Showers in liquid argon

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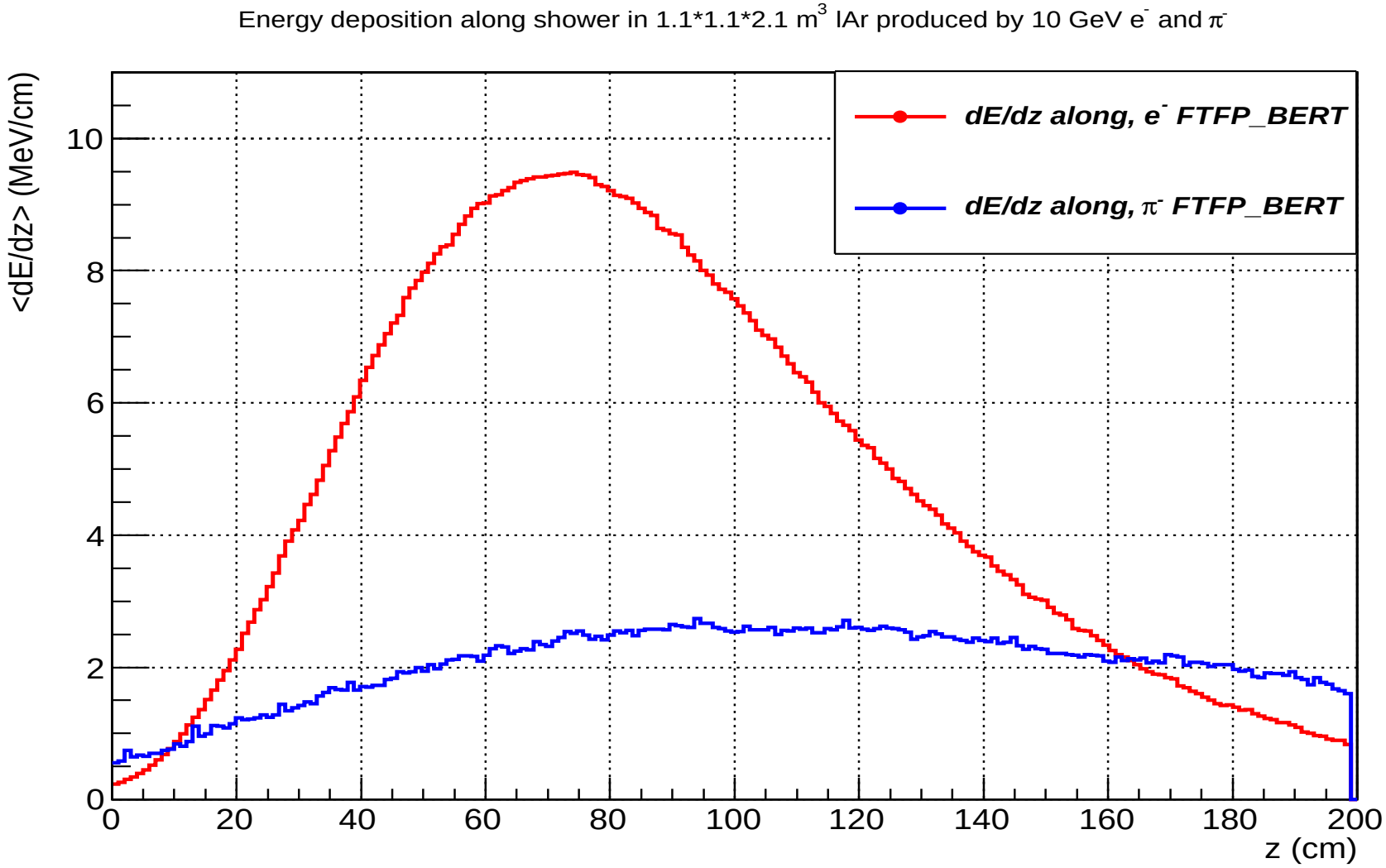
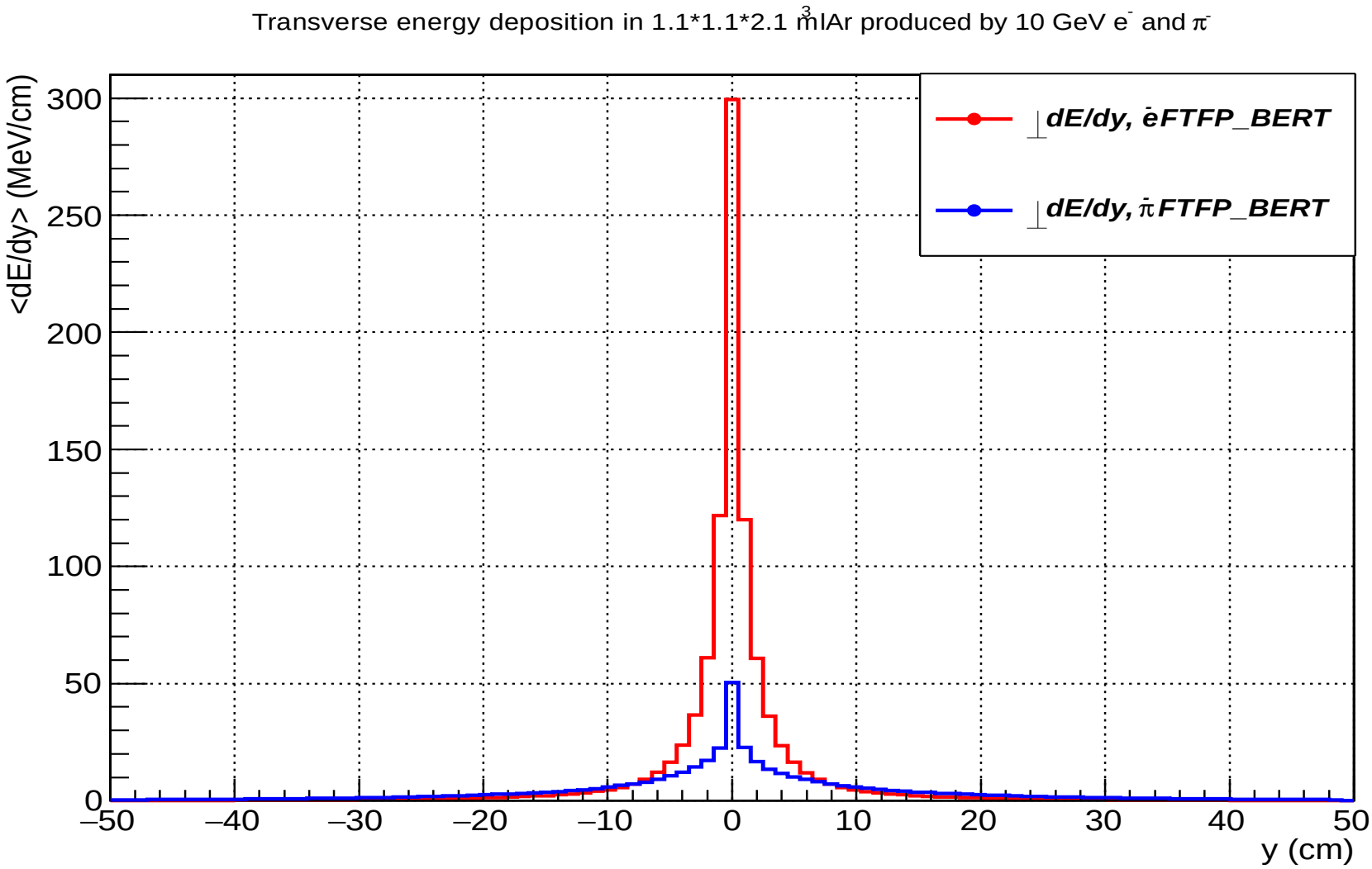
Abstract

