



Measurement of neutral mesons by means of one photon detected in ALICE electromagnetic calorimeter and another from its conversion in central tracking system



Alexander Borissov, for the ALICE collaboration, Wayne State University

Electromagnetic Calorimeter (EMCAL)

- EMCAL and PHOS calorimeters complement tracking detectors by measurement of electromagnetic probes like photons, hadrons in photon decay channels, and neutral portion of jet energy.
- EMCAL has 10 modules containing 11520 optically isolated towers, each spans $\delta\phi \times \delta\eta = 0.014 \times 0.014$, tower size at $\eta = 0$ is equal to $\sim 6 \times 6 \times 24.6 \text{ cm}^3$
- Acceptance: $80^\circ < \phi < 180^\circ$, $\Delta\eta = 1.4$
- Energy resolution $\simeq 11\%/\sqrt{E_\gamma(\text{GeV})} + 2\%$
- This analysis is performed on data from 2010, when 4 EMCAL modules were operational.

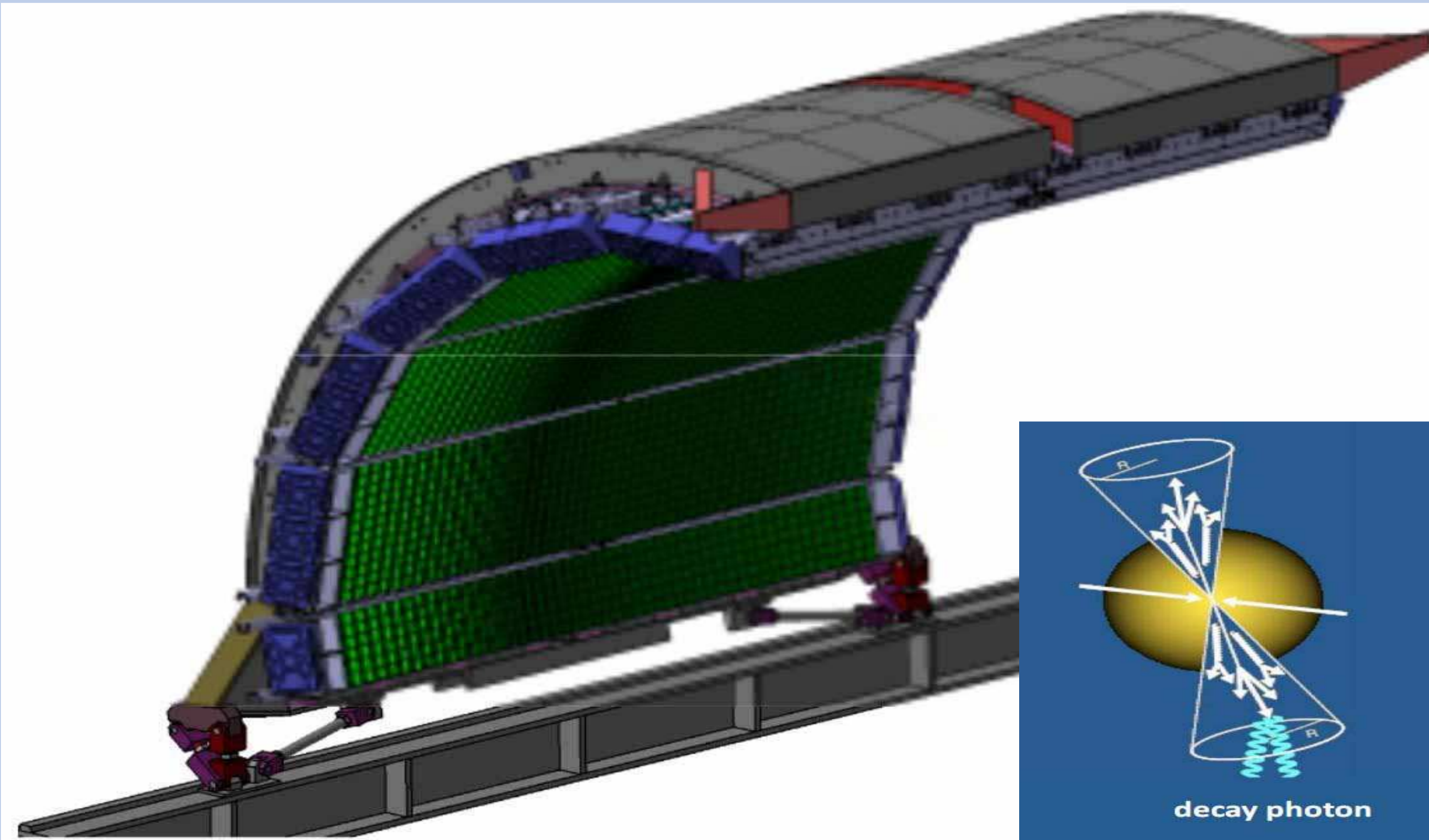
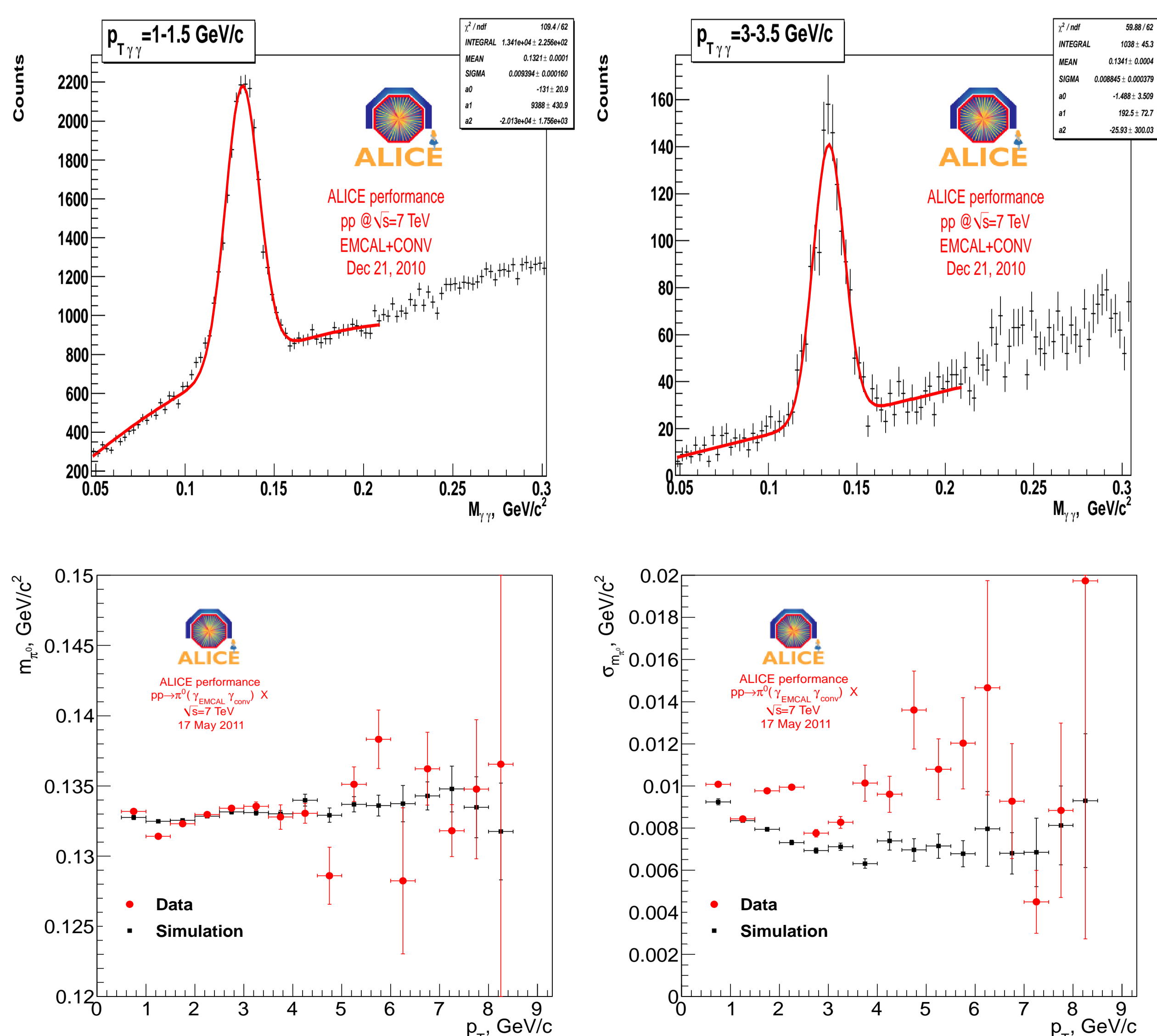
e^+e^- pairs from photon conversion are measured in time projection chamber (TPC)

- Probability of photon conversion in central tracking system is ~ 0.08 .
- Reconstruction efficiency is about **0.67**.
- Measured from both photons converted in TPC, width of π^0 invariant mass is about **3 MeV**. Its p_T spectrum is in good agreement with PHOS data.

