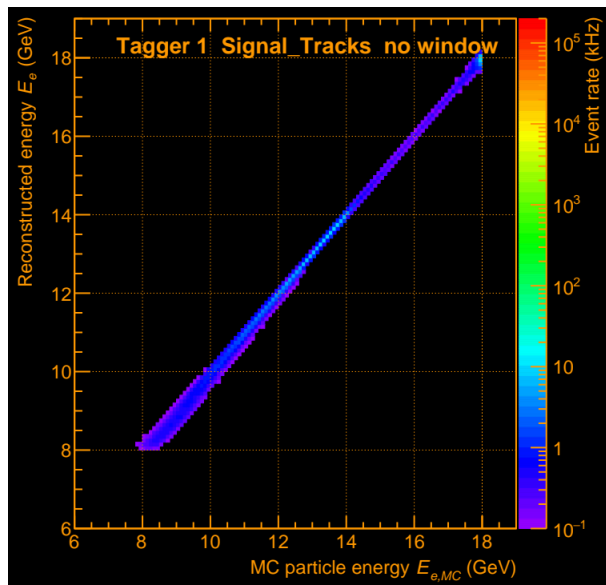
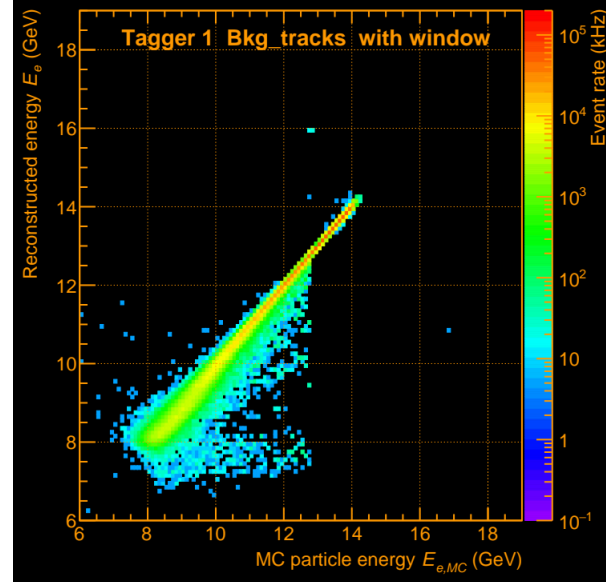
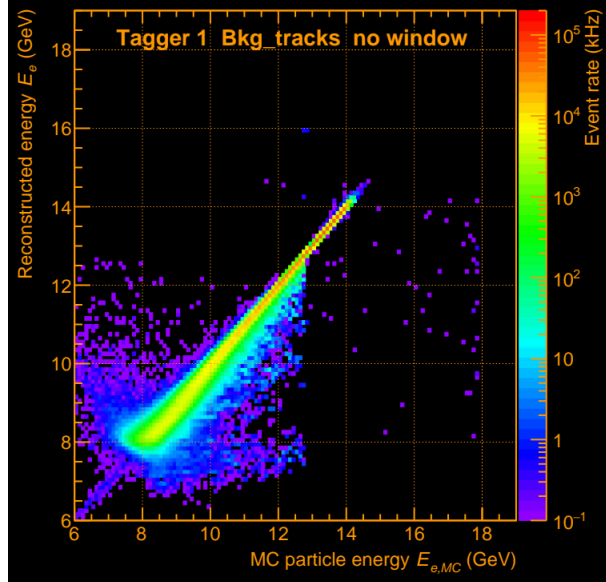


