Stringy Geometries in the Context of Double Field Theory

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based on a project with
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Arnold Sommerfeld Center
LMU Munich

December 2, 2013

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2. use it as **background**
3. describe strings moving in the **background**

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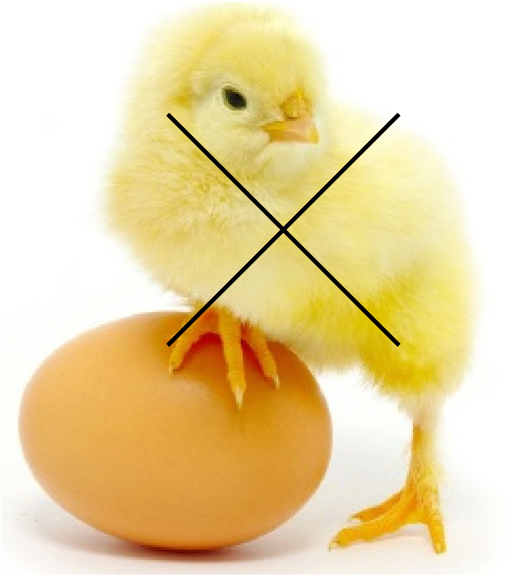

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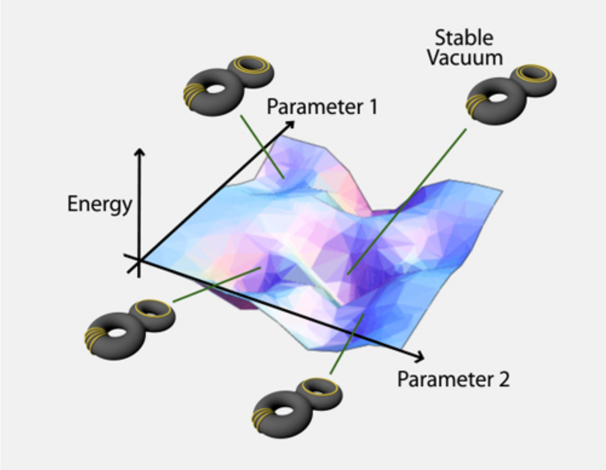

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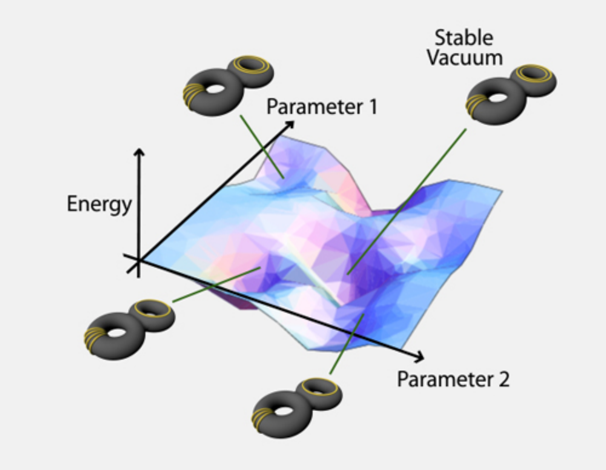

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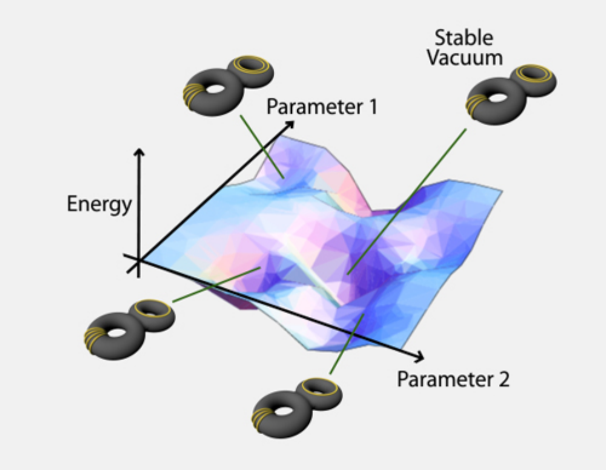

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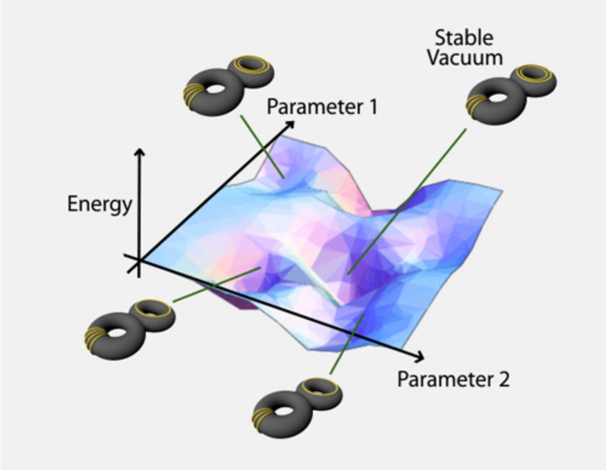

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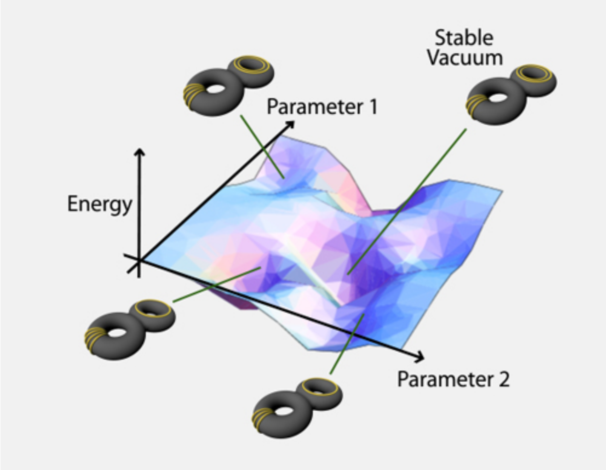

