

Beyond the Standard Model Implications of String Theory

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- Dark matter

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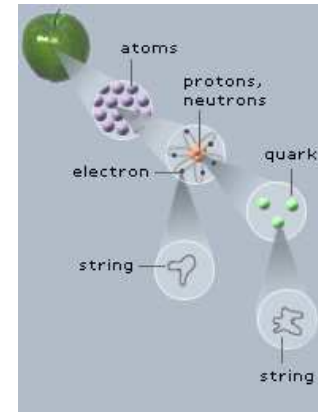
String Theory is a candidate solution to more ambitious theoretical questions like

- Ultraviolet finite quantisation of gravity, space-time at very short distances
- Statistical interpretation of black hole entropy
- Unification of gauge theories and gravity in one theoretical framework

String Theory

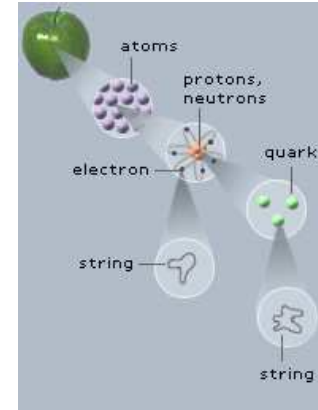
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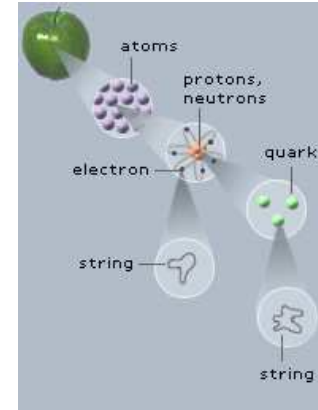
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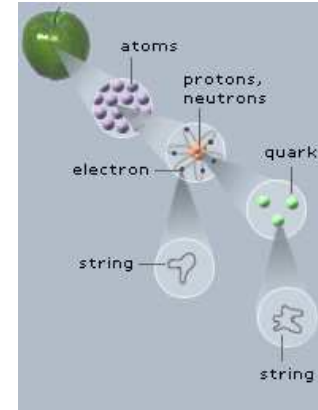
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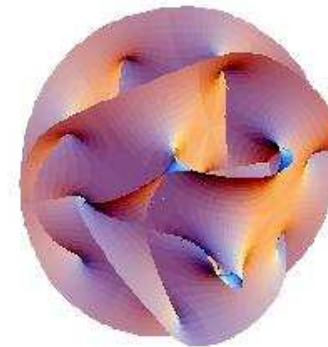
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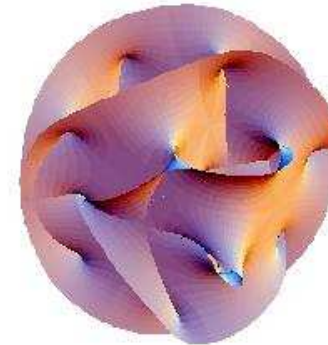


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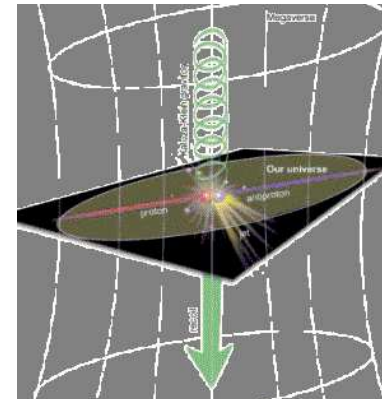
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Scenario II:

The gauge interactions are **con-
fined** on 4D hypersurface (Brane) in 10D. Only **gravity** in 10D.



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Supersymmetry breaking: Dynamical supersymmetry breaking on hidden E_8^H mediated gravitationally to observable E_8 .

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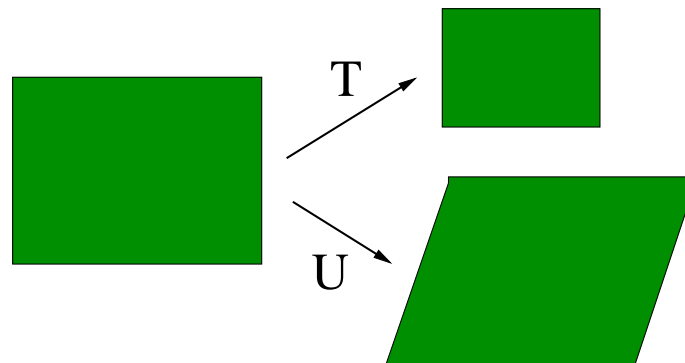
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Details of **MSSM physics** depend on geometry of (X, V) , i.e. the details of **moduli stabilisation** and the details of **susy breaking** + generated **soft susy breaking terms**.

