**AND Λ HADRONS PRODUCTION IN**

**PROTON-PROTON AND PROTON-LEAD**

**COLLISIONS AT 5.02TEV STUDIED WITH**

**THE LHCB DETECTOR**

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The study of hadron production in a strongly interacting environment is expected to shed light on the quest of the partial restoration of chiral symmetry in hot/dense nuclear matter. A modification of hadron production features (differential cross-sections, mass and width, branching ratios, nuclear modification factors etc.) has been predicted by the Quantum Chromodynamics (QCD) models. The strength of the modification depends on the baryon density and the temperature. To identify signatures of the Quark-Gluon-Plasma (QGP) studies are undertaken to compare quarkonium production cross-sections measured in proton-proton (p-p), proton-nucleus (p-A) and nucleus-nucleus (A-A) collisions [1, 2]. Whilst the highest probability of QGP creation is expected in A-A collisions, it is assumed that the p-A collision proceeds in cold nuclear matter with a well-defined density, thus revealing the Cold Nuclear Matter effects (CNM) [3].

V0 hadrons are named after the “V”-shaped track signature of their dominant decays: Λ → pπ−, → π+ and → π+π−, which are present in this analysis. Only long (passing through all Tracker station) tracks, with a quality factor χ2track/ndf < 5, are considered, with the V0 decaying within the VELO and the daughter tracks being fully reconstructed in the spectrometer with momentum p > 2GeV/c. Any oppositely-charged pair is kept as a potential V0 candidate if they form a vertex with a good quality of χ2vtx < 9 (with one degree of freedom for a V0 vertex). The Λ+ candidates are required to have invariant masses within ±70MeV/c2 and within ±100MeV/c2 of the PDG corresponding values [4]. The mass windows are made large in comparison with a mass resolution of few MeV/c2 to allow reliable subtraction of the background under the peak. The V0 production differential cross-sections measured with LHCb forward spectrometer in p-p and p-Pb collisions at √SNN = 5.02TeV are presented for transverse momentum range 0.15 < pT < 7.0GeV/c and rapidity ranges 1.5 < y∗ < 4.0 and −5.0 < y∗ < −2.5. The absolute values of differential cross-sections are measured for the first time in this rapidity ranges. V0 hadrons, produced in strong interactions, include strange quark weakly decaying to final states which are comparatively easy for theoretical calculations as well as for experimental reconstruction. The ratios of prompt V0 production cross-sections as well as nuclear modification factors were calculated in order to study the fundamental (QCD) processes behind parton fragmentation and hadronisation. These values are essential to study the transport of baryon number from p-p collisions to final state hadrons as well as the baryon-meson suppression factor in strange quark hadronisation.

The nuclear modification factors (RpPb) are calculated using the formula:

𝑅𝑝𝑃𝑏(𝑃𝑏𝑝)=

The Fig 1 shows that NMF for all V0 species and configurations are suppressed at low pT and ramps up as a function of pT. While NMF tends to rise for all the available pT bins for , the NMF for Λ and Λ reaches its maximum around 2 GeV/c and then remains mostly constant or even shows a slight decrease within the range of measurement uncertainties. The measured NMF is below the unity for all V0 species for p-Pb collision configuration. In the case of Pb-p collisions NMF exceeds the unity at around 1.35 GeV/c. From y∗ distributions of NMF one can see that NMF ramps up to central rapidity as well as NMF is more suppressed for forward rapidities (up to 40%) than for backward ones (60–80%).







Figure 1. Results for p-Pb and Pb-p data as a function of pT are shown in Fig. 40 (left column) and as a function of y∗ (right column) for (top row), Λ (middle row), and Λ ̅ (bottom row). Black circles mark forward (p-Pb) and blue ones—backward (Pb-p) configurations.

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