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10^{500} backgrounds [2, 3]

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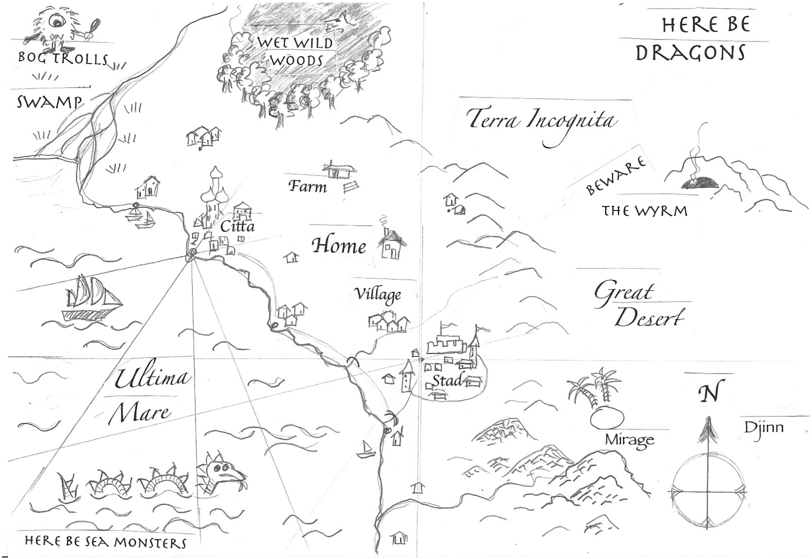

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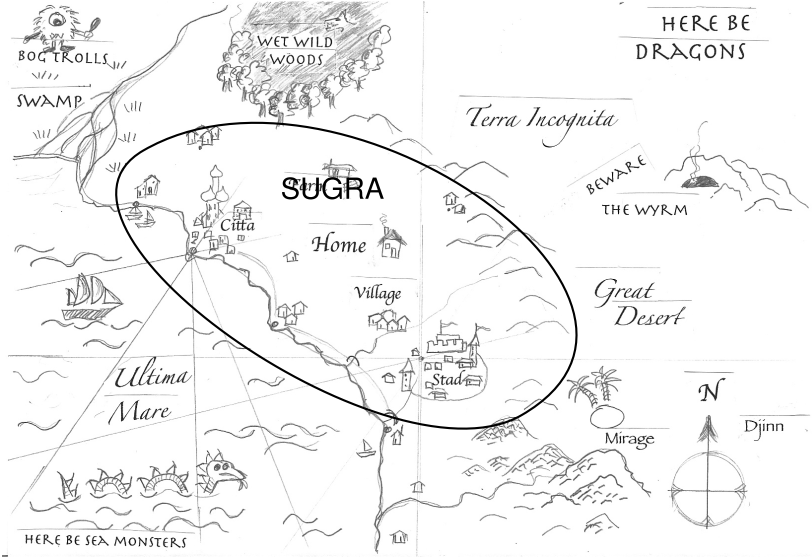

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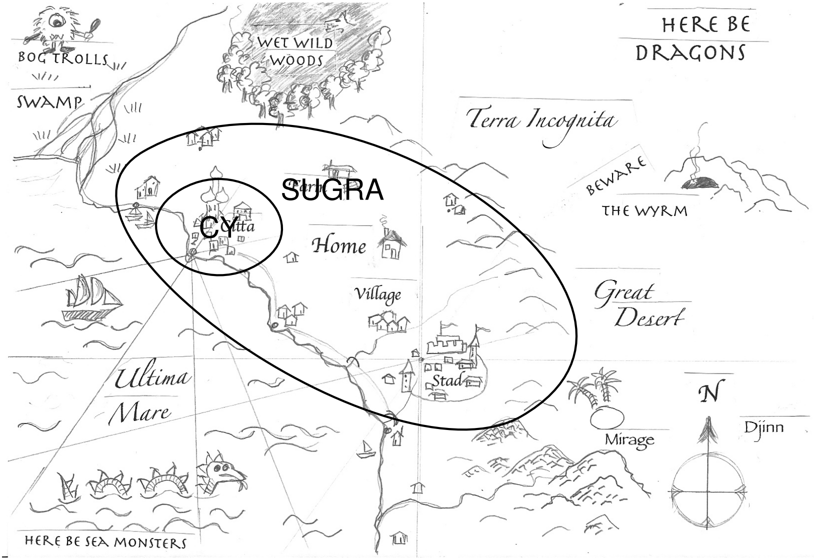

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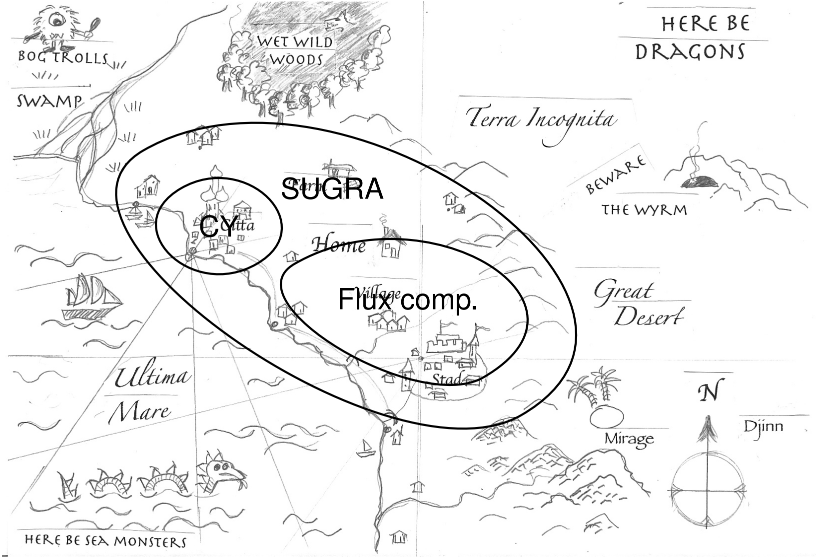