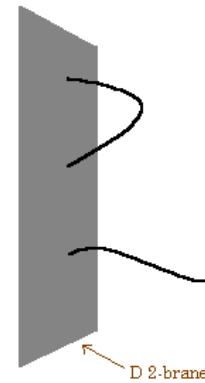


Also $g_s = \exp(\phi)$ is a modulus.
(Activity of $LMU+MPI$ group)

Brane Worlds

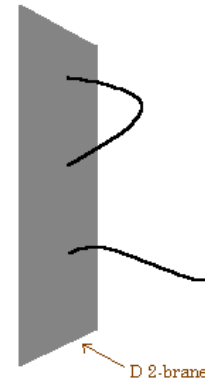
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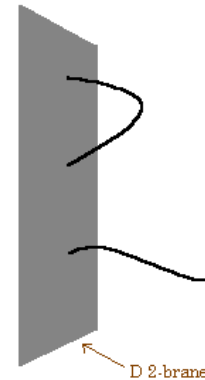
This changes the analysis of scales for a $D(p + 3)$ brane

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A small M_s can be traded for a large transversal dimension V_t !

Three cases: $M_s = 1 \text{ TeV}$, $M_s = 10^{11} \text{ GeV}$, $M_s = 10^{17} \text{ GeV}$.

Brane Worlds

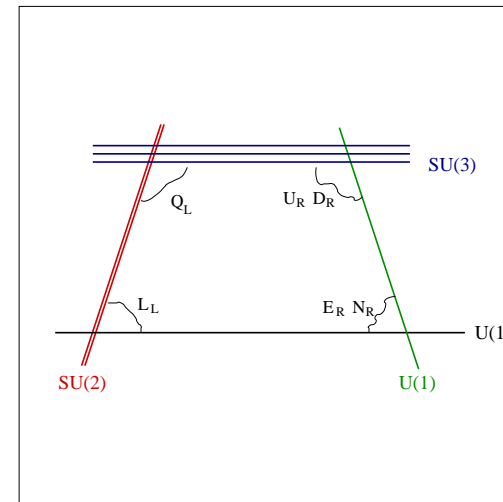
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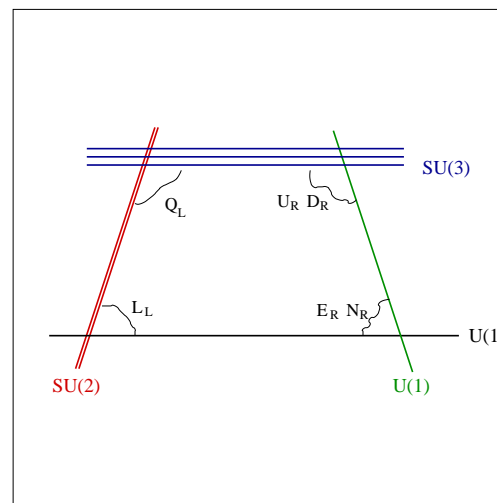
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Possible string compactifications, mechanisms for **moduli stabilisation** and the determination of the **4D effective action** for the light $m < M_s$ modes are under investigation (string phenomenology).

(One of the **main activities** of the string-pheno group at LMU+MPI and the world-wide SVP).

