

Chapter 4

Elastic, Inelastic, and Path Length Fluctuations in Jet Tomography at RHIC and LHC

4.1 Introduction

Light quark and gluon jet quenching observed via π, η suppression [368–370] in Cu+Cu and Au+Au collisions at $\sqrt{s} = 62 - 200$ AGeV at the Relativistic Heavy Ion Collider (RHIC) has been remarkably consistent thus far with predictions [274, 275, 277, 297, 371–373]. However, recent non-photonic single electron data [237–240] (which present an indirect probe of heavy quark energy loss) have significantly challenged the underlying assumptions of the jet tomography theory (see [374]). A much larger suppression of electrons than predicted was observed in the $p_T \sim 4 - 8$ GeV region (see Fig. 4.1). These data falsify the assumption that heavy quark quenching is dominated by radiative energy loss when the bulk QCD matter parton density is constrained by the observed $dN/dy \approx 1000$ rapidity density of produced hadrons.