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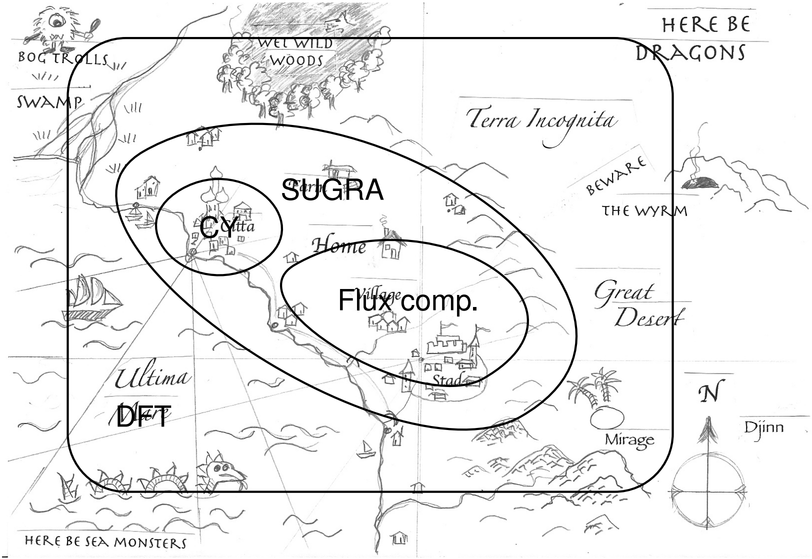

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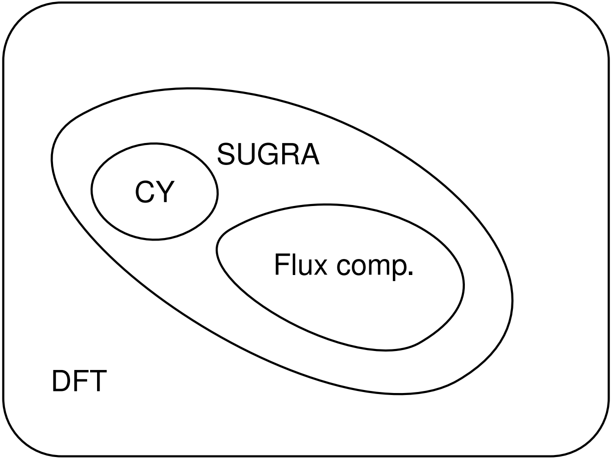

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$\sim$ Einstein-Maxwell theory $\rightarrow$ point particles

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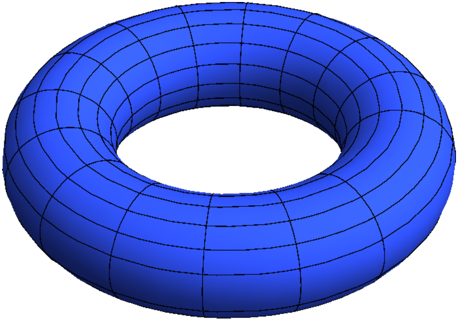
$$\boxed{\sim \text{Einstein-Maxwell theory} \to \text{point particles}}$$

- backgrounds solve S_{NS}'s field equations

Backgrounds “seen” by point particles

- general relativity: spacetime = smooth manifold



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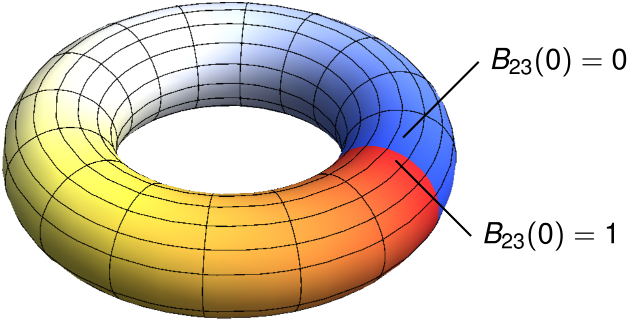

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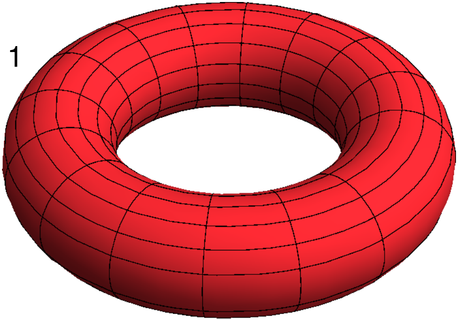
$H_{123} = \partial_{[1} B_{23]} = 1$



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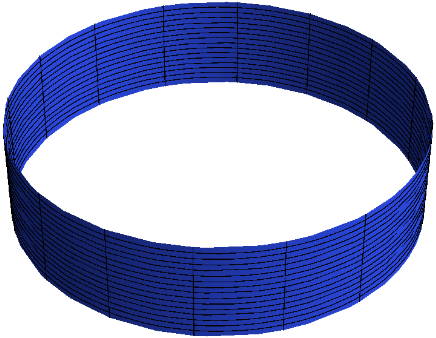

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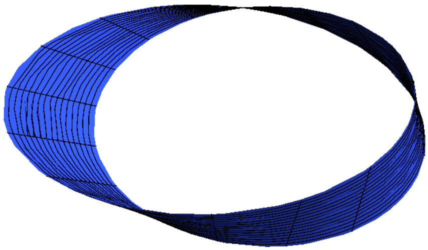