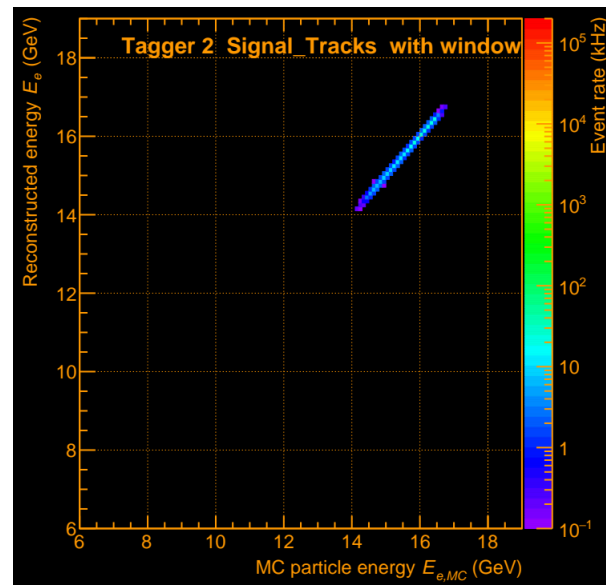
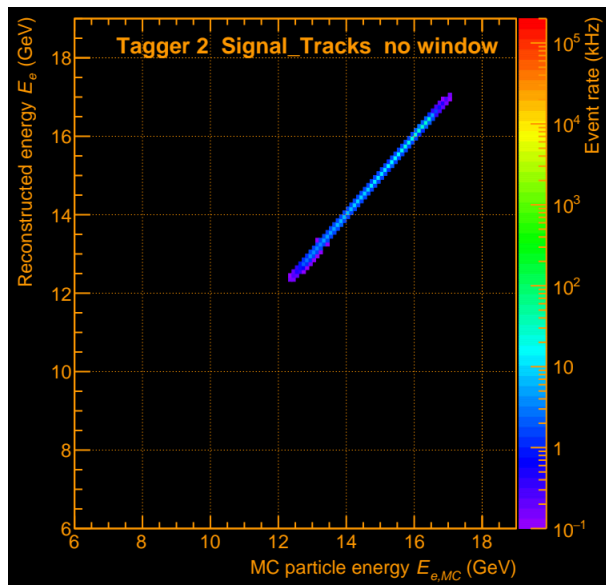
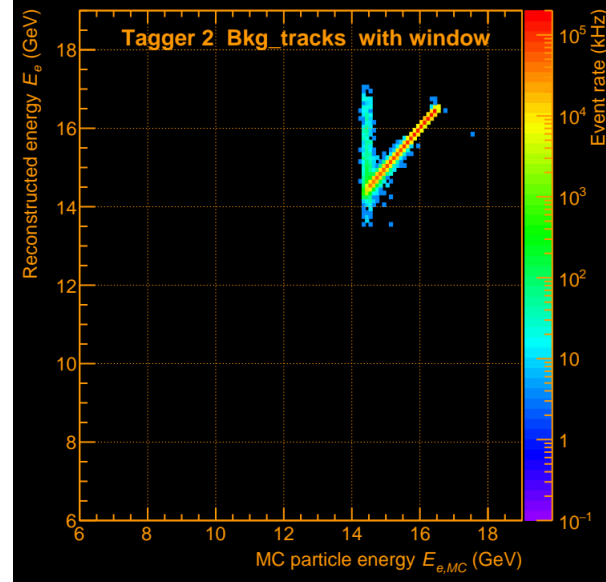
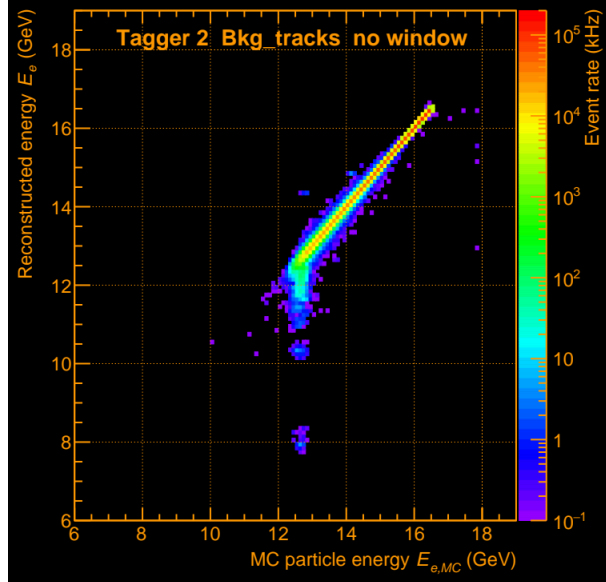








