

ρ -meson

The goal of this research is to study how hadronic matter transitions into quark-gluon plasma. This transition is believed to have occurred in the early universe about 10 microseconds after the big bang. In particular, this transition created more than 95% of the visible mass in the universe, and confined quarks and gluons into hadrons. Hot nuclear matter can be recreated in the laboratory by colliding heavy atomic nuclei at very high energies. This transition into the quark-gluon plasma can be probed by analyzing the invariant mass distributions of ρ -mesons. The ρ -meson was chosen because it decays into dilepton pairs, e.g. e^+e^- or $\mu^+\mu^-$. Dilepton pairs are a preferred observable because they do not interact through the strong nuclear force inside the strongly interacting fireball, therefore ρ -mesons decay into dileptons in the medium and can be measured during heavy ion collisions. In this project, we developed a parameterization of this process which will help to describe quark-gluon plasma which filled the early universe.