

- Conformal metric:  $ds^2 = g_{\ell m} dx^\ell dx^m$ .  $x^\ell = (x^\mu, z)$ ,  $g_{\ell m} \rightarrow (R^2/z^2) \eta_{\ell m}$ .
- Action for massive scalar modes on  $\text{AdS}_{d+1}$ :

$$S[\Phi] = \frac{1}{2} \int d^{d+1}x \sqrt{g} \frac{1}{2} \left[ g^{\ell m} \partial_\ell \Phi \partial_m \Phi - \mu^2 \Phi^2 \right], \quad \sqrt{g} \rightarrow (R/z)^{d+1}.$$

- Equation of motion

$$\frac{1}{\sqrt{g}} \frac{\partial}{\partial x^\ell} \left( \sqrt{g} g^{\ell m} \frac{\partial}{\partial x^m} \Phi \right) + \mu^2 \Phi = 0.$$

- Factor out dependence along  $x^\mu$ -coordinates,  $\Phi_P(x, z) = e^{-iP \cdot x} \Phi(z)$ ,  $P_\mu P^\mu = \mathcal{M}^2$ :

$$\left[ z^2 \partial_z^2 - (d-1)z \partial_z + z^2 \mathcal{M}^2 - (\mu R)^2 \right] \Phi(z) = 0.$$

- Solution:  $\Phi(z) \rightarrow z^\Delta$  as  $z \rightarrow 0$ ,

$$\Phi(x, z) = C z^{\frac{d}{2}} J_{\Delta - \frac{d}{2}}(z\mathcal{M}), \quad \Delta = \frac{1}{2} \left( d + \sqrt{d^2 + 4\mu^2 R^2} \right).$$