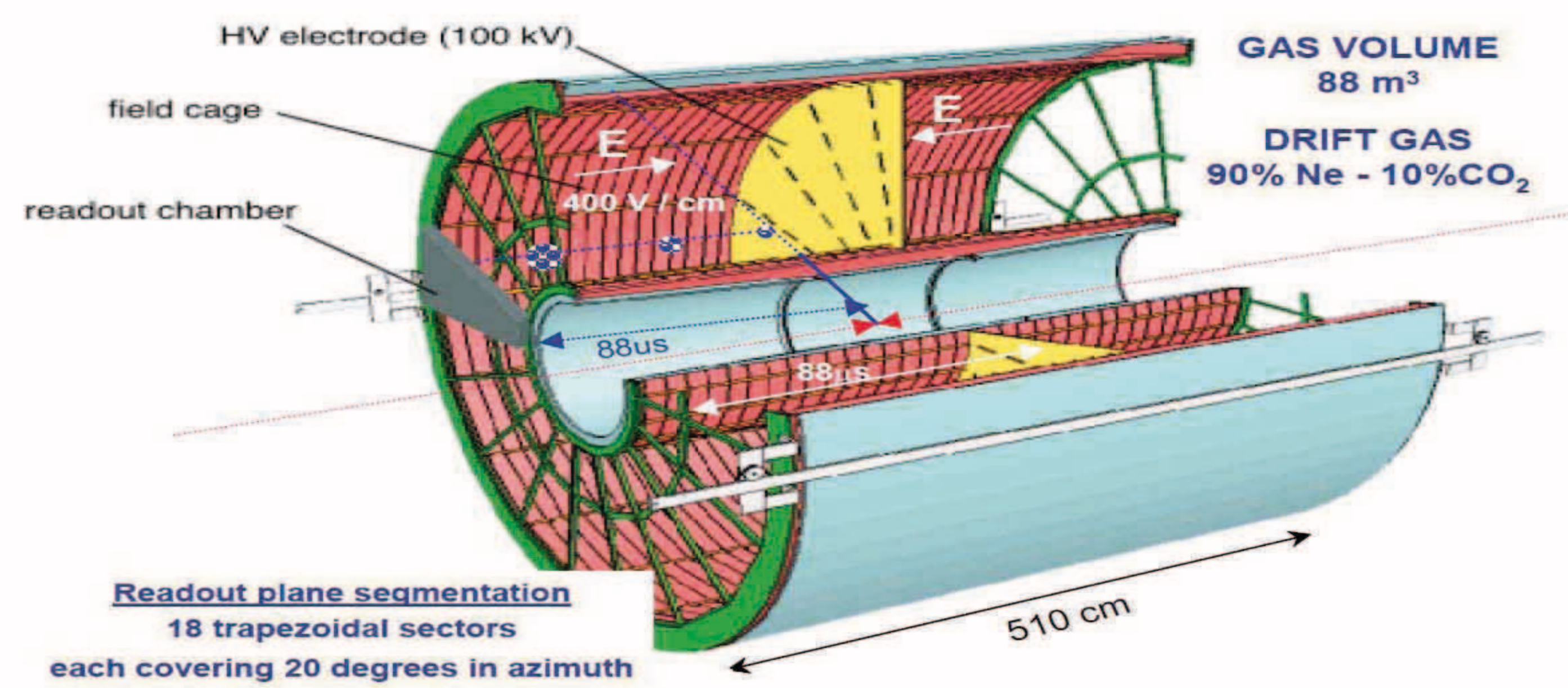
π^0 from converted and EMCAL photons

- Detection of converted photon allows selection of π^0 coming from the main interaction point.
- Measurement of π^0 width allows to study calorimeter response from one photon, while the second one is accurately resolved by TPC.
- Statistics is lower in comparison with both photons detected in EMCAL.
- π^0 p_T -spectrum measured with this method complements other measurements in terms of phase space of π^0 production and systematic uncertainties.

