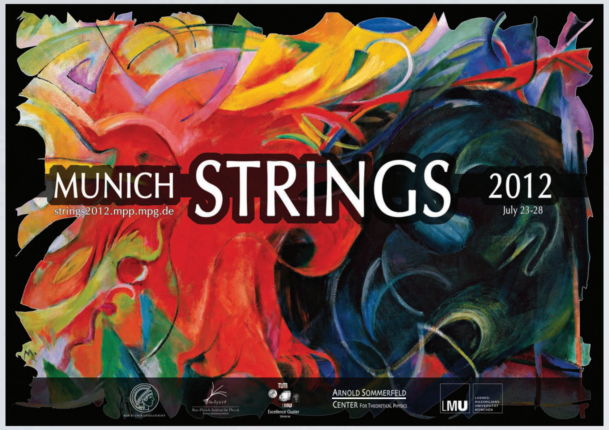

STRINGS-2
012
Gong Show

Alessandra Gnecchi

Padua University, Italy

DUALITY INVARIANCE FOR BLACK HOLES IN N=2 GAUGED SUPERGRAVITY

with G. Dall'Agata, JHEP 1103 (2011) 037
+ work in progress...

N=2, U(1)-Gauged Supergravity

Scalar potential mimics a cosmological constant

Solutions now depend on BH charges and parameters of the gauging

$$p^\Lambda = \frac{1}{4\pi}\int_{S^2} F^\Lambda\,, \qquad q_\Lambda = \frac{1}{4\pi}\int_{S^2} G_\Lambda\,, \qquad g_\Lambda$$

→ Beyond asymptotically flat geometries, AdS_4

Cvetic et al., Duff & Liu, Sabra 1998-2003

Cacciatori & Klemm, 2009

Existence of extremal BPS solutions with horizon geometry $AdS_2 \times S^2$ and finite horizon radius, first order equations

related works: Hristov, Toldo & Vandoren, 2011

Static black holes metric ansatz

$$ds^2 = -e^{2U(r)}dt^2 + e^{-2U(r)}(dr^2 + e^{2\psi(r)}d\Omega^2)$$

$AdS_2 \times S^2$ ⟷ AdS_4

$\partial_i \mathcal{W} = 0$ $\qquad$ $D_i \mathcal{L} = 0$

Double attractor condition

- More constraints on the fields
- Less solutions less easily found

Duality Covariant BPS flow

Fully symplectic vector of gauge couplings $\mathcal{G} = (g^\Lambda, g_\Lambda)$

$$\mathcal{L} = \langle \mathcal{G} \,, \mathcal{V} \rangle \qquad \mathcal{Z} \equiv \langle Q, \mathcal{V} \rangle$$

BPS first order flow driven by the superpotential

$$\mathcal{W} = e^U |\mathcal{Z} - i e^{2(\psi - U)} \mathcal{L}|$$

BPS constraints ~ Charge quantization condition

$$\langle \mathcal{G}, Q \rangle + 1 = 0$$

cfr. Romans, '92

1/4 - BPS condition

$$\begin{aligned} \gamma^0 \epsilon_A &= i\, e^{i\alpha}\, \varepsilon_{AB} \epsilon^B \\ \gamma^1 \epsilon_A &= e^{i\alpha}\, \delta_{AB} \epsilon^B \end{aligned}$$

Attractor Equations

$$Q + e^{2A}\,\Omega\mathcal{M}\mathcal{G} = -2\mathrm{Im}(\overline{\mathcal{Z}}\mathcal{V}) + 2\,e^{2A}\,\mathrm{Re}(\overline{\mathcal{L}}\mathcal{V})$$

$$e^{2A} = -i\,\frac{\mathcal{Z}}{\mathcal{L}} = R_S^2$$

Interesting relation for the black hole entropy

$$e^{-2A} = 2\left(|D_i\mathcal{L}|^2 - |\mathcal{L}|^2\right)$$

$$\Rightarrow$$

$$e^{2A} = 2\left(|D_i\mathcal{Z}|^2 - |\mathcal{Z}|^2\right)$$

Attractor Equations

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→ Any geometric interpretation?

More solutions

- **Extensions to multicenter BHS**

  Analogous derivation of the base space to Breitenlohner-Maison-Gibbons '88 analysis

- **First order equations for rotating solutions**

  introduce $\mathbf{G} = \mathcal{G}e^i dx^i$ $\quad \mathbf{L} \equiv \langle \mathbf{G}, \mathcal{V} \rangle$

$$\frac{1}{2}e^{V-U} \star_0 d\omega + \langle \mathcal{I}, d\mathcal{I} \rangle - e^{-2U}\mathrm{Re}(e^{-i\alpha-V}\mathbf{L}) = 0$$

$\longrightarrow$ $\mathcal{P}_I^x = \xi_I e^x \delta_x^I$ SU(2)~SO(3)

Thank You