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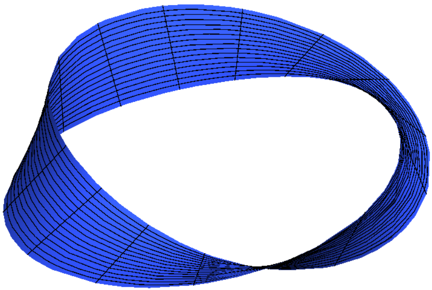

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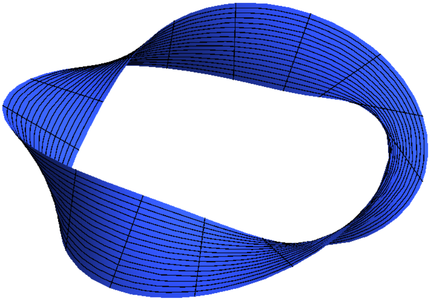

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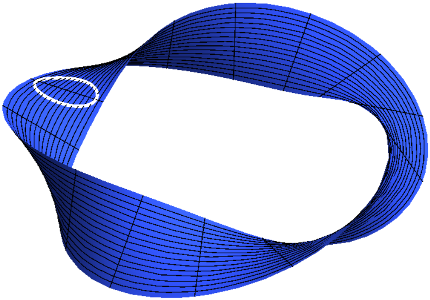

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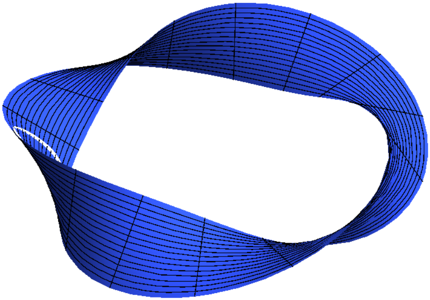

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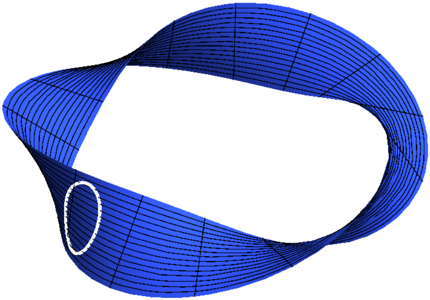

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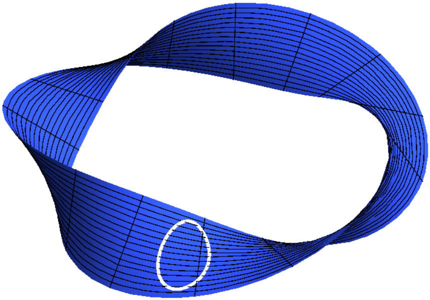

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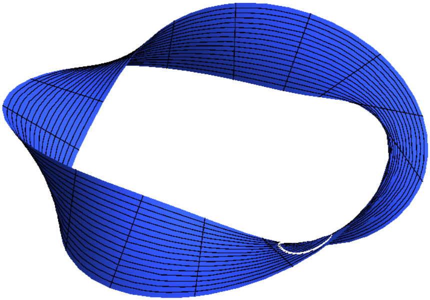

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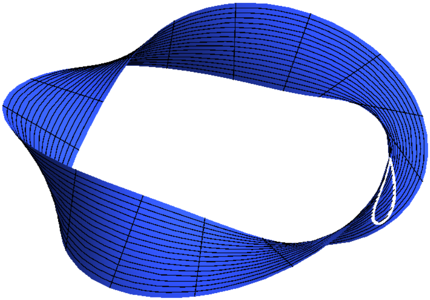

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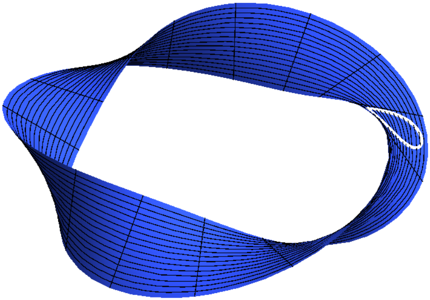

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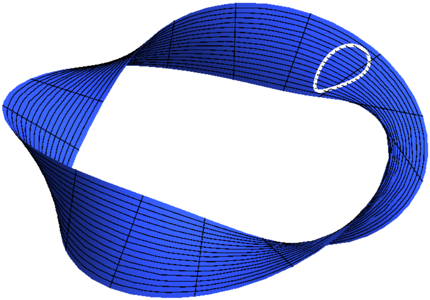

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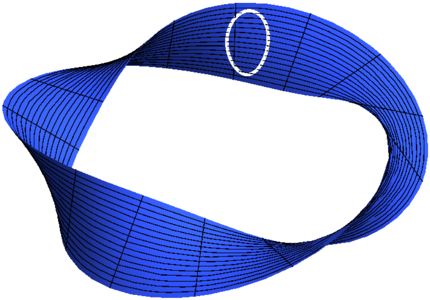

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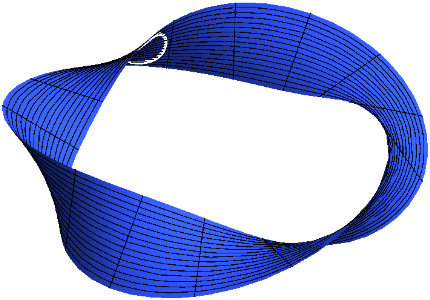

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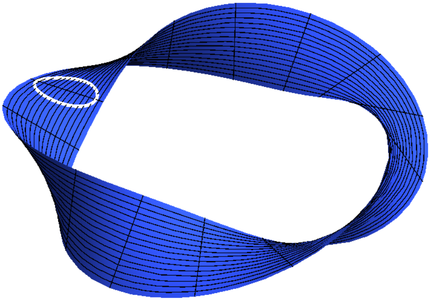

