Ultra-relativistic heavy-ion collisions are performed to generate and examine QCD matter at high temperatures, known as the quark-gluon plasma. This extraordinary state of matter is theorized to have been present in the initial microseconds following the Big Bang. Exploring the quark-gluon plasma and the characteristics of the strong force involves analyzing particle showers, referred to as jets, originating from scattered quarks and gluons.

Recent results from the measurement of the suppression of jet production in dependence on jet size in lead-lead collisions with the ATLAS, ALICE, and CMS experiments are inconsistent with each other. The motivation for this thesis is to clarify the inconsistencies. The thesis deals with the systematical study of track-jet production as a function of their size and minimum transverse momentum of their constituents using data from the ATLAS experiment. The correlations between calorimetric and track jets are also investigated. Furthermore, the thesis includes the correction of track-jet spectra for various detector effects and background using Monte Carlo (MC) simulations (so-called bin-by-bin unfolding). The last part is the application of the Iterative Constituent Subtraction (ICS) method to subtract the background, which is dominated by soft (low-p_{T}) particles.

Even though the results of the thesis do not fully clarify the inconsistency between the experiments, they provide a certain degree of understanding of track-jet suppression in the QGP. Further analysis which would include better unfolding and parameter tuning within the ICS should help to clarify the inconsistency between the experiments.