29th IPM Physics Spring Conference

# The effect of string cloud on viscosity

Mehdi Sadeghi

Ayatollah Boroujerdi University

We study the effect of string clouds on shear viscosity from fluid-gravity duality. The result shows that string cloud is affected in dual of Gauss-Bonnet gravity but it is not contributed in dual of Einstein-Hilbert gravity.

The Black Brane solution of AdS Einstein-Gauss-Bonnet in the presence of string cloud and is,

$$ds^2 = -H(r)N(r)^2dt^2 + \frac{dr^2}{H(r)} + \frac{r^2}{l^2}\sum_{i=1}^{D-2} dx_i^2$$

$$H(r) = \frac{r^2}{2\lambda_{gb}l^2}\left[1 - \sqrt{1 - 4\lambda_{gb}\left(1 - (\frac{r_+}{r})^{D-1} + Al^2\left(\frac{1}{r^{D-2}} - (\frac{r_+}{r})^{D-1}\frac{1}{r_+^{D-2}}\right)\right)}\right]$$

$$N^2 = \frac{1+\sqrt{1-4\lambda_{gb}}}{2}. \qquad \frac{2a}{D-2} = A \qquad \frac{(D-3)\alpha'}{l^2} = \lambda_{gb}$$

The ratio of the shear viscosity to the entropy density for 4D black brane solution in Gauss-Bonnet gravity in the presence of string cloud and is then

$$\frac{\eta}{s} = \frac{1}{4\pi}\left[1 - \frac{2\lambda}{D-3}\left((D-1) + Al^2 r_+^{2-D}\right)\right].$$

For suppressing the string cloud ( $A = 0$ ) , the result is as,

$$\frac{\eta}{s} = \frac{1}{4\pi}[1 - 2\frac{(D-1)}{(D-3)}\lambda]$$

For $\lambda = 0$ , we have,

$$\frac{\eta}{s} = \frac{1}{4\pi}$$