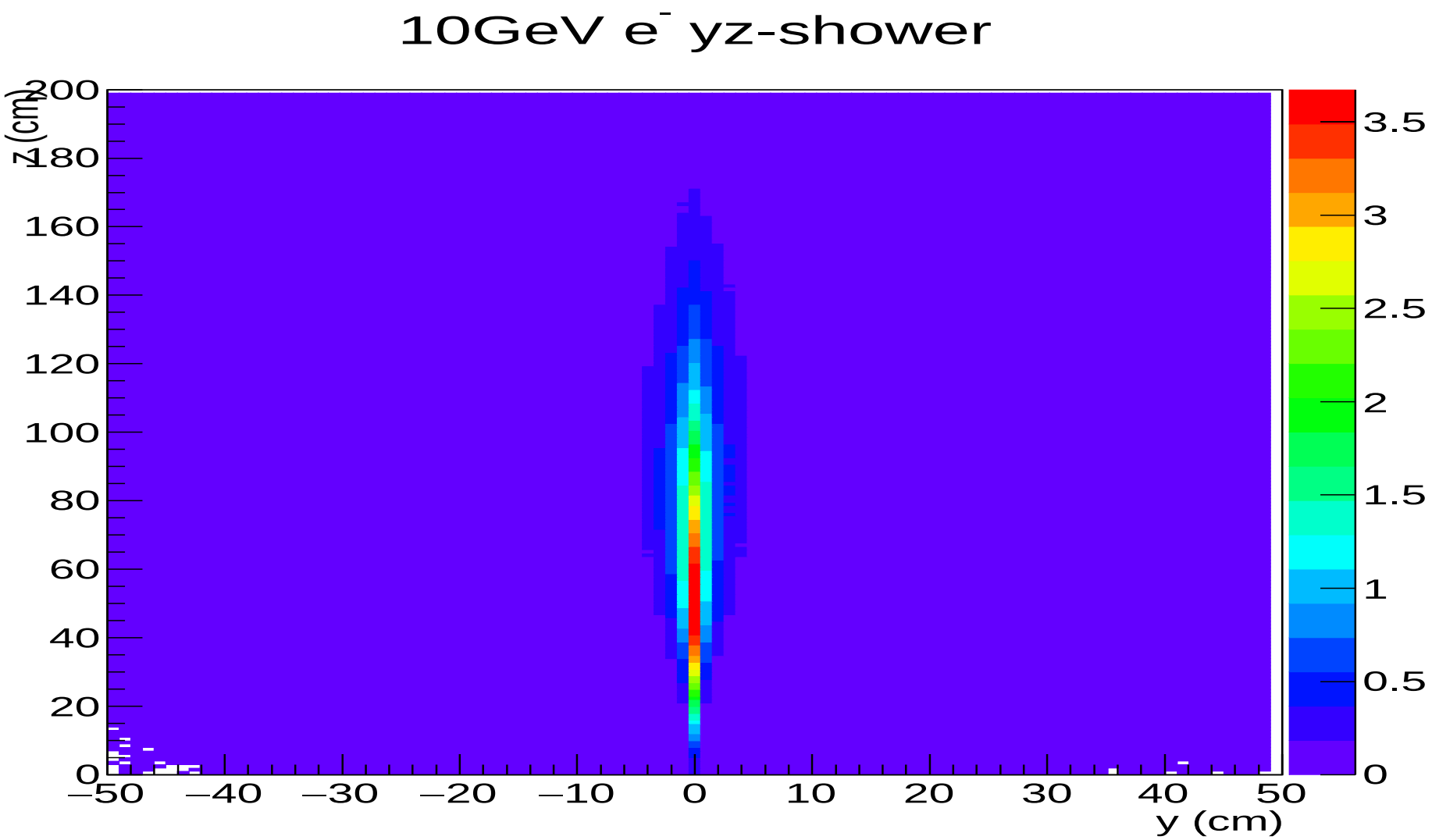
Images of different showers in liquid argon are presented. Showers produced by 10 GeV/c pions and electrons in ∼1x1x2 m^3 liquid argon are subdivided by ∼2x10^6 1 cm^3 cubic voxels.



