Three-dimensional gravity and logarithmic CFT

Nordic Network Meeting, Göteborg

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Outline

Logarithmic CFT

- Lightning review
- LCFTs as limits

Gravity duals

- Early hints
- Candidate theories

Tests of the conjectures

- TMG
- NMG
- GMG

Conclusion

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- Reviews: [Flohr] `hep-th/0111228`, [Gaberdiel] `hep-th/0111260`

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with

$$D^{L/R} = \not{\partial} \pm \frac{1}{\ell} \qquad D^m = \not{\partial} + \mu$$

$D^m \psi^m = 0$ is a massive graviton. $\psi^{L/R}$ are "pure gauge" $\sim T_{zz}/T_{\bar{z}\bar{z}}$.

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- Conjecture: $\mu\ell = 1$ is dual to an LCFT!

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- Add $\frac{1}{\mu}S_{CS}$: Generalised Massive Gravity. Around AdS_3:

$$(D^L D^R D^{m_1} D^{m_2}\psi)_{\mu\nu} = 0 \qquad m_{1,2}\ell = \frac{m^2\ell^2}{2\mu\ell} \pm \sqrt{\frac{1}{2} - \sigma m^2\ell^2 + \frac{m^4\ell^4}{4\mu^2\ell^2}}.$$

GMG parameter space

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- $D^{m_1} = D^{m_2}$:
  $\mathcal{O}^M$ has log-partner!
- $D^{m_1} = D^{m_2} = D^L$:
  Rank 3 Jordan cell!
- $c_L = c_R = 0$: log-NMG
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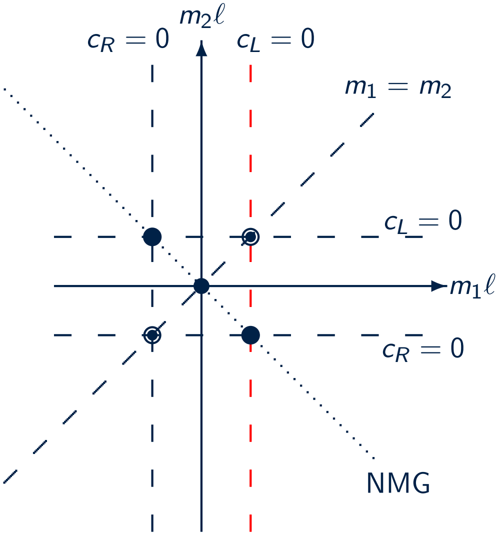
- PMG! $c_L = c_R \neq 0$
  Enhanced gauge symmetry!



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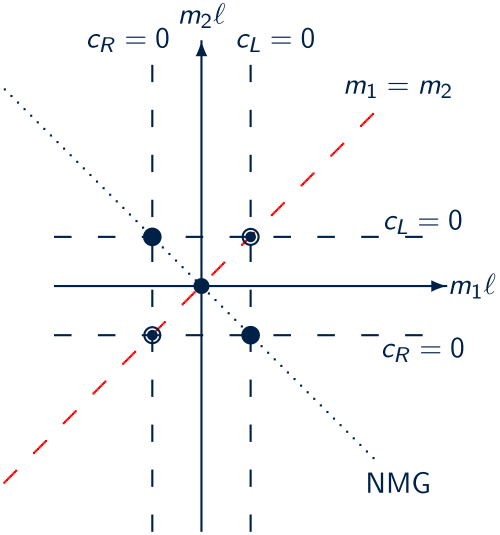

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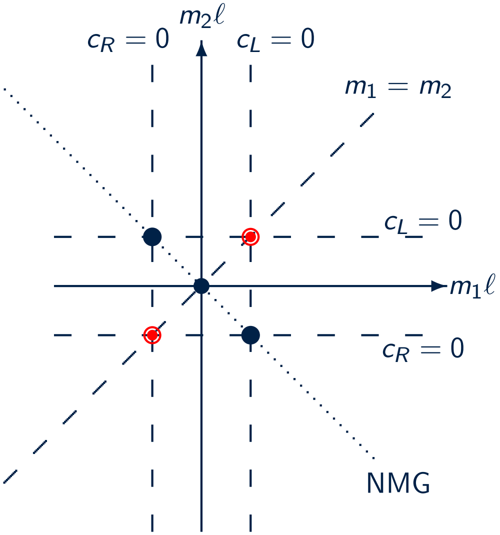

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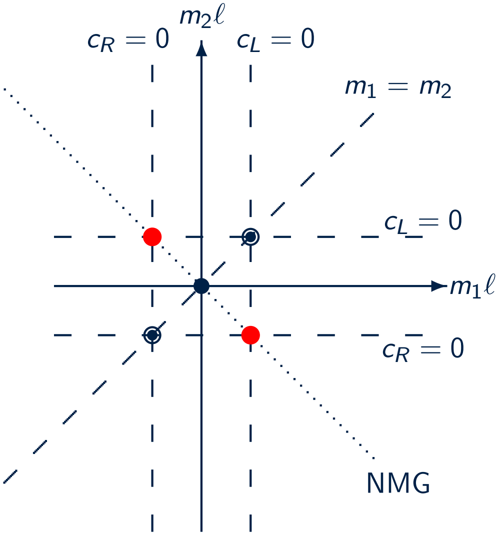