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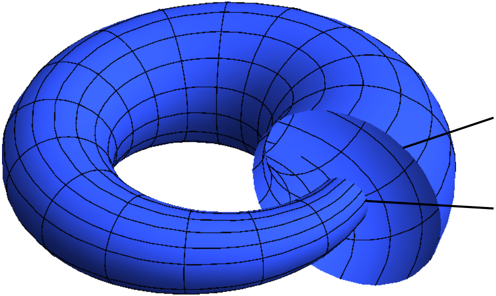

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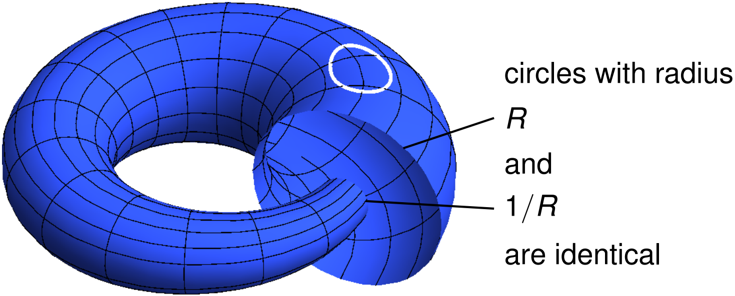

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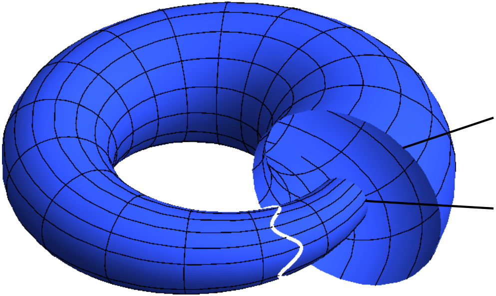

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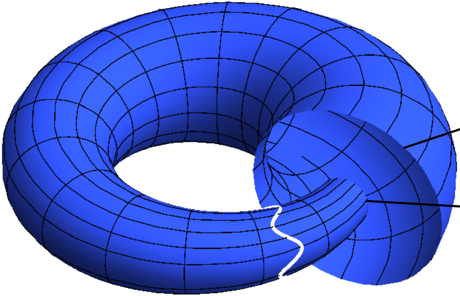

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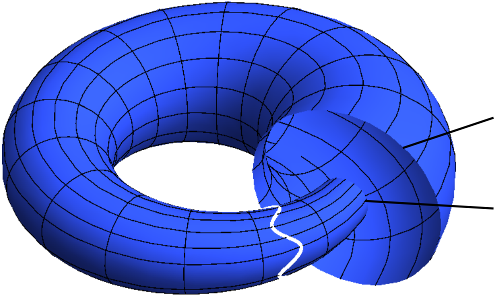

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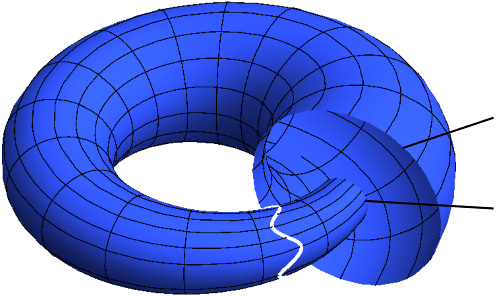

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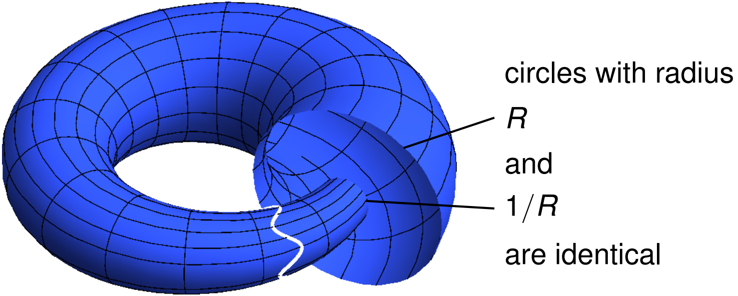

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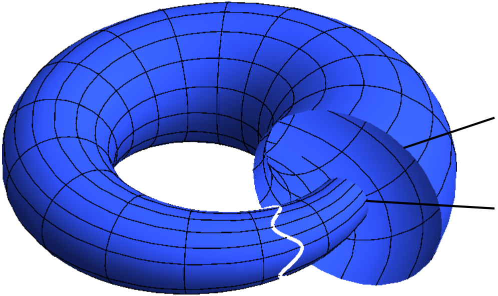

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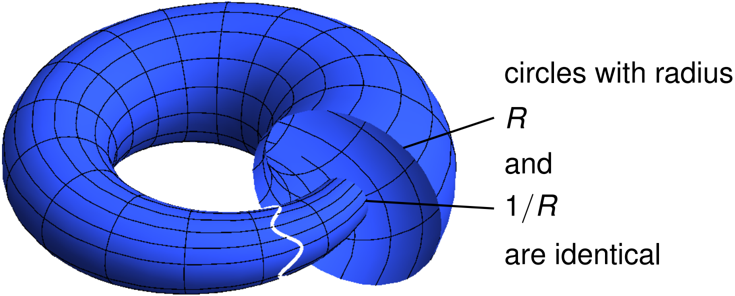

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~~SUGRA description~~

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$$+\frac{1}{8}\mathcal{H}^{MN}\partial_M\mathcal{H}^{KL}\partial_N\mathcal{H}_{KL} - \frac{1}{2}\mathcal{H}^{MN}\partial_N\mathcal{H}^{KL}\partial_L\mathcal{H}_{MK}$$

