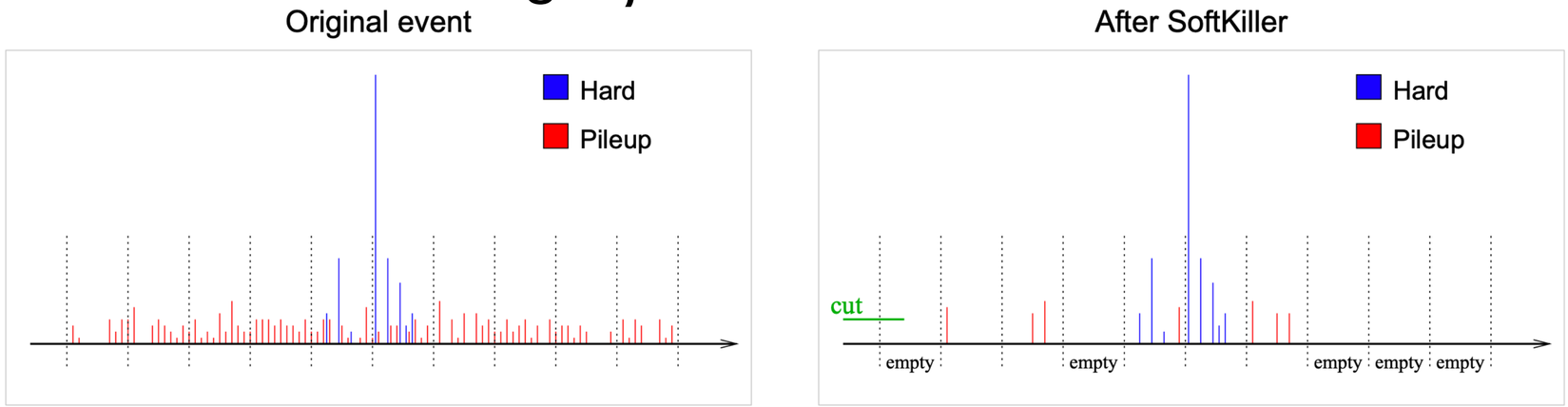
Updates on Calorimeter Hits Selection

Davide Zuliani - Calorimeter and jet reconstruction @ Muon Collider, 25/09/2020

Starting point
SoftKiller method

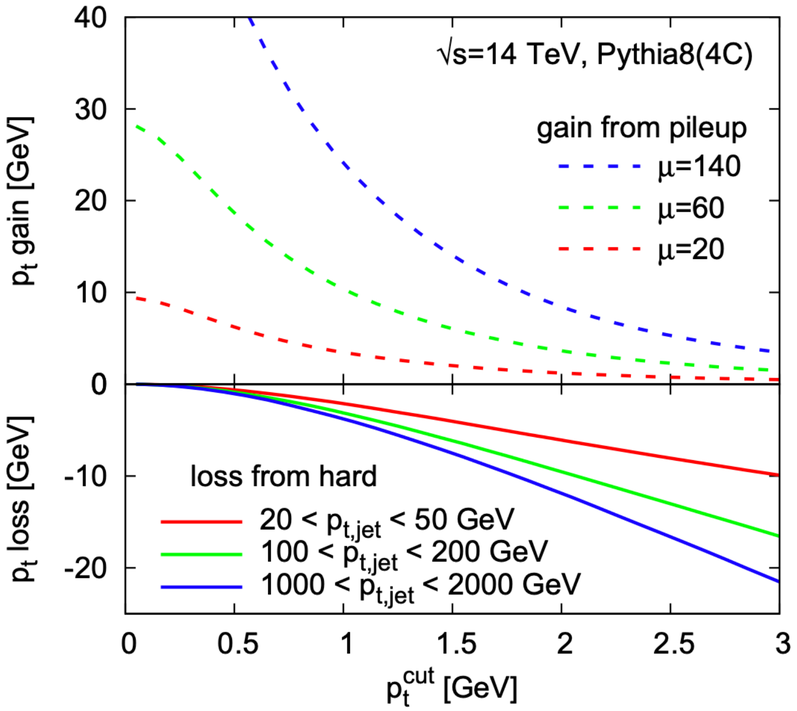
- Method used to reduce pileup effect
- Pseudorapidity-azimuth ($\eta - \phi$) space is divided in patches (size = $a \times a$)
- Main variable: $\rho = \text{median}\left(p_{t_i}/A_i\right)$ for $i \in$ patches
- A p_t^{cut} is inserted in order to get $\rho = 0$

