Holographic Complex CFTs

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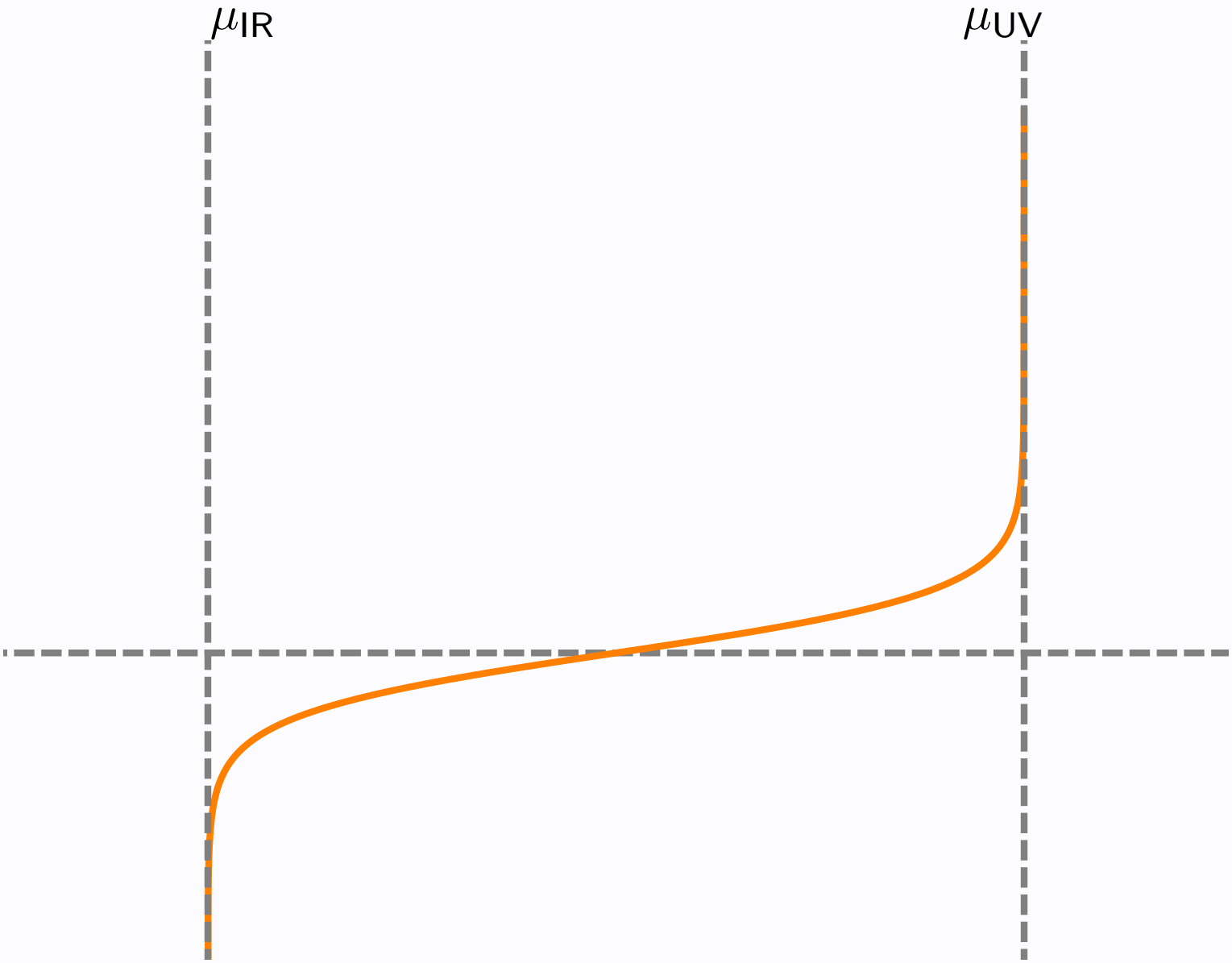
In collaboration with **A. F. Faedo, C. Hoyos & D. Mateos**

