Non-universal shear viscosity from Einstein gravity

based on **1110.0007** and **1212.4838** in collaboration
with **J. Erdmenger**, **D. Fernandez** and **P. Kerner**

holographic p-wave superfluid with backreaction

(arXiv:0912.3515)

$$S = \frac{1}{2{\kappa_5}^2} \int \mathrm{d}^5 x \sqrt{-g} \left(R - \Lambda - \frac{\alpha^2}{2} F^a_{\mu\nu} F^{a\mu\nu} \right)$$

$$\mathrm{d}s^2 = -N\sigma^2 \mathrm{d}t^2 + \frac{1}{N}\mathrm{d}r^2 + \frac{r^2}{f^4}\mathrm{d}x^2 + r^2 f^2 \left(\mathrm{d}y^2 + \mathrm{d}z^2\right)$$

$$A = \phi\tau^3 \mathrm{d}t + w\tau^1 \mathrm{d}x$$

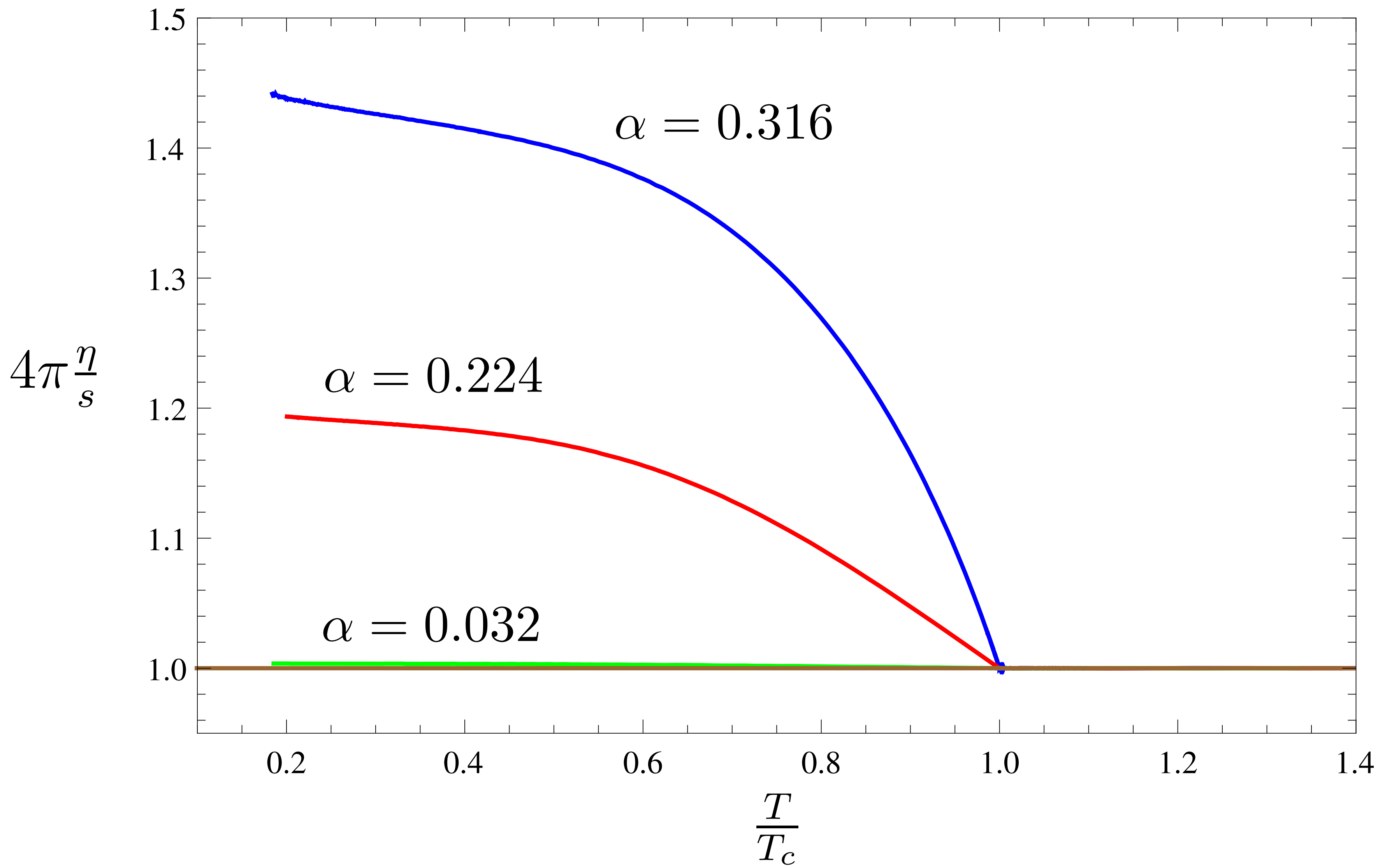
Fluctuations of metric and gauge field
=> holographic hydrodynamics
Superfluid phase: SO(3) => **SO(2)** rot. sym. in d=4
=> 3 distinct viscosity tensor components:

$$\frac{\eta_{yz}}{s} = \frac{1}{4\pi}$$

$$\frac{\eta_{xy}}{s} \equiv \frac{\eta_{xy}}{s}(T)$$

and

$$\frac{\lambda}{s} \xrightarrow{T \to T_c} \frac{1}{4\pi}$$



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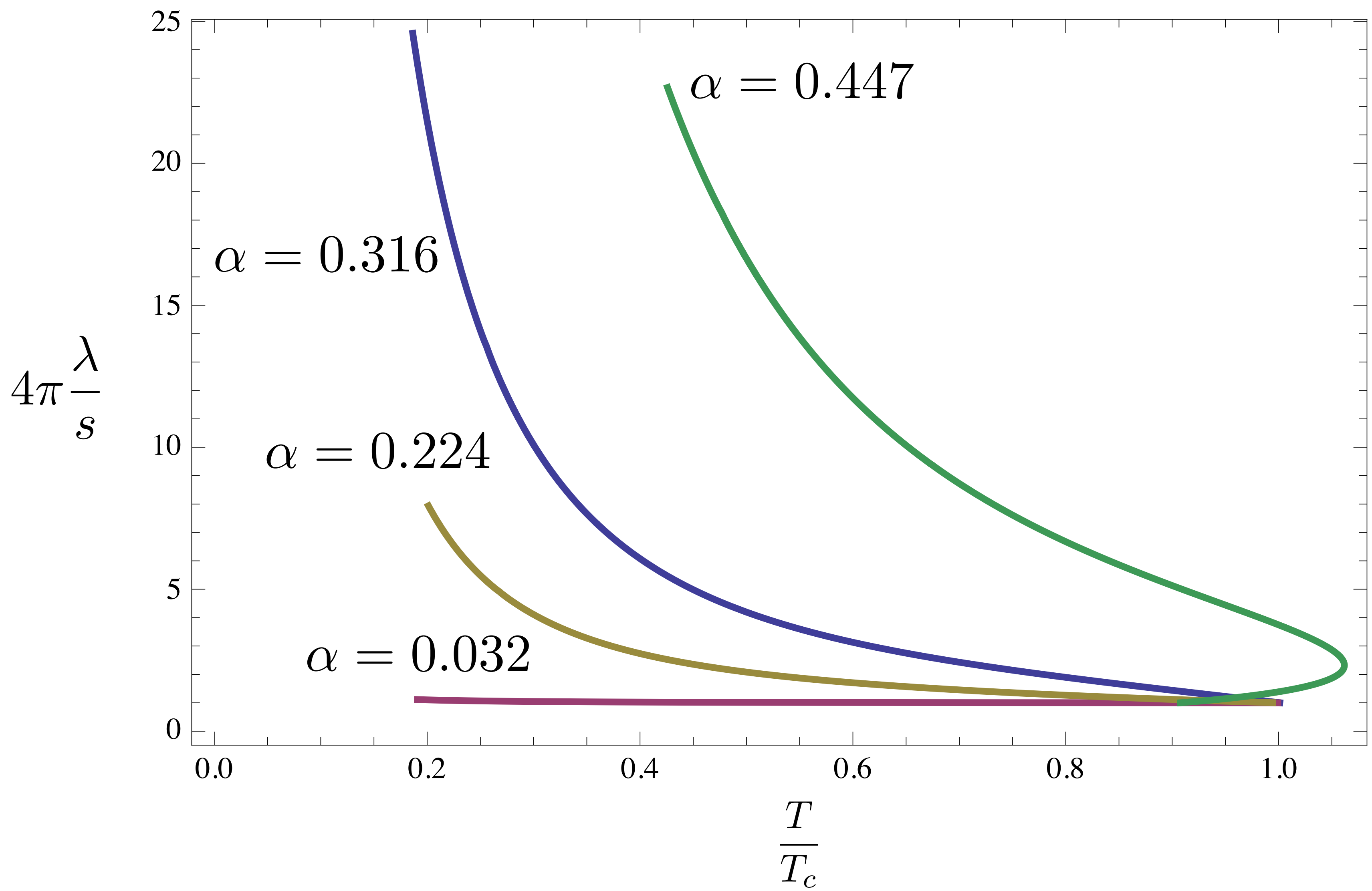

What do the viscosity tensor components measure?