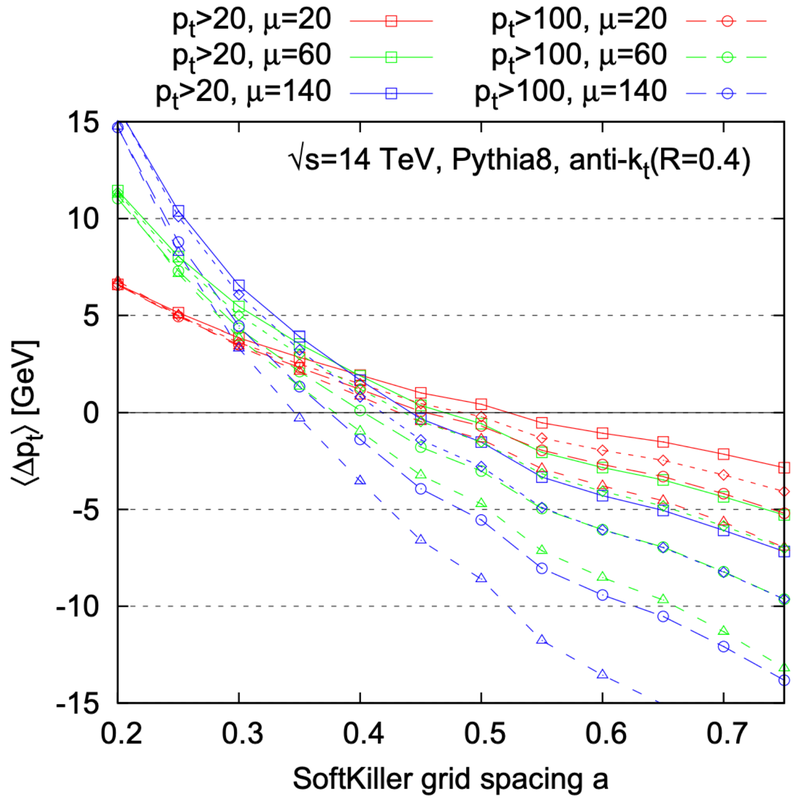
$p_t^{cut} = \text{median}(p_{t_i}^{max})$
for $i \in$ patches



Starting point
SoftKiller method

- The only free parameter is the patch dimension
- Compute potential bias in removing hits





“SoftKiller” @ Muon Collider

Up to now for ECAL barrel

- We consider hits
- Aim: reduction of hits in order to better reconstruct jets
- The $\eta - \phi$ is divided in patches and applied layer by layer
- Same approach used for SoftKiller, with some changes:

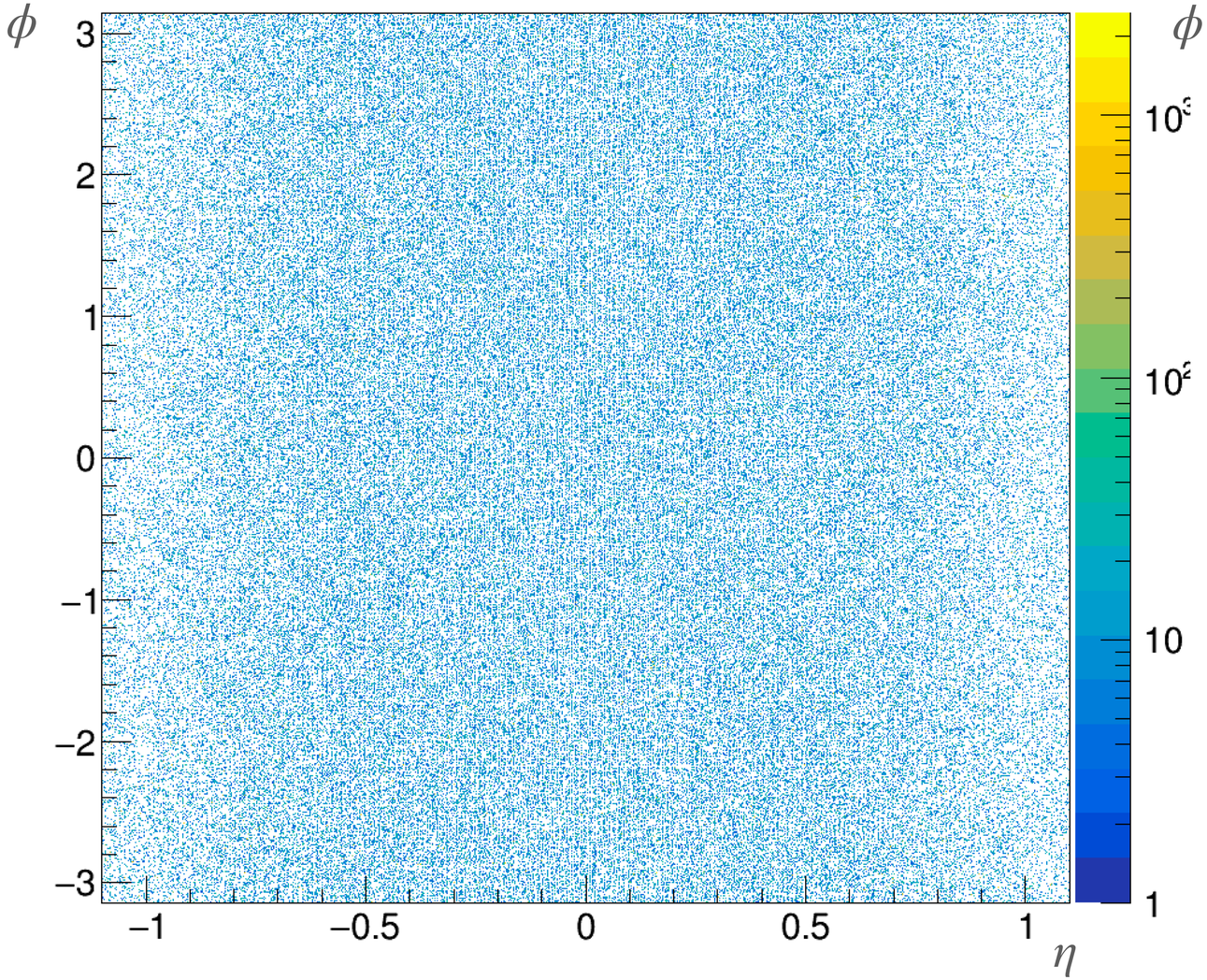
$p_t \Longleftrightarrow E$, energy released in one cell

