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Novel Phenomena in Hadron Physics

The study of Quantum Chromodynamics, the fundamental quark and gluon theory of hadronic and nuclear physics, is entering a new revolution due to the development of novel theoretical tools such as the AdS/ CFT correspondence and new experimental programs such as PANDA at GSI.

One can use five-dimensional anti-de Sitter *space* and Light-Front Holography to construct an analytic and relativistic first approximation to QCD. The resulting AdS/QCD model gives remarkably accurate predictions for hadron spectroscopy and a description of the quark structure of mesons and baryons which has scale invariance at short distances and quark confinement at large distances.

A number of novel applications of AdS/QCD and light-front wavefunctions to hadron physics phenomenology will be discussed, such as color transparency, hidden color, intrinsic charm, sea-quark asymmetries, dijet diffraction, direct hard processes, and hadronic spin dics.