TeV scale Brane Worlds

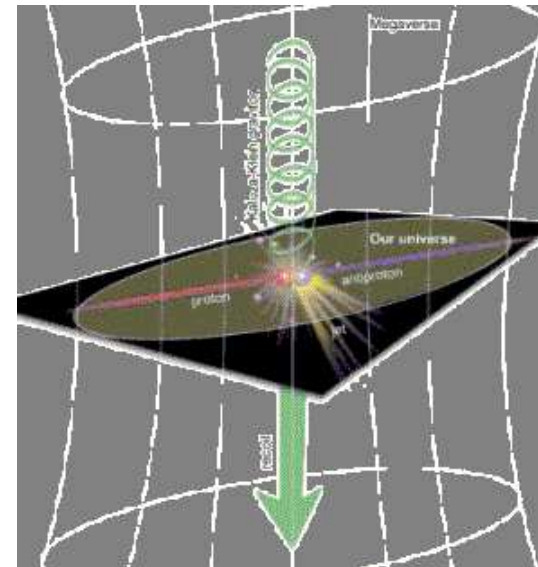
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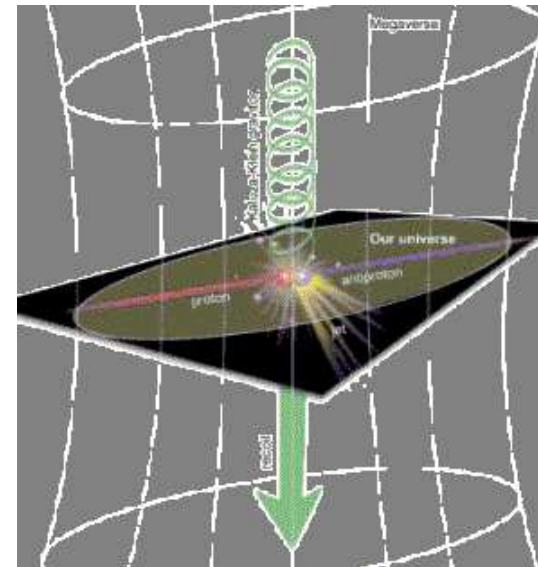
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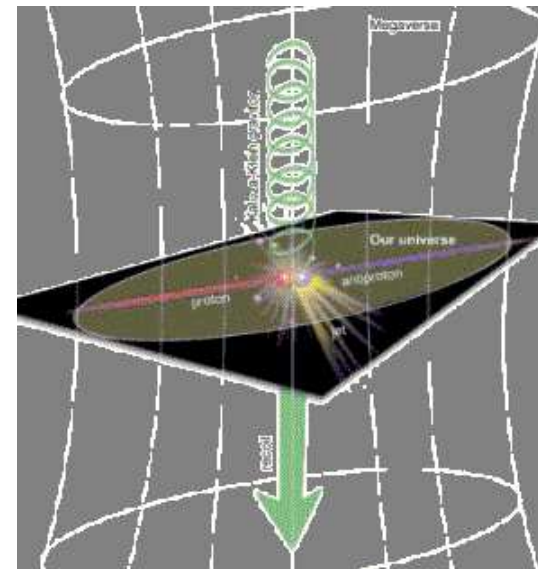
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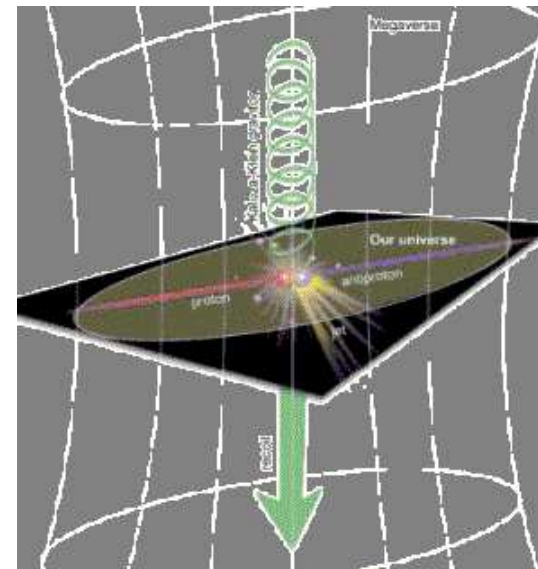
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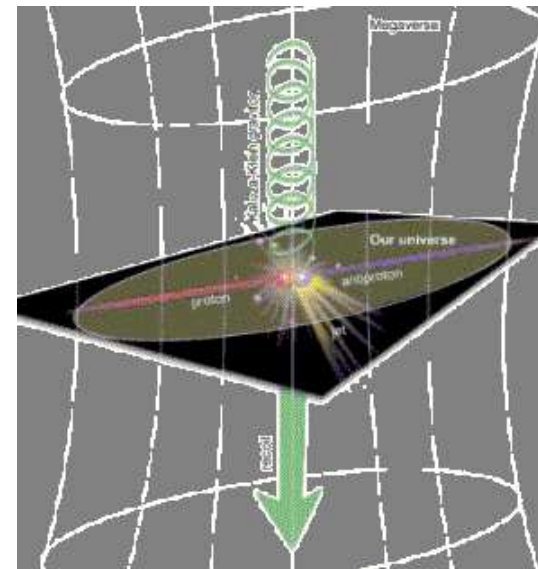
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Gauge **hierarchy** problem: Shifted towards explaining the hierarchy of compactification scales $l_t \gg l_{pl}$!