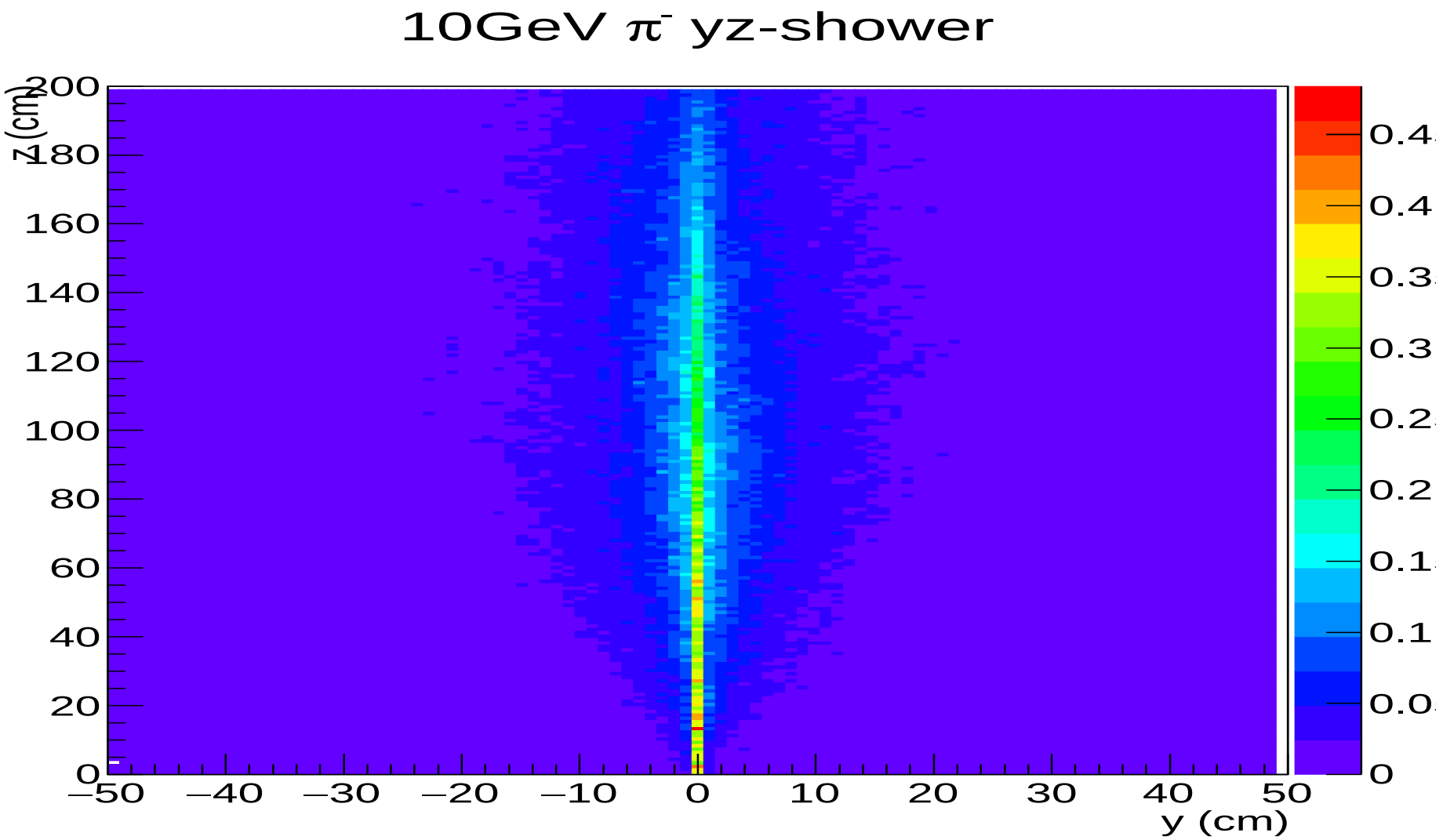
Longitudinal shower distribution produced by 10 GeV/c electrons (red) and pions (blue).



