

Title: Study of jet fragmentation and inclusive jet production in heavy-ion collisions with the ATLAS experiment

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Abstract: This thesis presents two measurements - measurement of the jet fragmentation functions and inclusive jet production in heavy-ion collisions. The fragmentation functions are measured in Pb+Pb and pp collisions with the ATLAS detector at the LHC. The distributions are measured as a function of jet transverse momentum and rapidity. The analysis utilises an integrated luminosity of 0.14 nb^{-1} of Pb+Pb data and 4.0 pb^{-1} of pp data collected in 2011 and 2013, respectively, at the same centre-of-mass energy of 2.76 TeV. Modest but significant centrality-dependent modifications of fragmentation functions in Pb+Pb collisions with respect to those in pp collisions are seen. Measurements of the yield and nuclear modification factor, R_{AA} , for inclusive jets are performed using 25 pb^{-1} of pp data at $\sqrt{s} = 5.02 \text{ TeV}$ and 0.49 nb^{-1} of Pb+Pb data at $\sqrt{s_{NN}} = 5.02 \text{ TeV}$. The jets are measured over the transverse momentum range of 100–1000 GeV in six rapidity intervals covering $|y| < 2.8$. The magnitude of the R_{AA} increases with increasing p_T and with decreasing centrality of the Pb+Pb collision. The R_{AA} is independent of rapidity at low p_T and it decreases with increasing rapidity at high p_T .

Keywords: jet quenching, fragmentation functions, nuclear modification factor, ATLAS detector