

How General Is Holography?

Max Riegler
rieglerm@hep.itp.tuwien.ac.at

Institute for Theoretical Physics
Vienna University of Technology

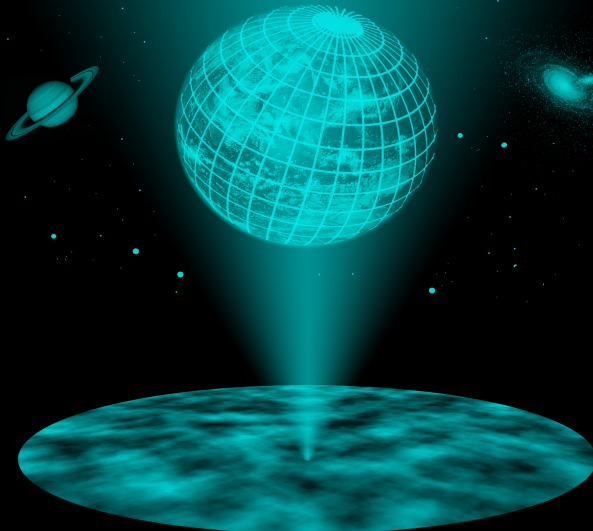
Humboldt Kolleg on Particle Physics
From the Vacuum to the Universe
June 27th, 2016

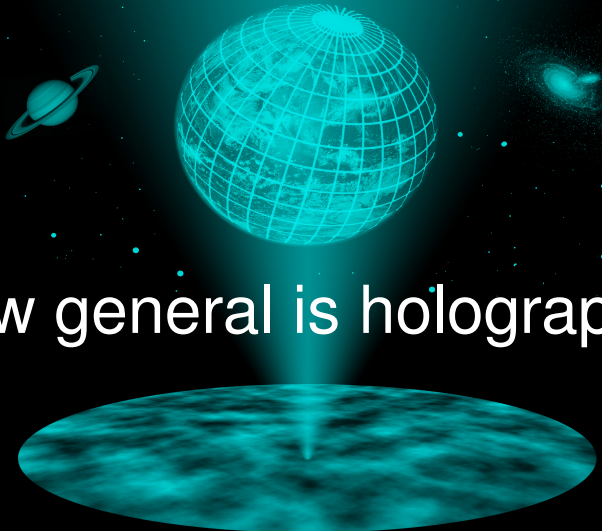


fdk Π Doktoratskolleg
Particles and Interactions

Introduction

The Holographic Principle

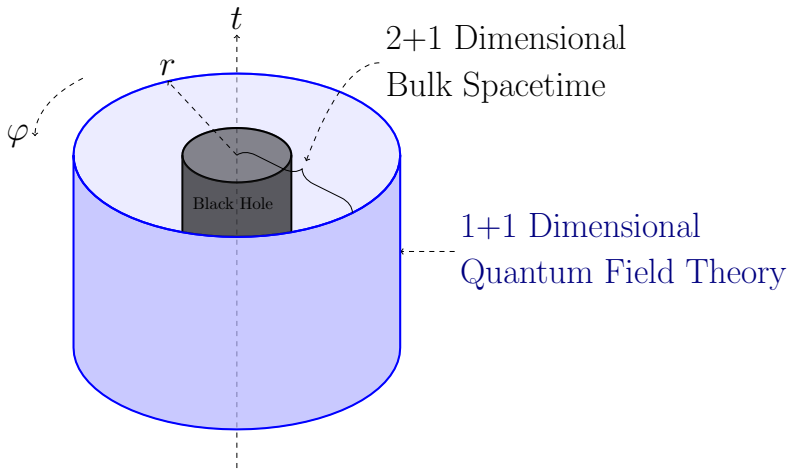




How general is holography?

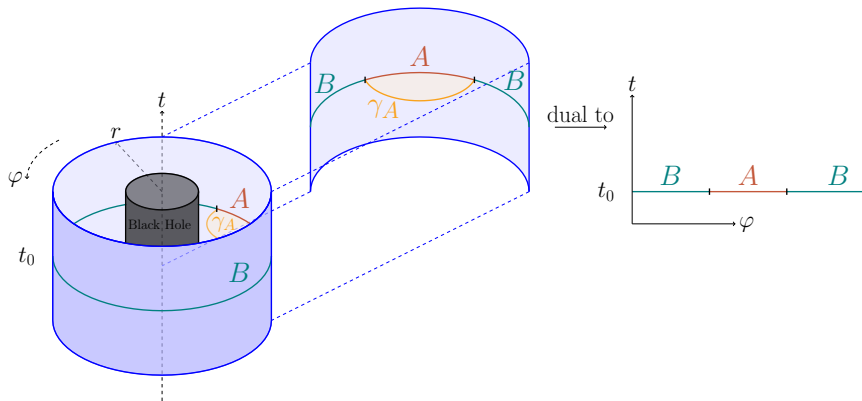
Introduction

Holography in 2(+1) Spacetime Dimensions



Holographic Entanglement Entropy

Geodesics as a Gravity Dual



$$W_{\mathcal{R}}(C) = \text{Tr}_{\mathcal{R}} \left[\mathcal{P} \exp \left(\int_C \mathcal{A} \right) \right],$$

