

II. Outstanding research and other results in 2017

a.) Outstanding research and other results

Hadron physics. — We have measured the transverse momentum spectra (p_T) of identified charged hadrons (pions, kaons, and protons) in proton-proton (pp) collisions at $\sqrt{s} = 13$ TeV. A comparison with lower energy data shows only a moderate dependence of the average transverse momentum on the center-of-mass energy. The data supports the assumption that the characteristics of particle production are constrained by the amount of initial parton energy that is available in any given collision.

We have proposed a tool to reveal the origin of the collective-like phenomena observed in pp collisions. From our studies, quantitative and qualitative differences between PYTHIA8 and EPOS3 Monte Carlo event generators are found in the p_T spectra when the leading jet p_T is increased. For low-multiplicity events the presence of jets can produce radial flow-like behavior.

We have measured two-particle angular correlations of charged particles in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV. The jet-related peak at $(\Delta\phi, \Delta\eta) = (0, 0)$ broadens with increasing centrality at low p_T and becomes asymmetric. An unexpected depletion around the center of the peak is observed at low p_T in the most central collisions. The comparison with the AMPT model shows that both effects are accompanied by large radial and longitudinal flow and could be results of the interaction of the jets with the flowing medium.

II/B Relationship between science and society

Members of the research group participated in the organisation of the following events: International Particle Physics Masterclasses, Wigner-CERN Open Days, Multi-colored physics bus.

V. List of important publications in 2017

A. Ortiz, G. Bencédi, H. Bello: Revealing the source of the radial flow patterns in proton-proton collisions using hard probes, *J. Phys. G* **44** (2017) 065001, IF: 2.899

ALICE Collaboration: Anomalous evolution of the near-side jet peak shape in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV, *Phys. Rev. Lett.* **119** (2017) 102301, IF: 8.462

CMS Collaboration: Measurement of charged pion, kaon, and proton production in proton-proton collisions at $\sqrt{s} = 13$ TeV, *Phys. Rev. D* **96** (2017) 112003, IF: 4.568