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$$\mathcal{R} = 4\mathcal{H}^{MN} \partial_M \phi' \partial_N \phi' - \partial_M \partial_N \mathcal{H}^{MN} - 4\mathcal{H}^{MN} \partial_M \phi' \partial_N \phi' + 4\partial_M \mathcal{H}^{MN} \partial_N \phi' + \frac{1}{8} \mathcal{H}^{MN} \partial_M \mathcal{H}^{KL} \partial_N \mathcal{H}_{KL} - \frac{1}{2} \mathcal{H}^{MN} \partial_N \mathcal{H}^{KL} \partial_L \mathcal{H}_{MK}$$

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Gauge transformations and the strong constraint [7, 8]

- generalized Lie derivative

$$\mathcal{L}_\xi \mathcal{H}^{MN} = \xi^P \partial_P \mathcal{H}^{MN} + (\partial^M \xi_P - \partial_P \xi^M)\mathcal{H}^{PN} + (\partial^N \xi_P - \partial_P \xi^N)\mathcal{H}^{MP}$$

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- trivial implementation of SC $\tilde{\partial}_i \cdot = 0 \rightarrow$ DFT = SUGRA

Scherk-Schwarz compactification [9]

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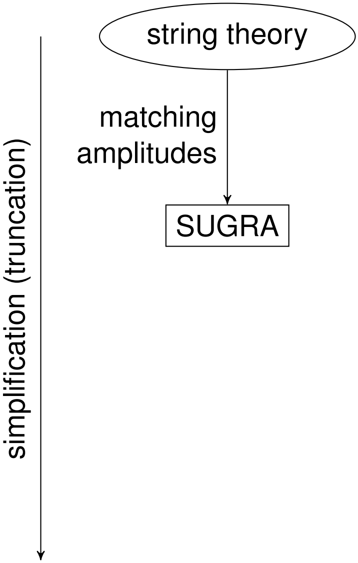

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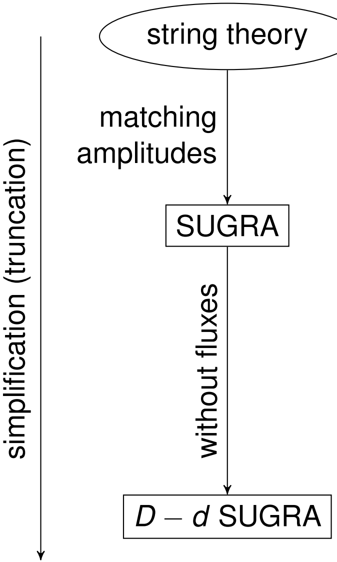

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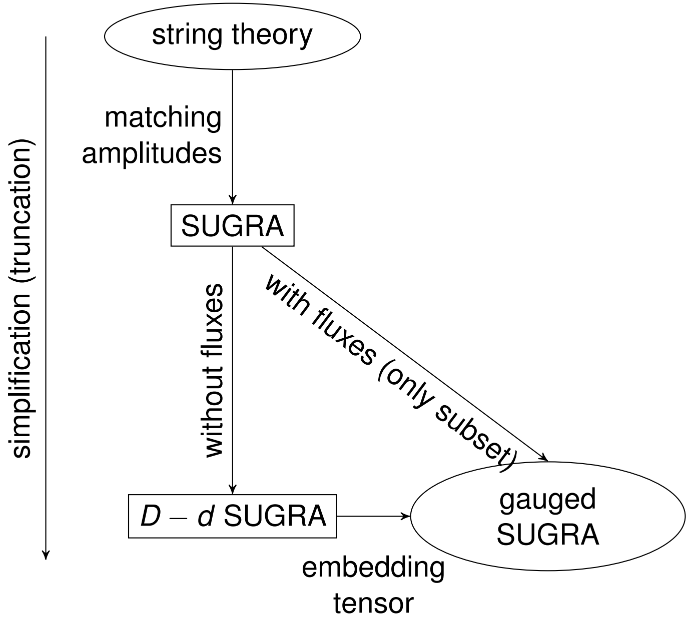

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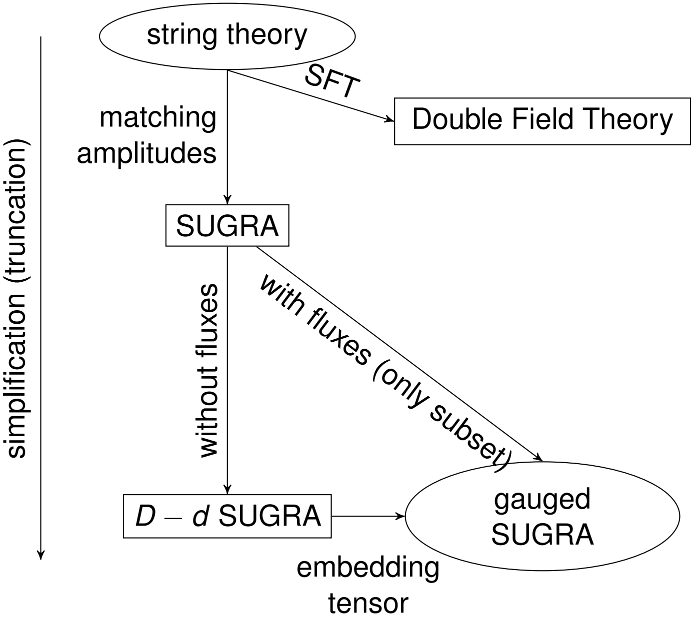