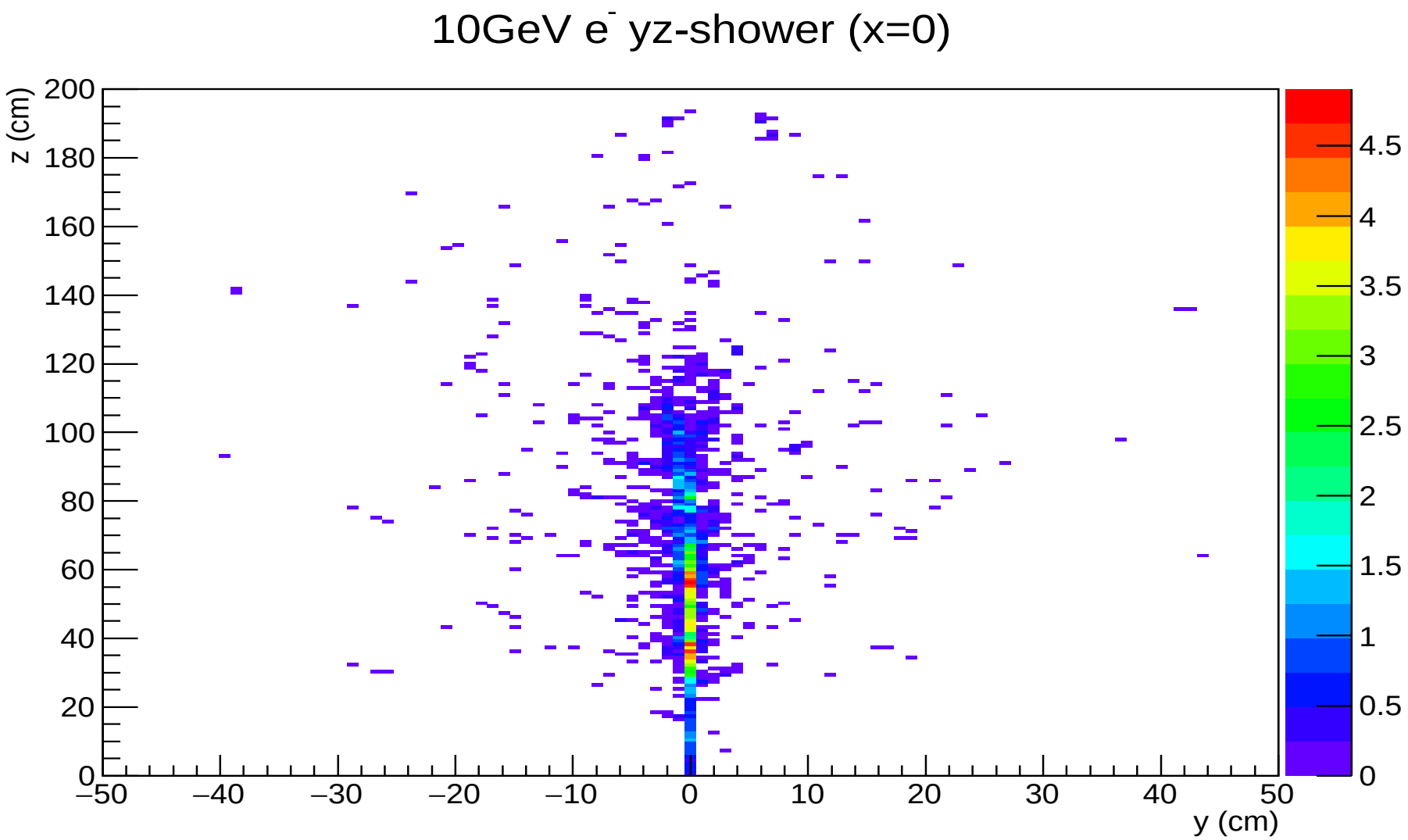
Transverse shower distribution produced by 10 GeV/c electrons (red) and pions (blue).



