

High- p_T Physics with the ALICE Experiment at the LHC

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In order to study hard scattering processes in Pb+Pb collisions at the LHC, the ALICE-USA Collaboration is proposing to build a large area electromagnetic calorimeter (EMCal) for the ALICE experiment. The combination of an EMCal and the tracking systems (TPC + ITS + vertex constraint) of ALICE appears to be an almost ideal detector for studying jets, which are considered to be an essential tool to study parton propagation through dense nuclear matter.

Detailed simulations of the EMCal plus TPC+ITS response to $\sqrt{s_{NN}}=5.5$ TeV Pythia jet-triggered events superposed on a Hijing Pb+Pb background have been performed. A modified UA1 JetFinder algorithm[1] has been used to reconstruct jets.

Fig. 1 shows a 100 GeV jet observable above the soft hadronic background in a central Pb+Pb event at $\sqrt{s_{NN}}=5.5$ TeV.

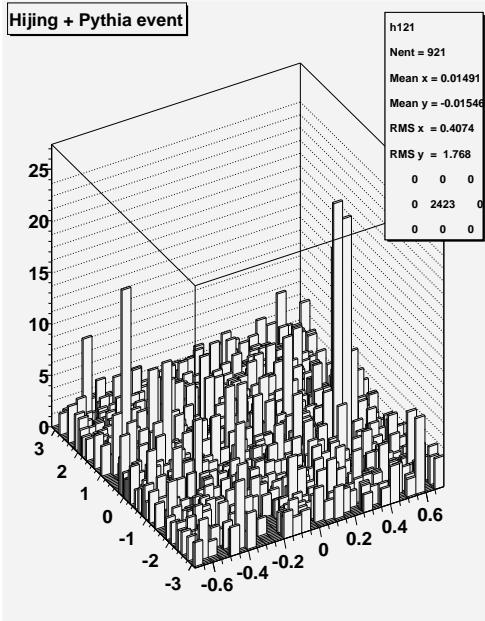


Figure 1: A jet with $E_T=100$ GeV stands out against the soft hadronic background.

Rate calculations for one ALICE-year (30 days) of Pb+Pb running show that there are sufficient statis-

tics to study jets of up to $E_T \geq 250$ GeV. By combining the tracking information from the TPC+ITS with EMCal energy measurements, the fragmentation functions of hard scattered partons may be studied in detail.

Fig. 2 shows the p_T spectrum of charged particles measured in simulated Pb+Pb events with the ALICE tracking system. The black histogram represents particles coming from jet fragmentation, whereas the red histogram corresponds to the soft hadronic background. Clearly, as the jet E_T increases, the soft background contribution becomes less significant.

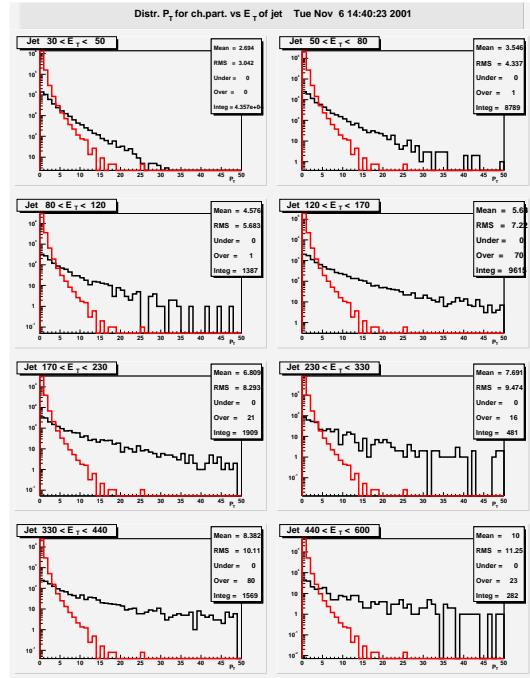


Figure 2: Jet constituent p_T distributions as a function of jet E_T .

References

- [1] W. Christie & K. Shesternov, STAR Note 196.