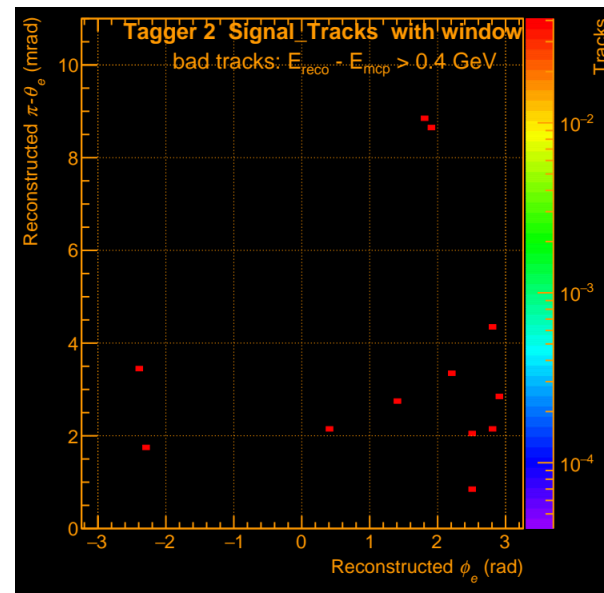
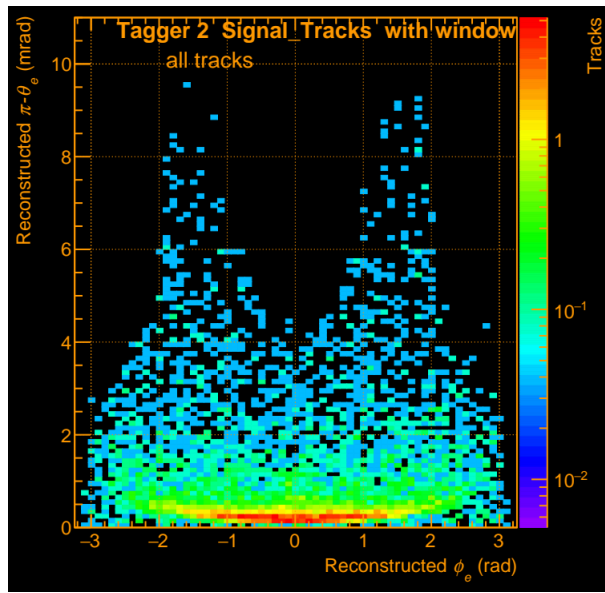
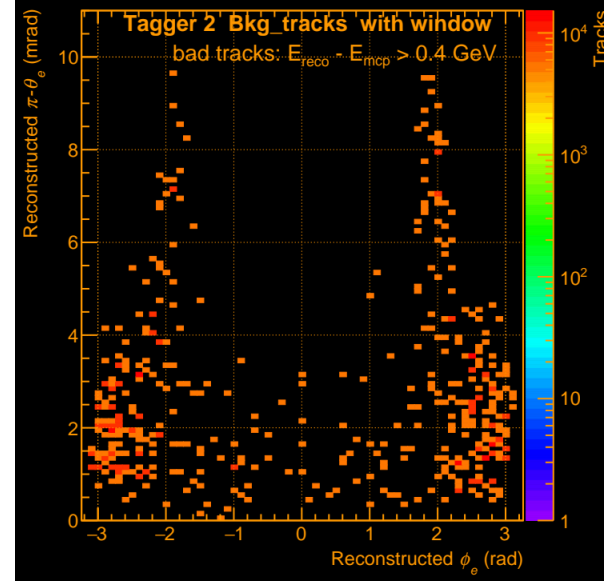
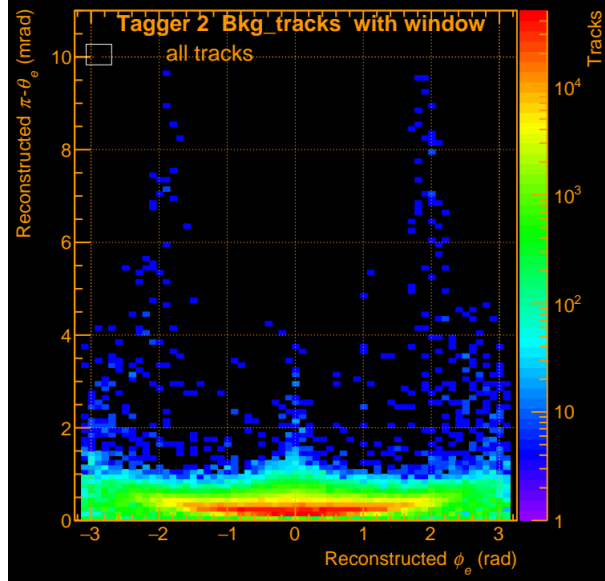




Tagger 2:

- where are the bad tracks
(with large ΔE) localized ?