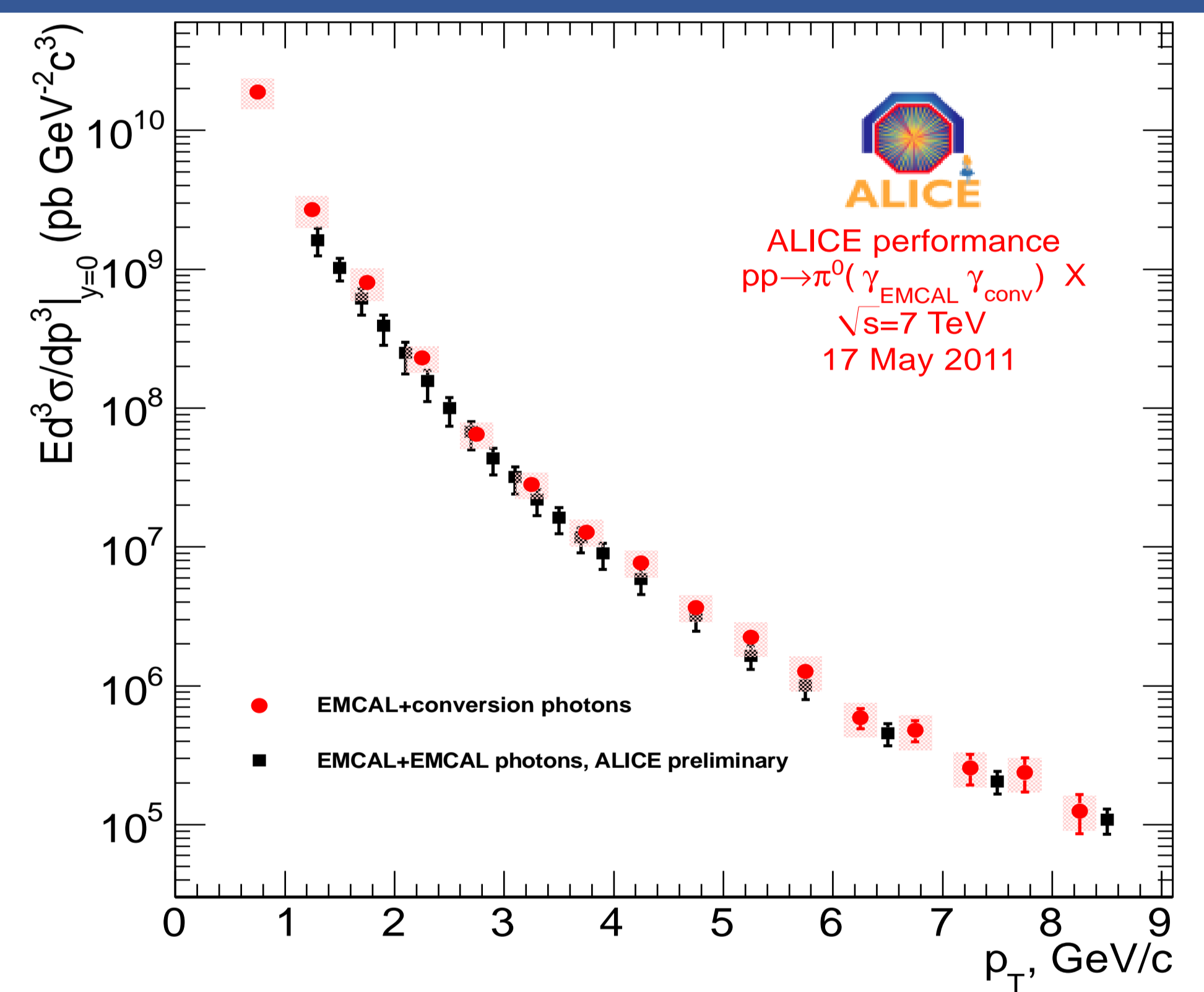
π^0 invariant mass and its width vs p_T



ALICE TPC LAYOUT



π^0 production cross section



Summary and outlook

- π^0 transverse momentum spectrum was obtained after application of corrections for acceptance and reconstruction efficiency.
- Results of Monte Carlo simulations of this approach are in reasonable agreement with data.
- Dominant sources of systematic uncertainties are background subtraction procedure and application of corrections.
- This method allows systematically independent estimate of EMCAL energy and position resolution.
- Analysis is ongoing for π^0 meson production from Pb-Pb and pp collisions at $\sqrt{s} = 2.76 \text{ TeV}$.