Noise in ECAL

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Electronics noise

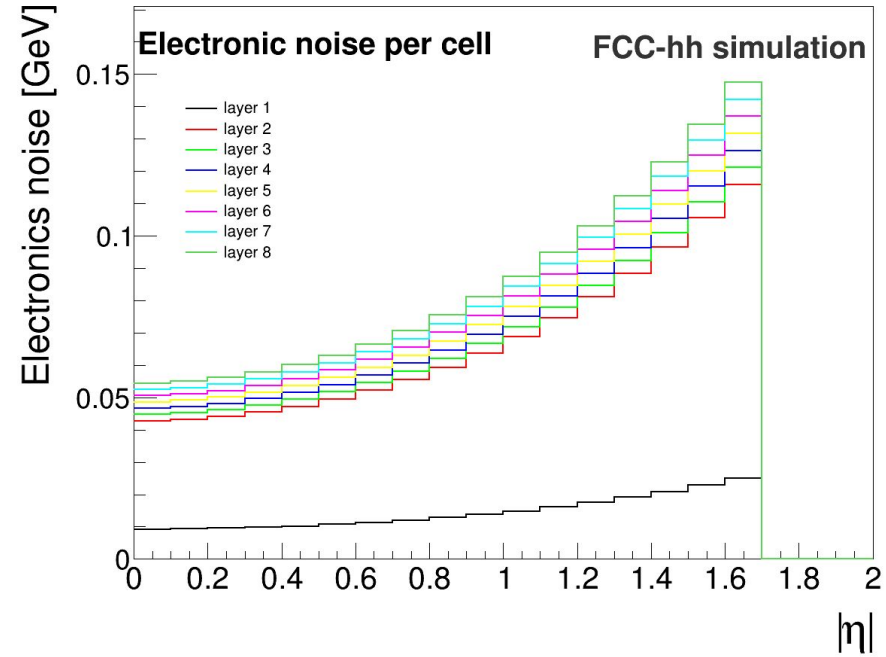
Layer thicknesses: 2 cm + 7x9 cm

Linear scaling with the capacitance $C_d = \varepsilon A/d$

- Distance d = 0.1 mm -> larger noise than for the simple geometry (d = 2 mm)

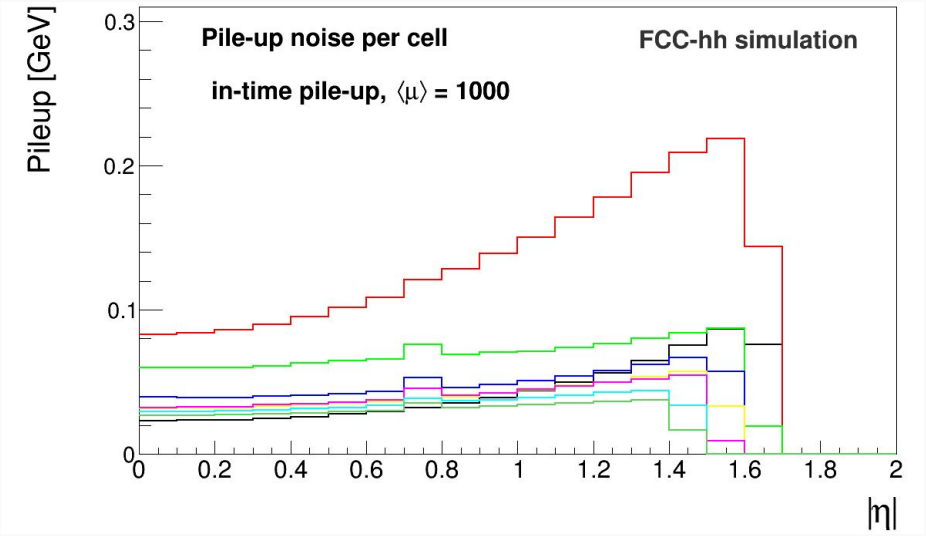
Noise grows with pseudorapidity and longitudinal layer number

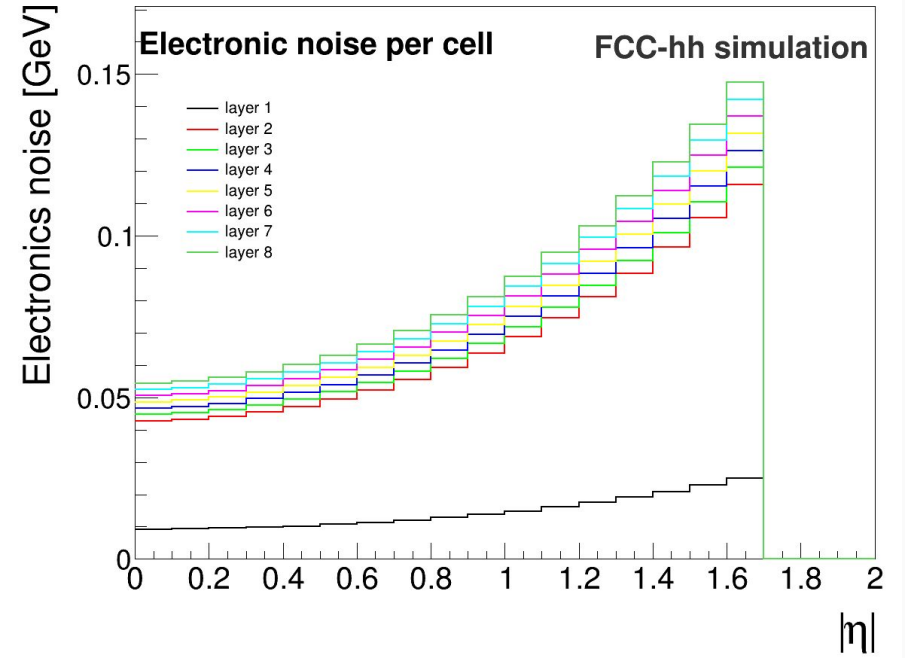
- Noise up to ~150 MeV for high eta



Electronics noise vs pile-up

Electronics noise is comparable or higher than pile-up contribution per cell starting from the 3rd long. layer at eta = 0





How to emulate the noise in the simulations?

Electronics noise in cells could be considered as uncorrelated

- Emulation of the electronics noise by random Gaussian during digitization

Pile-up contribution in cells is highly correlated

- Decided to be add pile-up to the reconstructed objects
  - First, we reconstruct e.g. electrons
  - Next, we smear the energy according to pile-up contribution (depending on eta of the cluster)

BACKUP

Electronic noise in ATLAS LAr

Electronic noise at electron scale