

Title: Discussion 1

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Abstract:

# Unitarity constraints

- Operators belong to unitary representations of the superconf. group
- Dimensions have different lower bounds
- Gauge invariant spin zero operators

$$D(\mathcal{O}) \geq 1, \quad D(\mathcal{O}) = 1 \leftrightarrow P_\mu P^\mu(\mathcal{O}) = 0,$$

# Central charges

- ◆ Positivity of coefficients related to the stress-energy trace anomaly
- ◆ 'a(R)' Conformal anomaly of SCFT = U(1)<sub>R</sub> 't Hooft anomalies  
*[proportional to the square of the dual of the Riemann Curvature]*

$$a(R) = 3\text{Tr}U(1)_R^3 - \text{Tr}U(1)_R$$

- ◆ 'c(R)'  
*[proportional to the square of the Weyl tensor]*

$$c(R) = 9\text{Tr}U(1)_R^3 - 5\text{Tr}U(1)_R$$

- ◆ 'b(R)'  
*[proportional to the square of the flavor symmetry field strength]*

$$b(R) = \text{Tr}U(1)_R F^2$$

# a-theorem

For any super CFT besides positivity we have, following Cardy

$$\Delta a \equiv a_{UV} - a_{IR} > 0$$

$$\Delta a = a_{UV} - a_{IR} = \pm \frac{1}{9} \sum_i |r_i| [(3R_i - 2)^2 (3R_i - 5)] > 0$$