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Title of the Thesis: Studies of Properties of Hot Hadronic Matter in Ultra Relativistic Nuclear Collisions

Abstract

The study of relativistic heavy ion collision is a fascinating field of research. In recent years, the field has seen an unprecedented level of progress. One of the aims of the ultra-relativistic heavy ion collision experiments is to collect various data including the multi particle production, their relative abundances and their distributions in the limited phase space, like transverse momentum and rapidity space. These data can throw light on properties of the hot and dense hadronic matter formed in such collisions. The theoretical study is often done in the framework of the thermal and hydrodynamical models. In order to make the collision scenario broadly understandable, several microscopic models have been proposed which attempt to describe the early pre-hadronic phase, formation of a novel state of matter called quark gluon plasma (QGP), its subsequent hadronization, formation of a strongly interacting hadron resonance gas (HRG) etc. In my thesis work we have studied these aspects by employing several models. For example we have done extensive analyses of the hot and dense hadronic matter produced in ultra-relativistic nucleus-nucleus collisions by suitably analyzing and modifying the existing Van der Waals-type model, the Non-linear Walecka model and the unified statistical thermal freeze-out model (USTFM) for their applications.