

QCD and strings

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In this talk, we have reported on some of the results on a holographic dual of QCD with massless flavors [1, 2], which have been obtained in collaboration with Shigeki Sugimoto at the Yukawa Institute of Theoretical Physics, Kyoto University.

In [1], we proposed a holographic dual of QCD with massless flavor quarks on the basis of a D4/D8-brane configuration using the probe approximation. A key ingredient there is a five-dimensional Yang-Mills theory on a curved space-time together with the Chern-Simons five-form on it: this system is argued to provide us with a unified framework to study the physics of the pion and an infinite number of massive vector mesons. Some aspects of this model were investigated in [1], and it is found that this model is powerful enough to reproduce the low energy phenomena of QCD that are to occur.

A thorough analysis of this model was done in the subsequent work [2]. We made sample computations of the amplitudes that involve the pion and vector mesons and compare these results with experiments. It is found that most of the results are in a good quantitative agreement with experimental data. Among those of great interest is that the D4/D8 model exhibits the complete vector meson dominance, which states that the mesons are coupled to the photon only through the photon-vector meson transition. In other words, there is no direct interaction between the mesons and the photon except the transition vertex.

For a detail of these results, please refer to [1, 2].

References

- [1] T. Sakai and S. Sugimoto, “Low energy hadron physics in holographic QCD,” *Prog. Theor. Phys.* **113**, 843 (2005) [[arXiv:hep-th/0412141](https://arxiv.org/abs/hep-th/0412141)].
- [2] T. Sakai and S. Sugimoto, “More on a holographic dual of QCD,” [arXiv:hep-th/0507073](https://arxiv.org/abs/hep-th/0507073).