$$S_{EE} = -\log [W_{\mathcal{R}}(C)].$$



Ammon, M., Castro, A., and Iqbal, N. (2013).

Wilson Lines and Entanglement Entropy in Higher Spin Gravity.
JHEP, 1310:110.

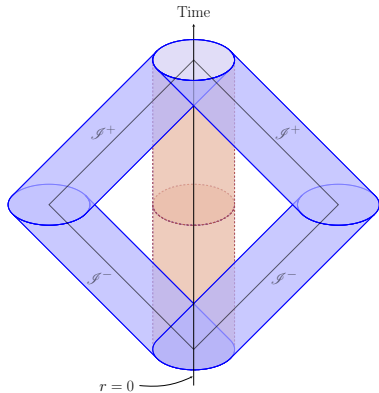


de Boer, J. and Jottar, J. I. (2014).

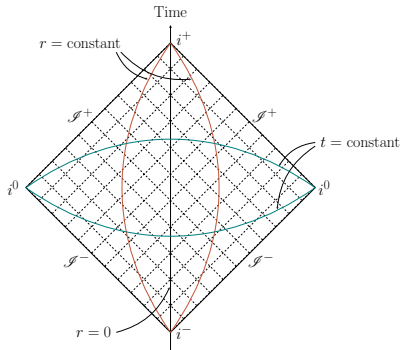
Entanglement Entropy and Higher Spin Holography in AdS_3 .
JHEP, 04:089.

Introduction

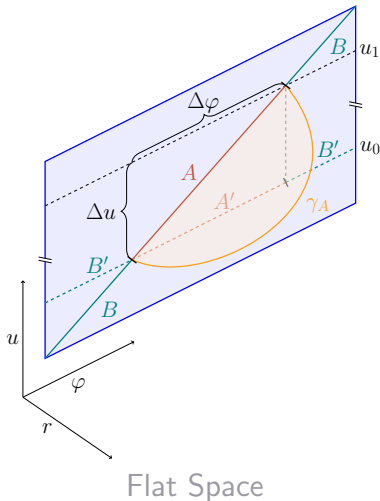
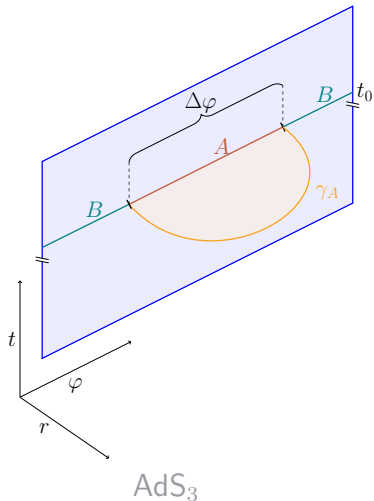
Flat Space as a Ultrarelativistic Boost



(a)



(b)



Global Flat Space Einstein Gravity

$$S_{EE} = \frac{1}{4G} \cot\left(\frac{\Delta\varphi}{2}\right) \Delta u.$$



Bagchi, A., Basu, R., Grumiller, D., and Riegler, M. (2015).

Entanglement entropy in Galilean conformal field theories and flat holography.

Phys. Rev. Lett., 114(11):111602.

Conclusions and Outlook

The Frog, the Brid and the Wizard



- ▶ Holographic intuition coming from AdS/CFT also seems to be applicable to flat space holography.

Conclusions and Outlook

The Frog, the Brid and the Wizard



- ▶ Holographic intuition coming from AdS/CFT also seems to be applicable to flat space holography.
- ▶ Extend dual QFT calculation to also include higher-spins.

Conclusions and Outlook

The Frog, the Brid and the Wizard



- ▶ Holographic intuition coming from AdS/CFT also seems to be applicable to flat space holography.
- ▶ Extend dual QFT calculation to also include higher-spins.
- ▶ Find explicit QFT models realizing $\mathfrak{so}_{2,3}$ ($\mathcal{F}\mathcal{W}_N$) symmetries.



Thank you for your attention!