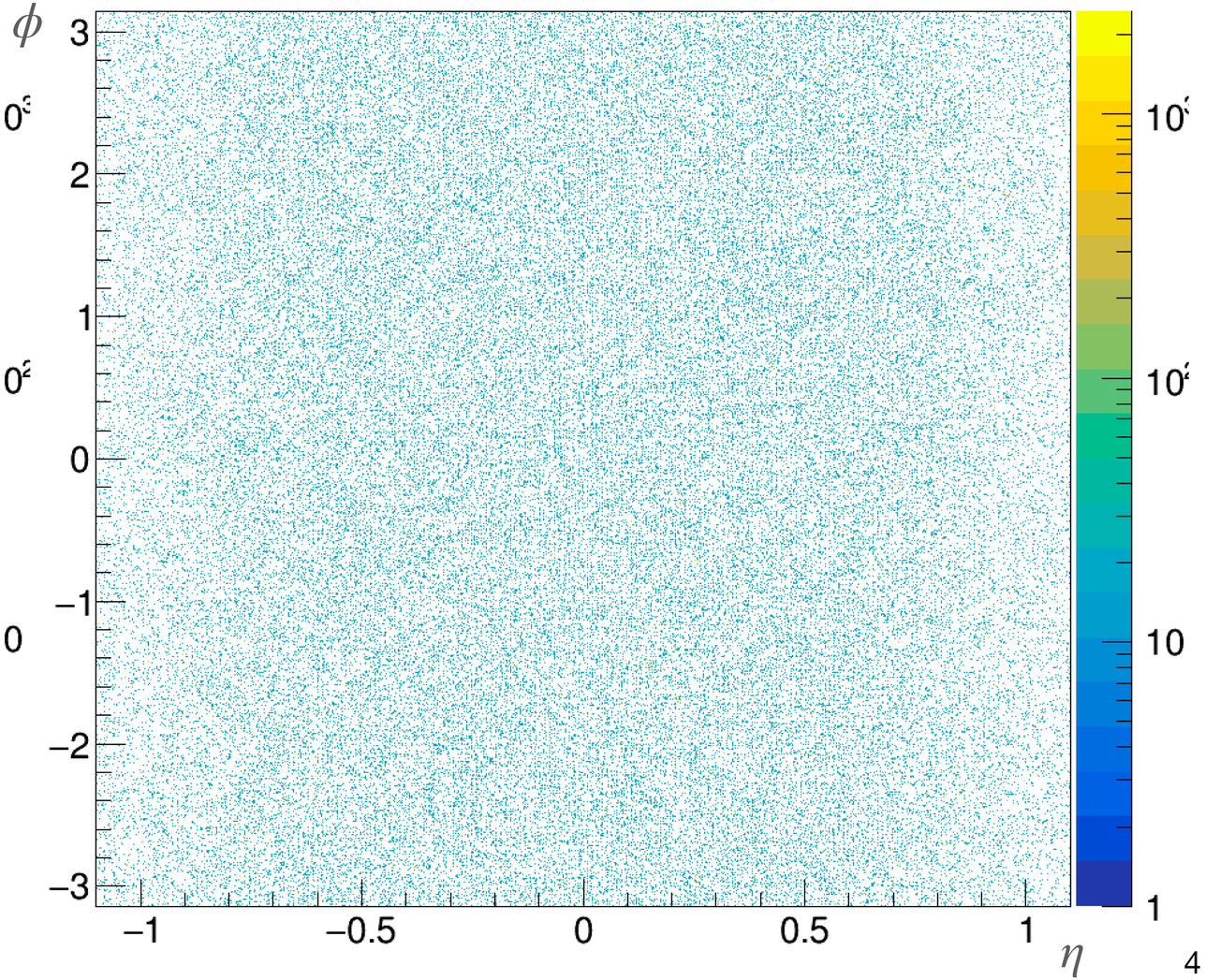
$p_t^{cut} \Longleftrightarrow E^{cut}$, energy cut on cells