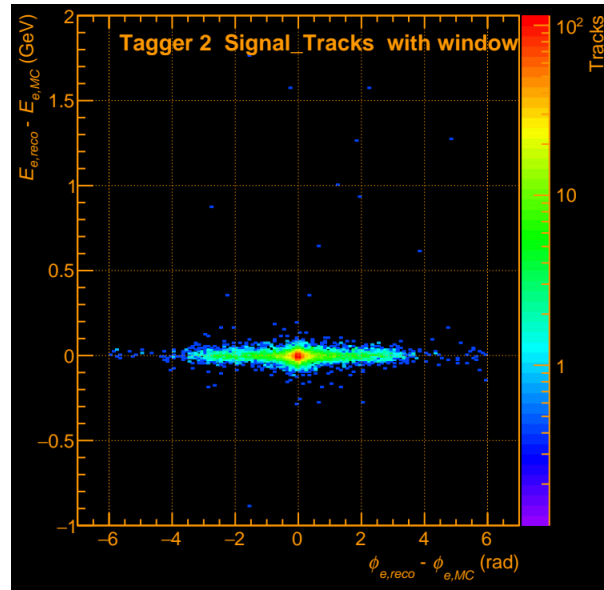
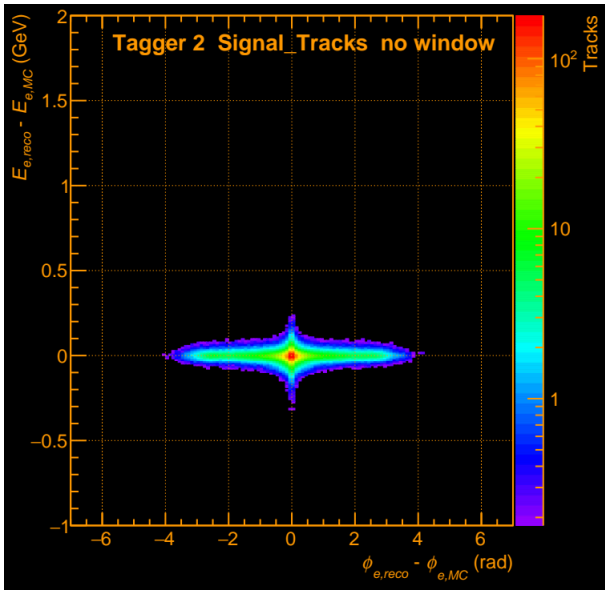
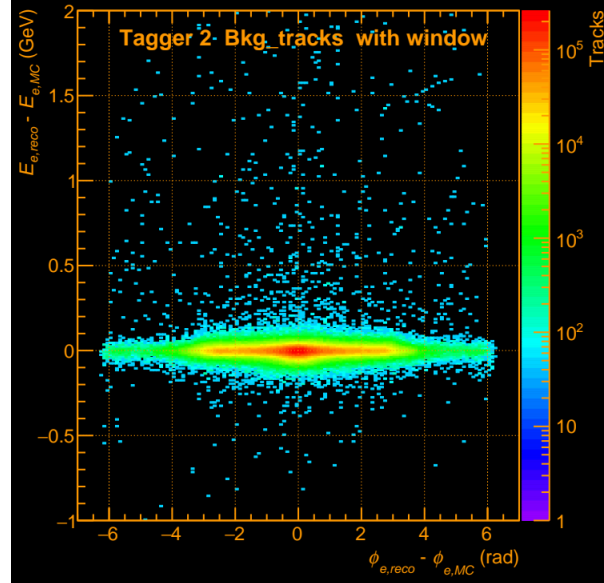
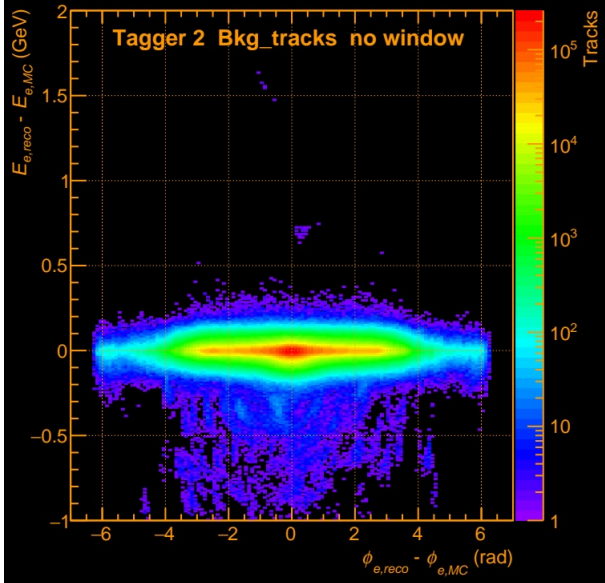
→ at the edge of ϕ range



Tagger 2:

- is ϕ reconstructed well?

→ some very bad, majority ok



back-up