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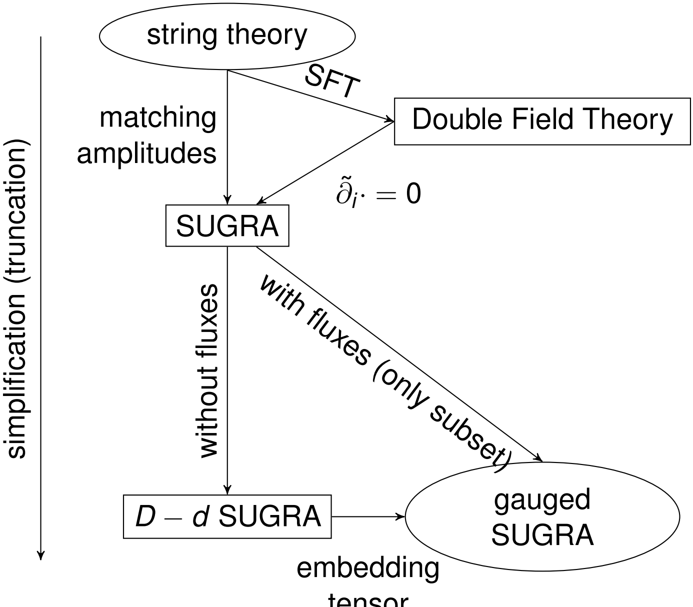

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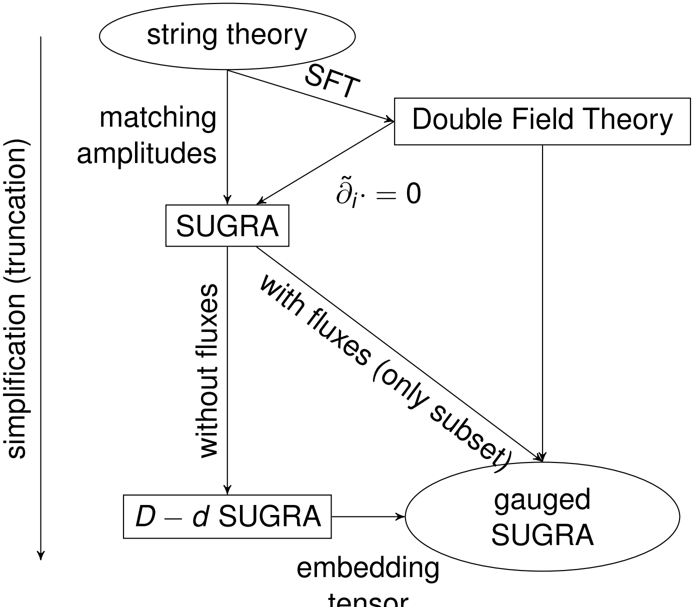

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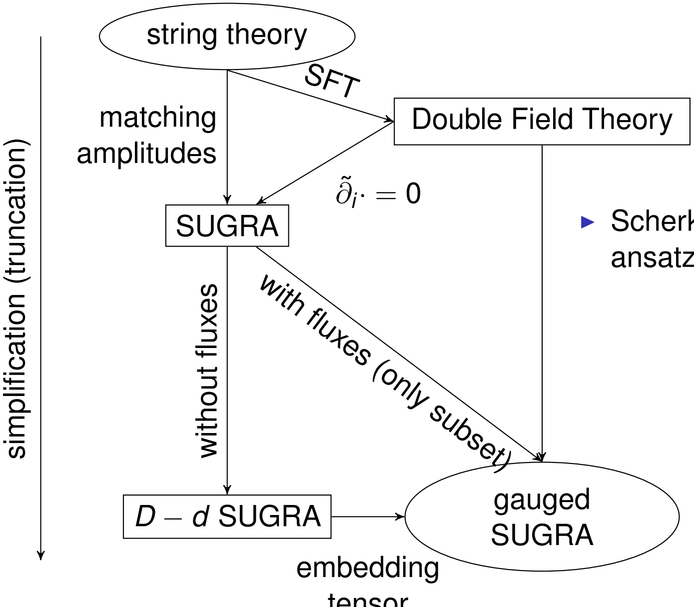

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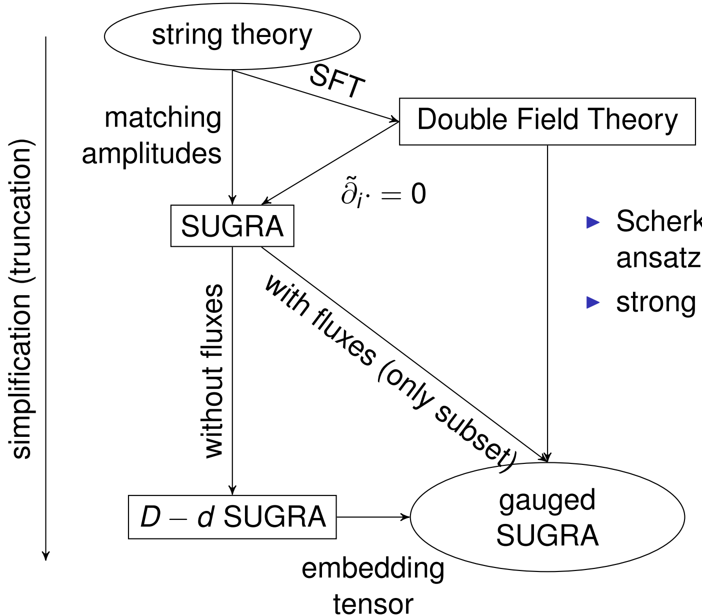