Check biases w.r.t. energy released by signal

“SoftKiller” @ Muon Collider

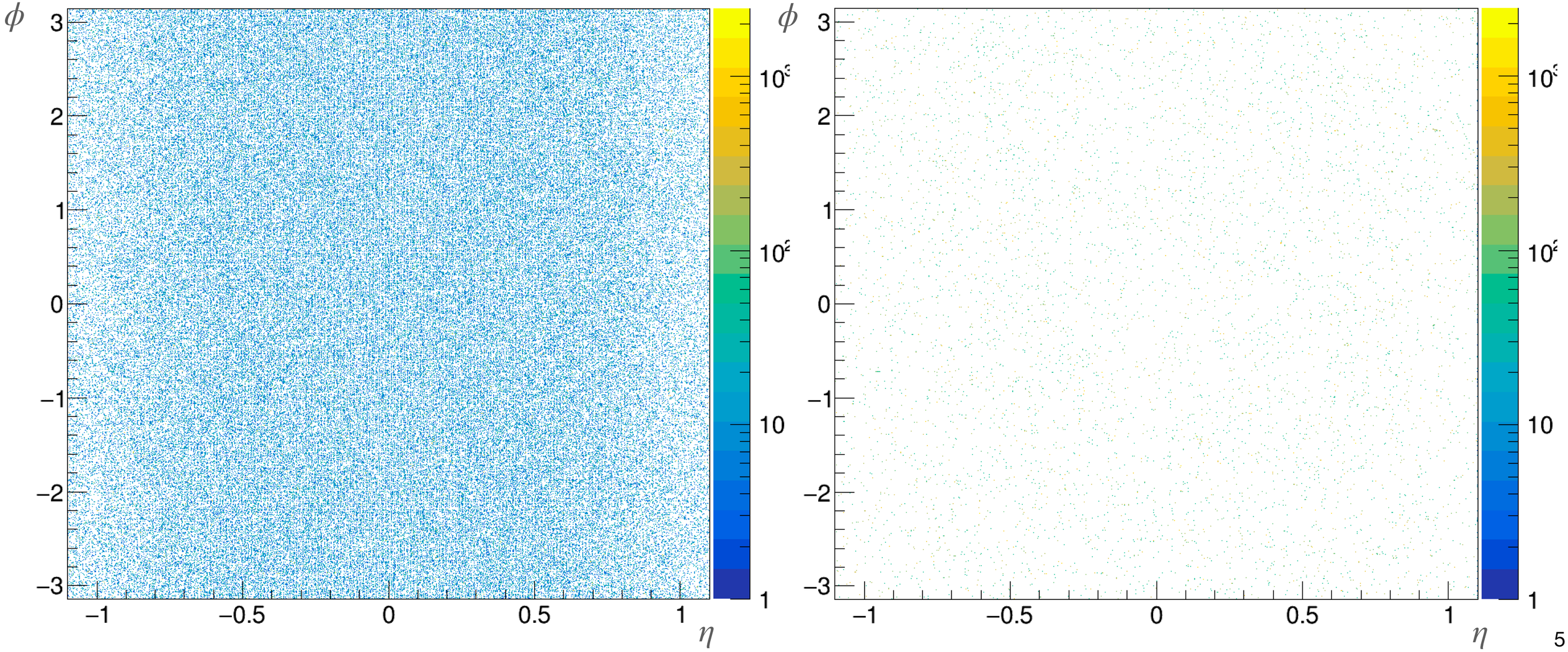
Preliminary comparison for a $E_{cut} = 10$ MeV





“SoftKiller” @ Muon Collider

Preliminary comparison for a $E_{cut} = 50$ MeV



“SoftKiller” @ Muon Collider

Next steps

- Optimize the choice of patch size
- Understand the impact on signal
- Choose specific cuts for each layer

- If results are good:
  - Evaluate the impact on jet reconstruction