Based on **1909.04008**

Walking behaviour



Fixed Point Annihilation

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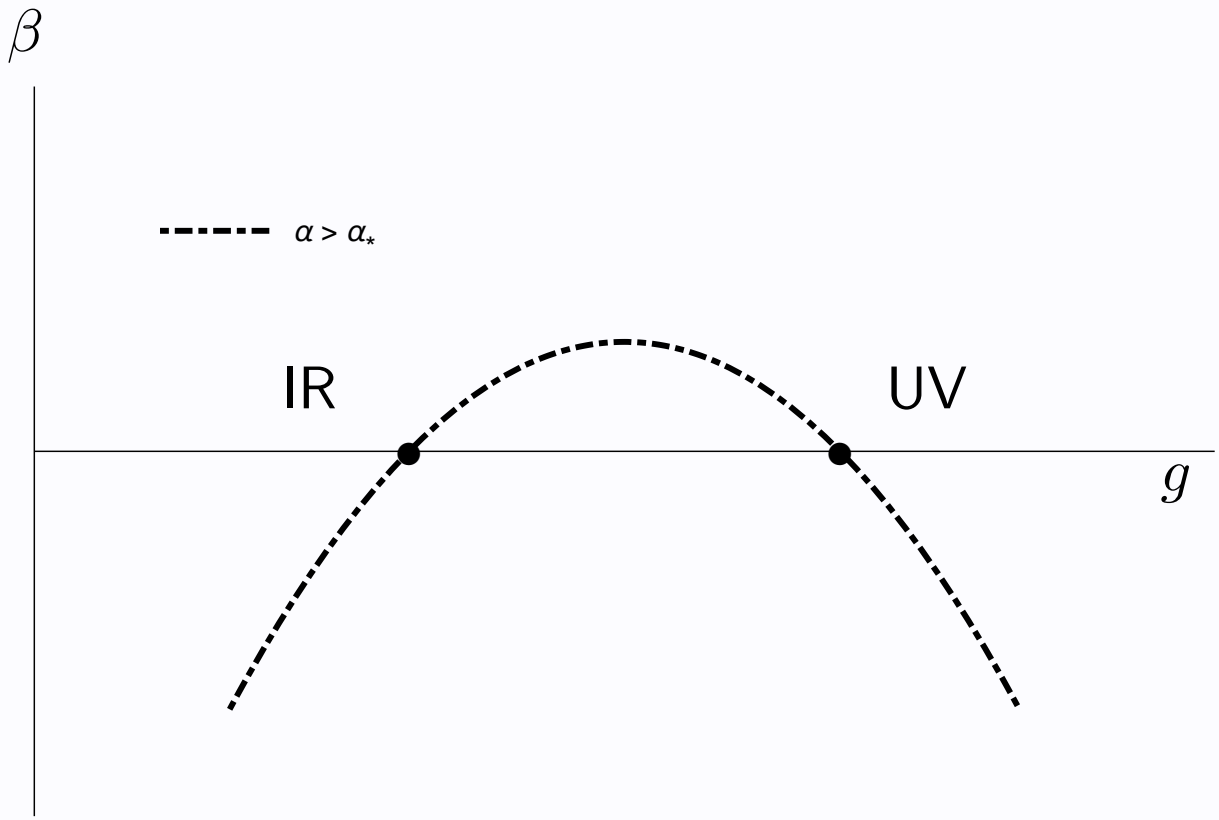

[Kaplan, Lee, Son; '09]

