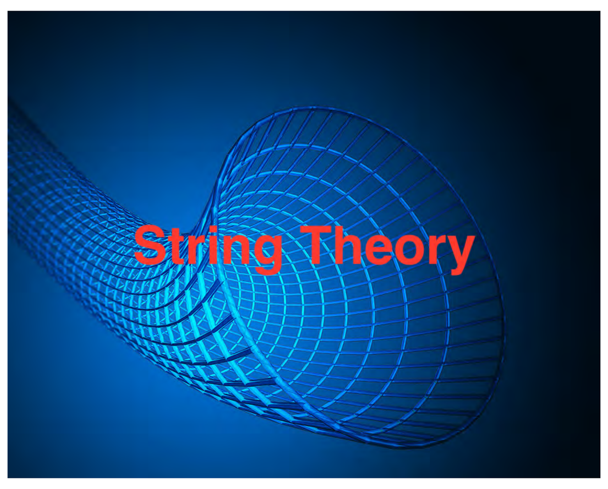

CORRELATORS OF THE SYMMETRIC PRODUCT ORBIFOLD

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$\text{AdS}_3/\text{CFT}_2$ AND MOTIVATION

The symmetric orbifold is conjectured to be dual to tensionless pure NSNS AdS_3 strings,

Pure NSNS tensionless strings on $\text{AdS}_3 \times \text{S}^3 \times \text{T}^4$ $\iff$ $\text{Sym}^N(\text{T}^4)$

- **Single particle states** correspond to **single cycle** permutations
- **Spectrum** and **symmetry algebra** have been matched

THE SYMMETRIC PRODUCT ORBIFOLD

$$\text{Sym}^N(\mathcal{M}) = \frac{(\mathcal{M})^N}{S_N}$$

- Twist fields σ_g introduce **twisted boundary conditions**
- For a cycle of length w **fractional Virasoro modes** are defined by

$$L_n = \oint \mathrm{d}z\, z^{n+1} T^\ell(z) \qquad n \in \mathbb{Z} - \frac{\ell}{w}$$

A NEW TECHNIQUE

For large N, we develop a new technique, **relying just on the symmetry algebra**, to

Fractionally moded null vectors $\Longrightarrow$ Differential equations for correlators

A NAIVE TRY

The vector

$$L_{-\frac{1}{w_3}}\sigma_{g_3}$$

is null, hence

$$\left\langle \sigma_{g_1}(0)\sigma_{g_2}(1) L_{-\frac{1}{w_3}}\sigma_{g_3}(u)\sigma_{g_4}(\infty)\right\rangle = 0\,.$$

Since the OPE

$$T^\ell(z)\sigma_g(u) \sim \frac{L_{-\frac{\ell}{w}}\sigma_g(u)}{(z-u)^{2-\frac{\ell}{w}}} + \frac{L_{-1-\frac{\ell}{w}}\sigma_g(u)}{(z-u)^{1-\frac{\ell}{w}}} + \dots$$

contains fractional modes **we cannot just wrap the contour** around the Riemann sphere.

We do not know how to evaluate the **many fractional modes**.

OUR METHOD

Given a contour C around the insertion points,

$$\oint_C dz \left\langle \sum_{k=1}^N f_k(z) T^{(k)}(z)\sigma_{g_1}(0)\sigma_{g_2}(1)\sigma_{g_3}(u)\sigma_{g_4}(\infty)\right\rangle = 0$$

where $f_k(z)$ satisfies

1. $f_k(e^{2\pi i}z + z_r) = f_{g_r(k)}(z + z_r)\,,$
2. f_k has no poles except at infinity ,
3. $f_k(z) \sim \gamma_4 z + \dots\,, \qquad z \sim \infty$
4. $f_k(z) \sim \alpha_r \delta_{r,3} + \beta_r (z - z_r)^{1-\frac{1}{w_r}}\delta_{r,3} + \gamma_r(z - z_r) + \dots$

$\downarrow L_{-1}$ $\qquad \downarrow L_{-\frac{1}{w_3}}$ $\qquad \downarrow L_0$

THE DIFFERENTIAL EQUATION

We obtain

$$\left(\alpha_3\partial_u + h_1\gamma_1 + h_2\gamma_2 + h_3\gamma_3 - h_4\gamma_4\right)\langle\sigma_{g_1}(0)\sigma_{g_2}(1)\sigma_{g_3}(u)\sigma_{g_4}(\infty)\rangle = 0$$

- The differential equation is **solved analytically**.
- The solution depends on the Taylor expansion of $f_k(z)$.

THE SOLUTION

One can define a **covering space** for the Riemann sphere, where fields are **single-valued**.

- A unique $f_k(z)$ can be found and written in terms of the **covering map**,
- We **recover** and **extend** previous results in the literature.