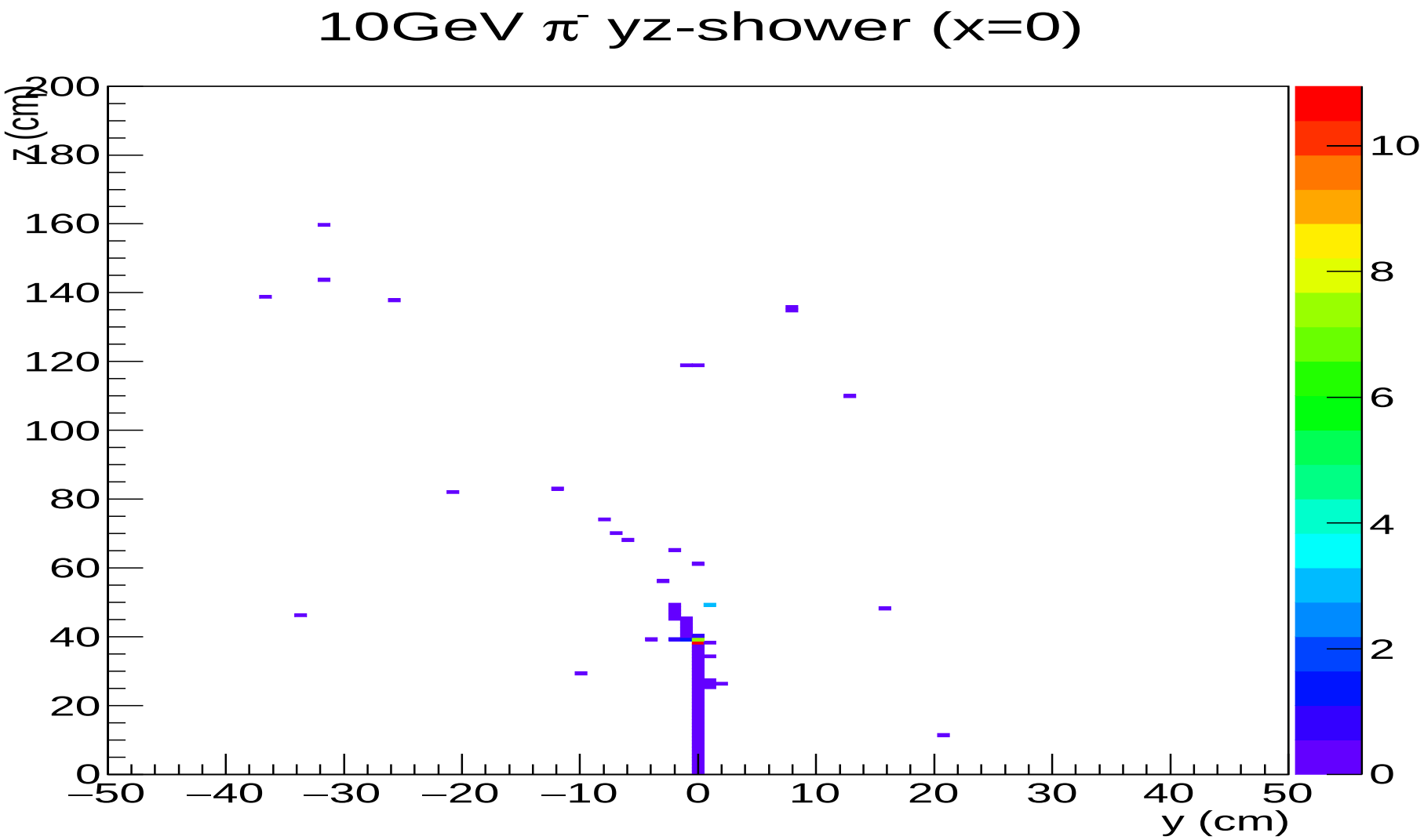
Longitudinal-transverse shower distribution produced by 10 GeV/c electrons (1000 events, G4MT mode, 1 cm^3).