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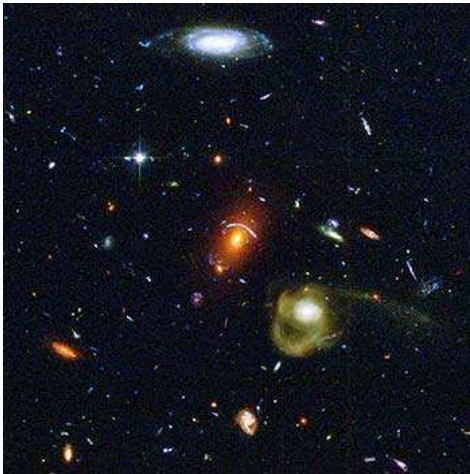
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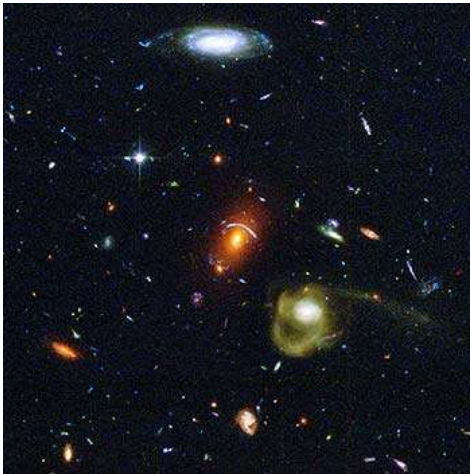
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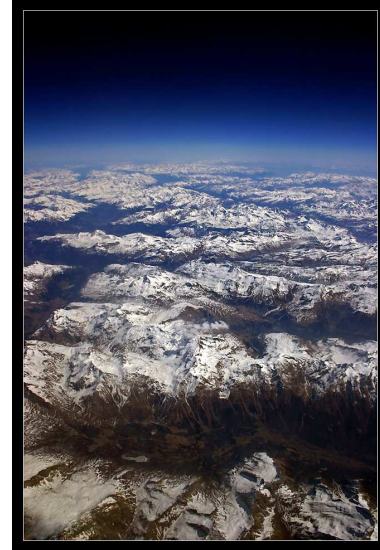
$$R_{\mu\nu} - \frac{1}{2} g_{\mu\nu} R + g_{\mu\nu} \Lambda = 8\pi G T_{\mu\nu}$$

No dynamical explanation yet, environmental

String Multiverse

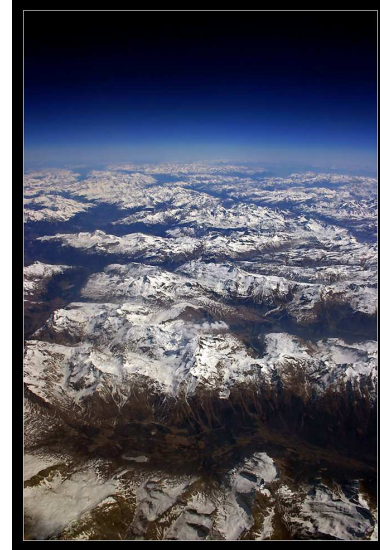
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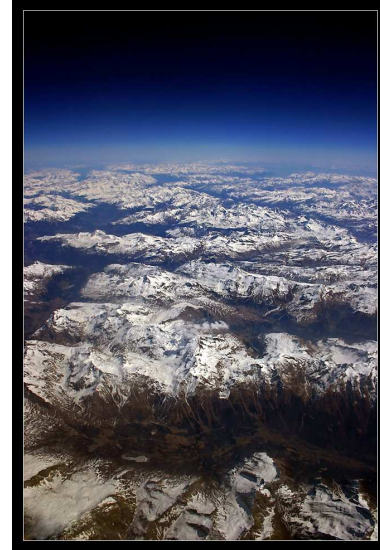
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String vacua with various **susy breaking** scales.

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Activity of AdS-CFT group (Johanna Erdmenger)

- Use of stringy AdS-CFT correspondence to learn about QCD, chiral symmetry breaking, Quark-Gluon plasma, ...