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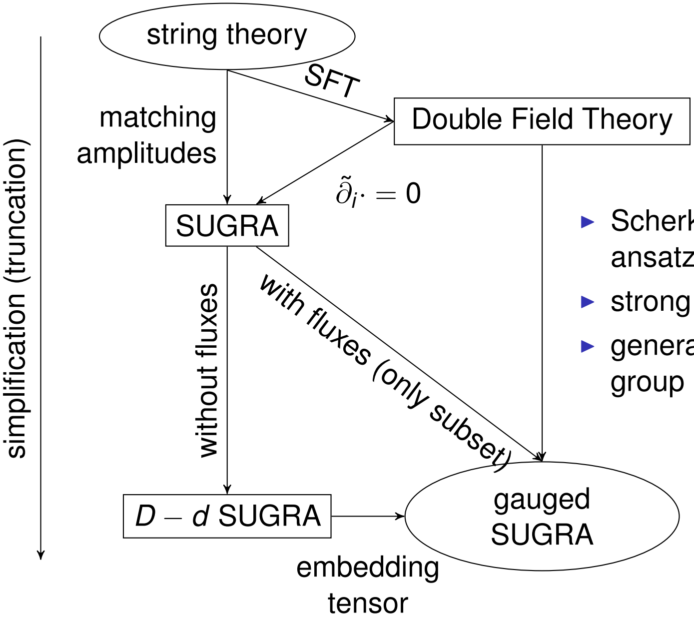

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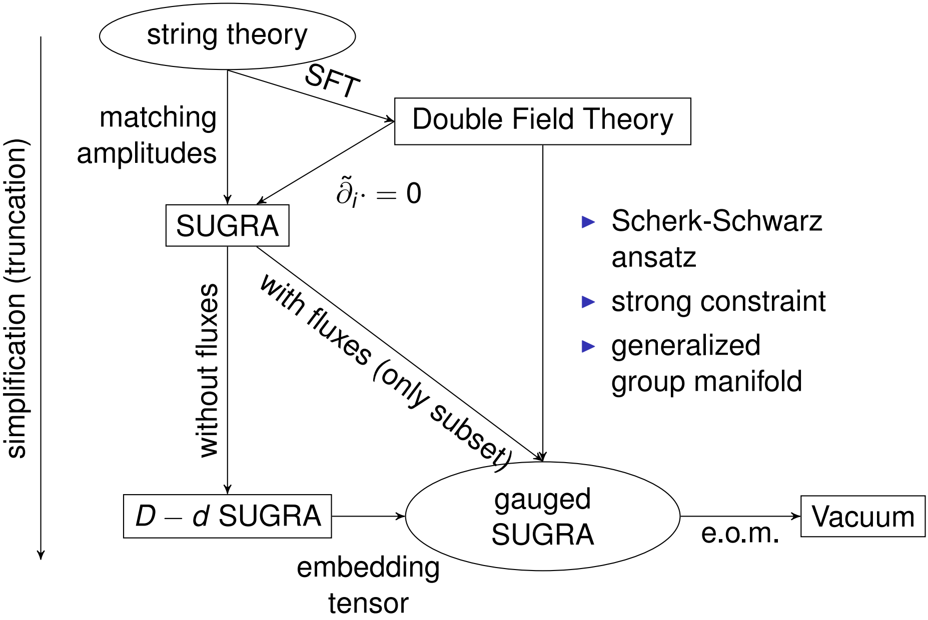

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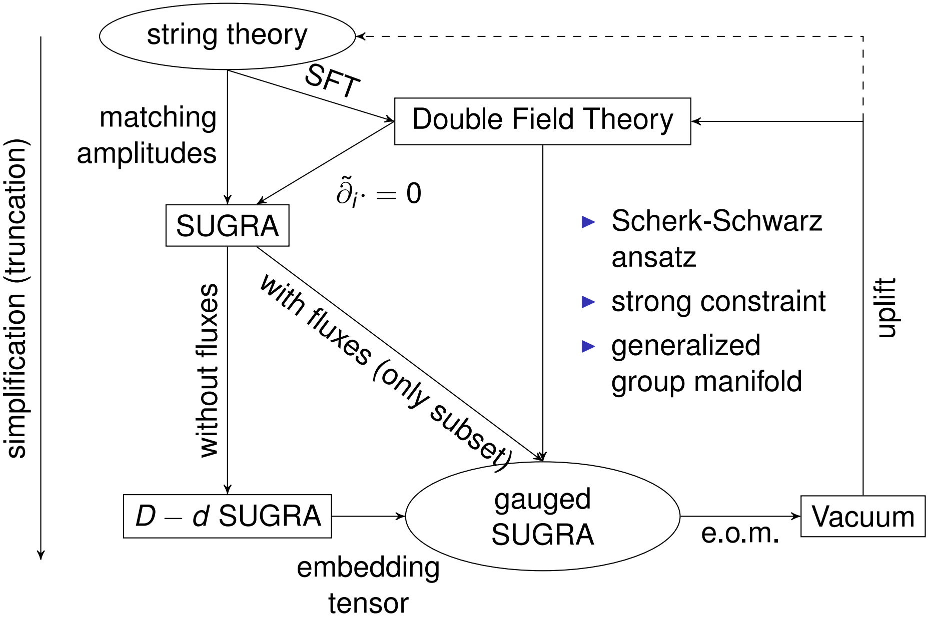
Scherk-Schwarz compactification [9] or a tool to construct backgrounds and fluctuations



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Group manifold = Scherk-Schwarz ansatz in doubled coordinates

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- space "looks" at every point the same

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- closure of G_R $\rightarrow$ constraints on $\mathcal{F}_{IJK}$

Gauged SUGRA [10, 11] and its vaccua

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$$S_{\text{eff}} = \int \mathrm{d}x^{(D-d)} \sqrt{-g} e^{-2\phi} \Big(\mathcal{R} + 4\partial_\mu \phi \partial^\mu \phi - \frac{1}{12} H_{\mu\nu\rho} H^{\mu\nu\rho}$$

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- fluctuations around this background reproduce result on asym. orbifold (has to be check completely)

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- watch out for our publication on the arXiv 1312.????

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