

This is to be solved subject to the constraint

$$A_\mu(r \rightarrow 0, x, y, t) = \mathcal{A}_\mu(x, y, t)$$

where  $\mathcal{A}_\mu$  is a source coupling to a conserved U(1) current  $J_\mu$  of the CFT3

$$\mathcal{S} = \mathcal{S}_{CFT} + i \int dx dy dt \mathcal{A}_\mu J_\mu$$

At non-zero chemical potential we simply require  $\mathcal{A}_\tau = \mu$ .