Longitudinal-transverse shower distribution produced by 10 GeV/c pions (1000 events, G4MT mode, 1 cm^3).



Longitudinal-transverse shower distribution produced by 10 GeV/c electrons at $x = 0$ (1 event, 1 cm^3).



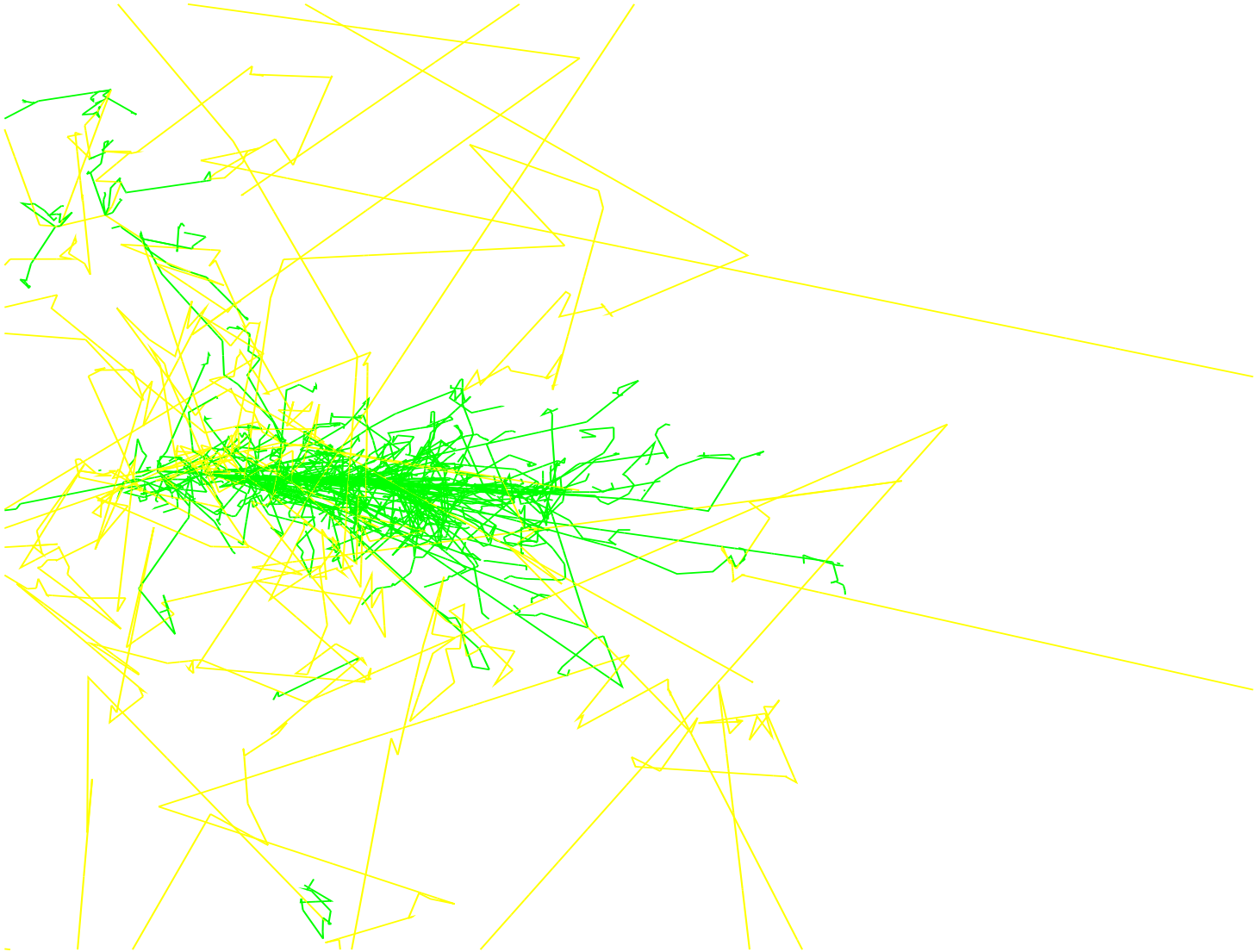
Longitudinal-transverse shower distribution produced by 10 GeV/c pions at $x = 0$ (1 event, 1 cm^3).

1 Summary

1. One event showers from 10 GeV/c pions and electrons are quite different in terms of the space distribution of the shower energy deposition. It can be used for particle identification.
2. 3x3x3 mm^3 voxels are in progress. This is close to the liquid argon TPC space resolution.
3. Liquid argon TPC data with 3x3x3 mm^3 volume resolution can be used for the shower shape studies.

