

Strings and Supergravity in Padova

Presentation

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Theoretical physics group

Antonio Bassetto, Gianguido Dall'Agata, Giancarlo De Pol, Kurt Lechner, PIERALBERTO Marchetti, Marco Matone, Paolo Pasti, Moises Picon, Dmitri Sorokin, Mario Tonin, Roberto Volpato, Linus Wulff

- A. Bassetto, G. De Pol, "SYM $N=4$ in light-cone gauge and the 'bridge' identities," arXiv:0705.4414 [hep-th];
- G. Lopes Cardoso, A. Ceresole, G. Dall'Agata, J. M. Oberreuter, J. Perz, "First-order flow equations for extremal black holes in very special geometry," arXiv:0706.3373 [hep-th];
- O. Chandía and M. Tonin, "BRST Anomaly and Superspace Constraints of the Pure Spinor Heterotic String in a Curved Background," arXiv:0707.0654 [hep-th];
- E. Bergshoeff, J. Hartong, D. Sorokin, "Q7-branes and their coupling to IIB supergravity," arXiv:0708.2287 [hep-th];
- E. Bergshoeff, P. S. Howe, S. Kerstan, L. Wulff, "Kappa-symmetric $SL(2,R)$ covariant D-brane actions," arXiv:0708.2722 [hep-th];
- M. Matone, R. Volpato, to appear;
- ...

Worldvolume dynamics of 7-branes coupled to IIB SUGRA

- 7-branes coupled to $SL(2, \mathbb{R})$ -triplet $A_8^{\alpha\beta}$ (IIB SUGRA field dual to the axiodilaton $\tau = \chi + ie^{-\phi}$) via charges $Q_{\alpha\beta}$
- Example: D7-branes ($Q_{11} = Q_{22} = Q_{21} = 0 \Rightarrow \det Q = 0$)
- Q7-branes ($\det Q > 0$)

General form of Q7-brane Wess-Zumino term

$$L_{WZ} \sim Q_{\alpha\beta} [A_8^{\alpha\beta} + A_6^{(\alpha} \mathcal{F}_2^{\beta)} + \dots]$$

A doublet of Born-Infeld fields is needed

- Nature of Q7-branes?
- Complete Born-Infeld part of Q7-brane action?

E. Bergshoeff, J. Hartong, D. Sorokin, arXiv:0708.2287 [hep-th]

Pure spinor heterotic strings in curved background

- σ -model for heterotic string in curved superfield background
- Pure spinor formalism: BRST-like charge Q
- Conditions: $Q^2 = 0$ and $QS = 0$
 \Rightarrow eom for SUGRA/SYM with no gauge/B-field coupling
- Gauge/B-field coupling is needed for anomaly cancelation
 \Rightarrow it arises as a BRST anomaly $Q\Gamma_{eff} = \alpha' \mathcal{A}$

\mathcal{A} satisfying consistency condition $Q\mathcal{A} = 0$ has been calculated

O. Chandía and M. Tonin, arXiv:0707.0654 [hep-th].

CFT partition functions and line bundles on moduli space

- Z_C : Partition function on a Riemann surface C of genus g for some CFT
- Holomorphic CFT $\Rightarrow Z_C$ depends holomorphically on the moduli
- In general, conformal anomaly $\Rightarrow Z_C$ is a (holomorphic) section of determinant line bundle $\lambda_1^{-\frac{c}{2}}$ on \mathcal{M}_g
- $Z_C \xrightarrow{\lim \rightarrow \partial \mathcal{M}_g}$ Lower genus correlators

CFT partition functions and line bundles on moduli space

- Systematic construction (for all $g > 1$) of explicit (in terms of θ 's) holomorphic sections of $\pi^* \lambda_1^{12-g} \otimes \mathcal{L}$ on $\mathcal{M}_{g,g-2}$

$$\left. \begin{array}{l} g = 2 \quad \rightarrow \quad \psi_{10} \in \lambda_1^{10} \\ g = 3 \quad \rightarrow \quad \psi_{18}^{1/2} \in \lambda_1^9 \\ g = 4 \quad \rightarrow \quad k_4 \in \lambda_1^{34} \\ g > 4 \quad \rightarrow \quad ? \end{array} \right\} \rightarrow \text{enter in the bosonic string measure}$$

- The divisor is related to the singular locus of θ -function
- Connection between Riemann period matrix and algebraic description of a curve

M. Matone, R. Volpato, to appear.