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Applications of AdS/CFT in Quark Gluon Plasma

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Citation

Atmaja, A. N. (2010, October 26). *Applications of AdS/CFT in Quark Gluon Plasma. Casimir PhD Series*. Retrieved from <https://hdl.handle.net/1887/16078>

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Stellingen

belong to the thesis

“Applications of AdS/CFT in Quark Gluon Plasma”

1. The soft wall AdS/QCD description is a crude but effective description of the IR physics. For temperatures $T > 190 MeV$, there is good agreement with AdS dual to $\mathcal{N} = 2$ Susy QCD with flavor branes. For Temperatures above $T < 190 MeV$ one needs the flavor brane embedding function $\psi_{m,0}(u)$ to capture the thermal resonances; it carries more information than just the mass as an IR-cut-off.

This thesis, Chapter 2.

2. The quark immersed in the plasma is dressed with a “cloud” of excitations of the plasma and the transverse fluctuation modes on the bulk string correspond to the excitations of this cloud.

This thesis, Chapter 3.

3. Very near the horizon, the expansion of the Nambu-Goto action in the transverse fluctuation X breaks down because the proper temperature becomes higher and higher as one approaches the horizon and, as a result, the string fluctuation gets wilder and wilder.

This thesis, Chapter 3.

4. In a rotating relativistic strongly coupled plasma, the drag force tends to bring the quark to the equatorial plane with an amount of force proportional to the mass of the quark and temperature of the plasma.

This thesis, Chapter 4.

5. The classical treatment of the string is justified as long as the string is much longer than a string length.

*C.P. Herzog, A. Karch, P. Kovtun, C. Kozcaz, L.G. Yaffe.
JHEP 0607:013, 2006.*

6. The relevant time scale for medium correlations in a relativistic plasma is $\sim D$ which is short compared to the relaxation time of the heavy particle $(M/T)D$. Furthermore, over the time scale of medium correlations the quark moves a negligible distance, $\sqrt{T/MD}$. Thus, for the purposes of calibrating the noise (κ), the mass may be taken to infinity and the heavy quark may be considered fixed.

J.C. Solana, D. Teaney.
Phys.Rev. D74:085012, 2006.

7. In the bulk, the stochastic force corresponds to the random excitation of the string by the Hawking radiation, while the friction corresponds to the fact that the excitations on the string get dissipated into the horizon.

J. de Boer, V.E. Hubeny, M. Rangamani, M. Shigemori.
JHEP 0907:094, 2009.

8. The spectrum of the highly excited mesons is not determined by the ultraviolet behavior of the AdS/QCD (which is already constrained to be asymptotically AdS). Rather, it crucially depends on the details of the infrared region.

A. Karch, E. Katz, D.T. Son, M.A. Stephanov.
Phys.Rev. D74:015005, 2006.

9. Man only discovered the laws of nature but not the One who created them in the first place.

Al-Qur'an: Al-Imran verse 190-191.

Ardian Nata Atmaja
October 2010