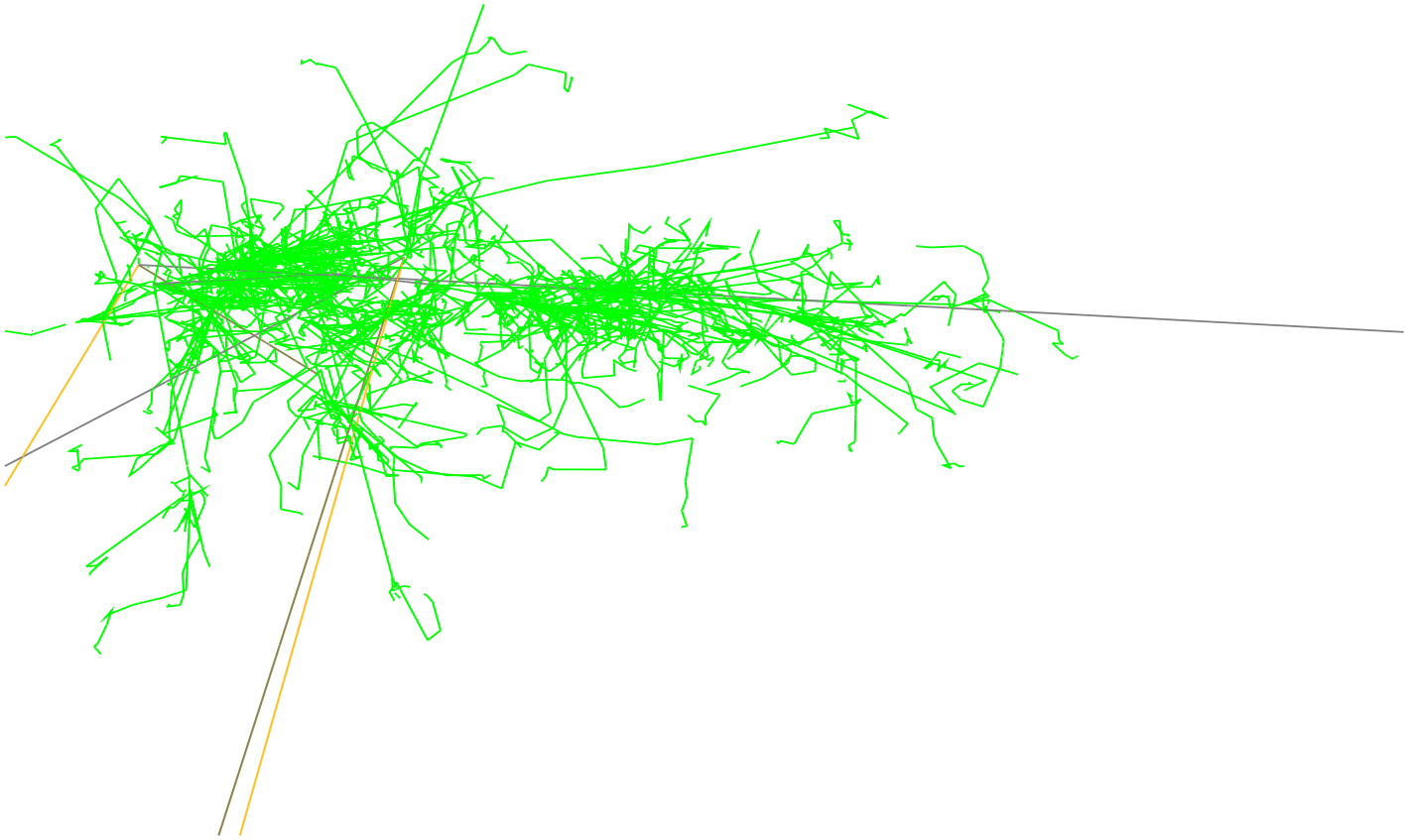
2 Back-up images

Run 0 Event 0



Shower produced by π^- 10 GeV/c, QGSP_BERT, neutral particles (γ, n)

Run 0 Event 0



Shower produced by π^- 10 GeV/c, FTFP_BERT neutral particles (γ, n, ν_μ, $\bar{\nu_\mu}$, ν_e , $\bar{\nu_e}$). Neutrons?