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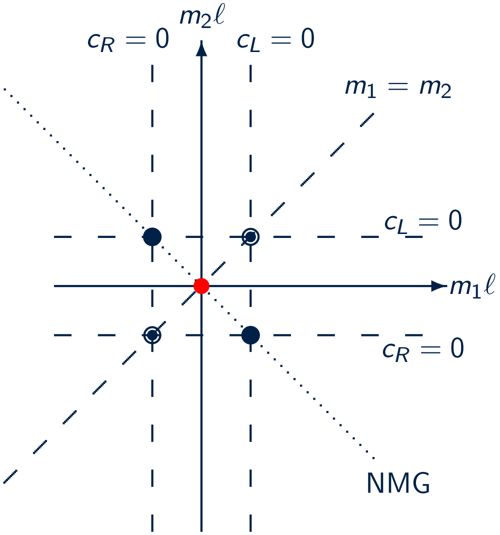

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- 1-loop partition function consistent with LCFT. [Gaberdiel, Grumiller, Sachs '10]

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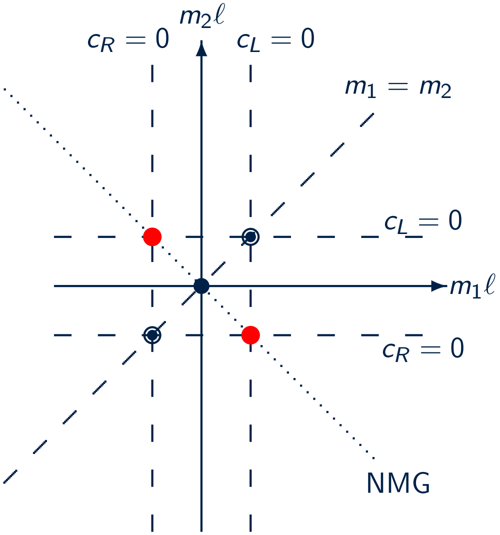

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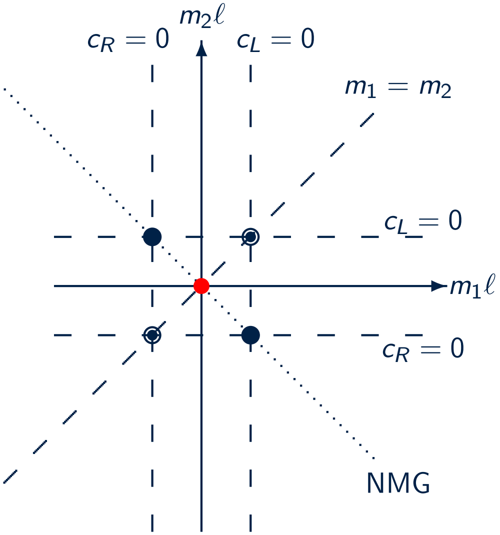

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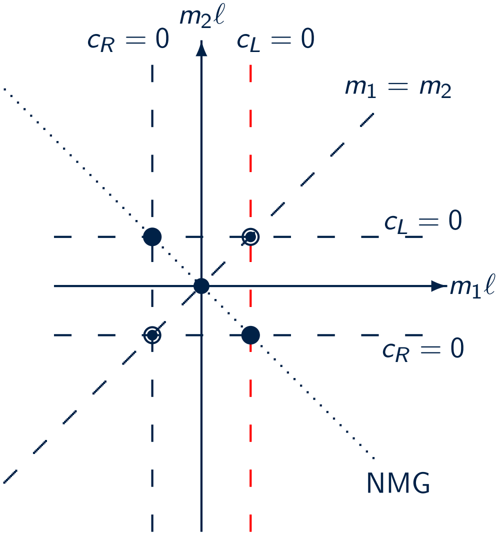

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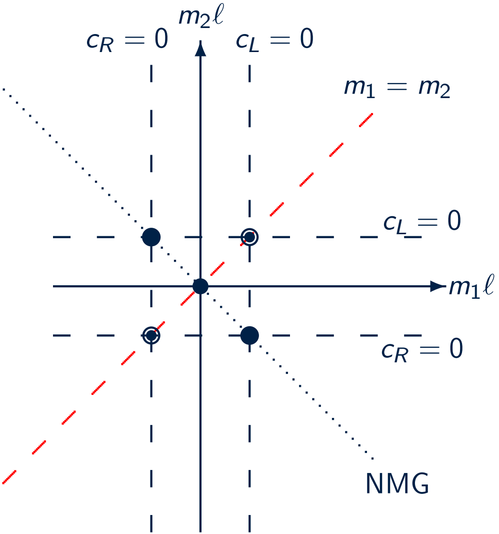

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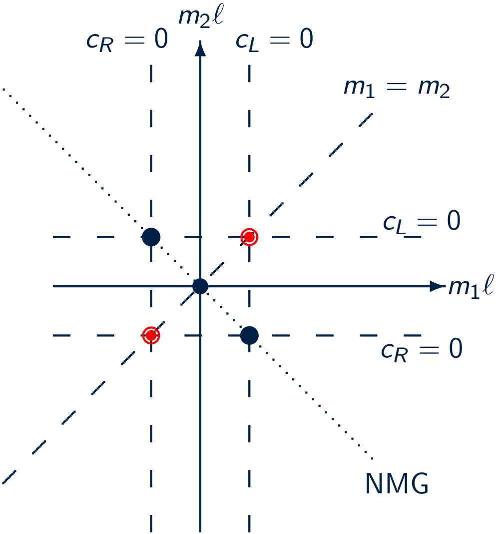

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