

Numerical calculation of meson mass using two-body Dirac equation

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Quark-gluon plasma is a substance that scientists predict existed in the early universe according to Quantum Chromodynamics, and evidence for its existence is being discovered through both theory and experiment. Since QGP is in thermal equilibrium, researchers are studying its thermal properties to understand how it evolves over time. As the temperature rises, mesons separate into quarks and gluons at a certain temperature, and by observing the amount and types of mesons that survive at a given time, we can determine the temperature of the QGP. Meson masses are an observable quantity that vary with temperature and cease to exist above the dissociation temperature. To calculate meson mass, we solved a two-body Dirac equation with a temperature-dependent potential using an AdS/CFT potential with a 5-dimensional gravitational model that confirms confinement within a quark-antiquark system. Our calculations show that the relative errors for mesons with a mass greater than 3 GeV are less than 1%.

Theory / experiment

Theory

Group or collaboration name

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