Phases of Flat Space Higher Spin Gravity

Mirah Gary

Institute for Theoretical Physics, TU Wien

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JHEP 1501 (2015) 152 [arXiv:1411.3728 [hep-th]], MG, D Grumiller, M Riegler, J Rosseel

FWF Der Wissenschaftsfonds.

TU WIEN INSTITUTE for THEORETICAL PHYSICS Vienna University of Technology

Higher Spin Flat Holography in $D = 3$

- Generalization of first order formulation of gravity

$$S = \frac{k}{4\pi} \int \left\langle A \wedge dA + \frac{2}{3} A \wedge A \wedge A \right\rangle$$

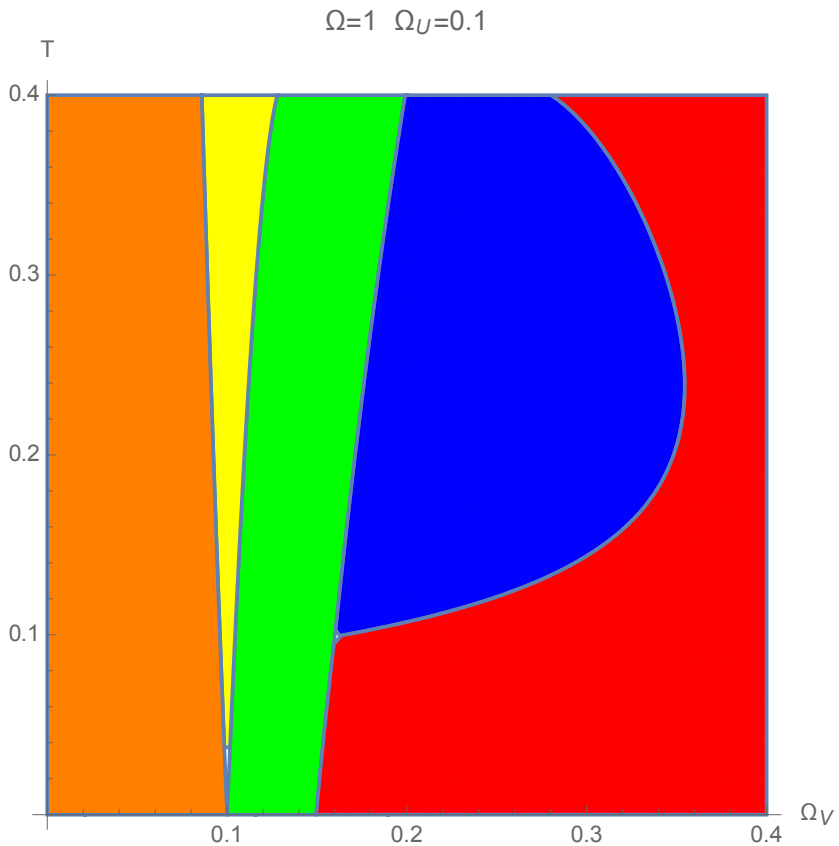
  where $\langle \cdot, \cdot \rangle$ is a non-degenerate bilinear form.
- Gauge group $G = \mathrm{isl}(N)$ for integer spins 2 to N
- We consider $G = \mathrm{isl}(3)$
- Asymptotic Symmetry Algebra is $\mathcal{W}\mathrm{BMS}_3$

Flat Space Cosmologies

- $\ell \to \infty$ limit of BTZ black hole
- Outer horizon goes to infinity
- Inner horizon becomes cosmological horizon
- Have finite energy, entropy
- For pure gravity, described by 2 parameters (M, J) or (T, Ω)
- For each additional spin, 2 additional parameters

Phases of Spin-3 Flat Space

- 4 branches[1] of Flat Space Cosmologies (blue, green, yellow, orange)
- Blue branch continuously connects to the pure gravity solution
- Also a Hawking-Page phase transition to hot flat space (red)



[1] Assuming the simplest solution of the holonomy conditions

Future Work

- Understanding possible 0^{th} order phase transitions
- Understanding or eliminating $2\pi\mathbb{N}$ conical surplus solutions

Thank You