Fixed Point Annihilation

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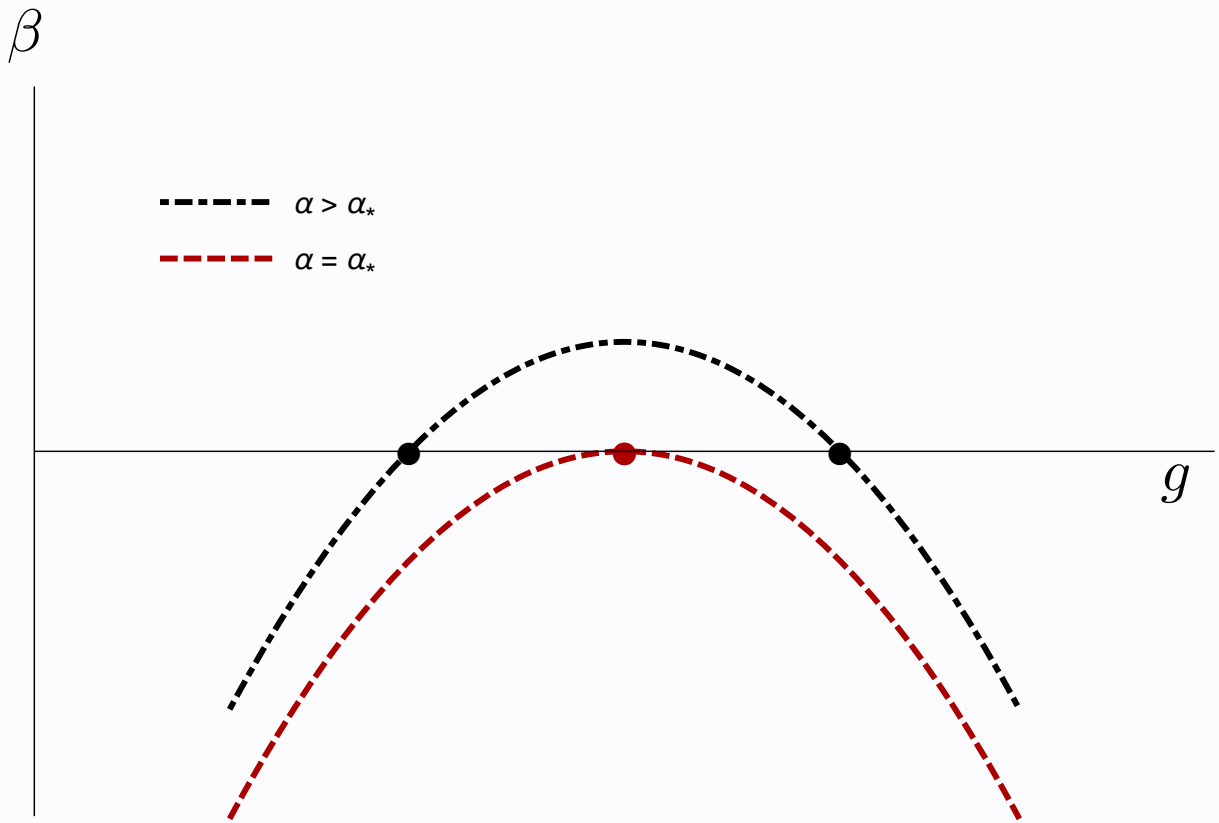
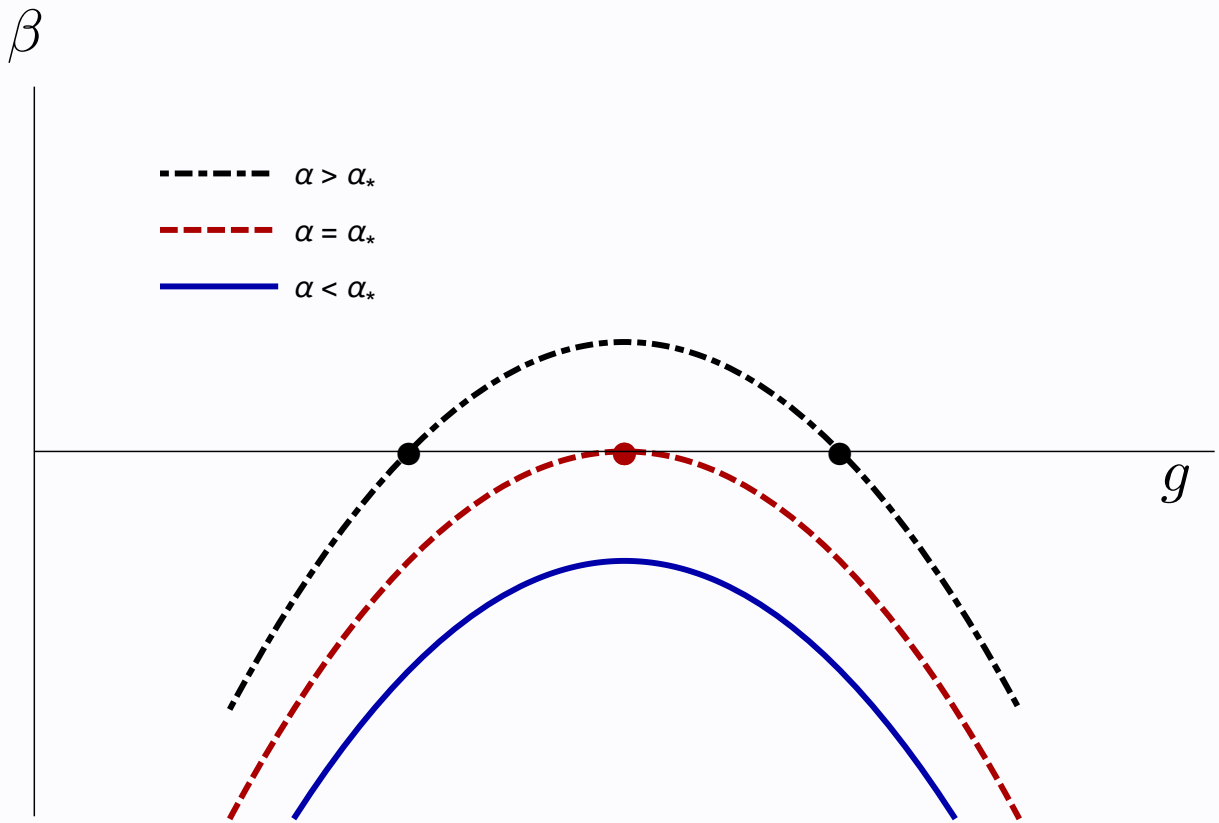


[Kaplan, Lee, Son; '09]

Fixed Point Annihilation

$$\beta = \frac{\partial g}{\partial \log \mu} = (\alpha - \alpha_*) - (g - g_*)^2 \quad = 0$$

$$g_\pm = g_* \pm i\sqrt{|\alpha - \alpha_*|} \qquad (\alpha - \alpha_*) < 0$$

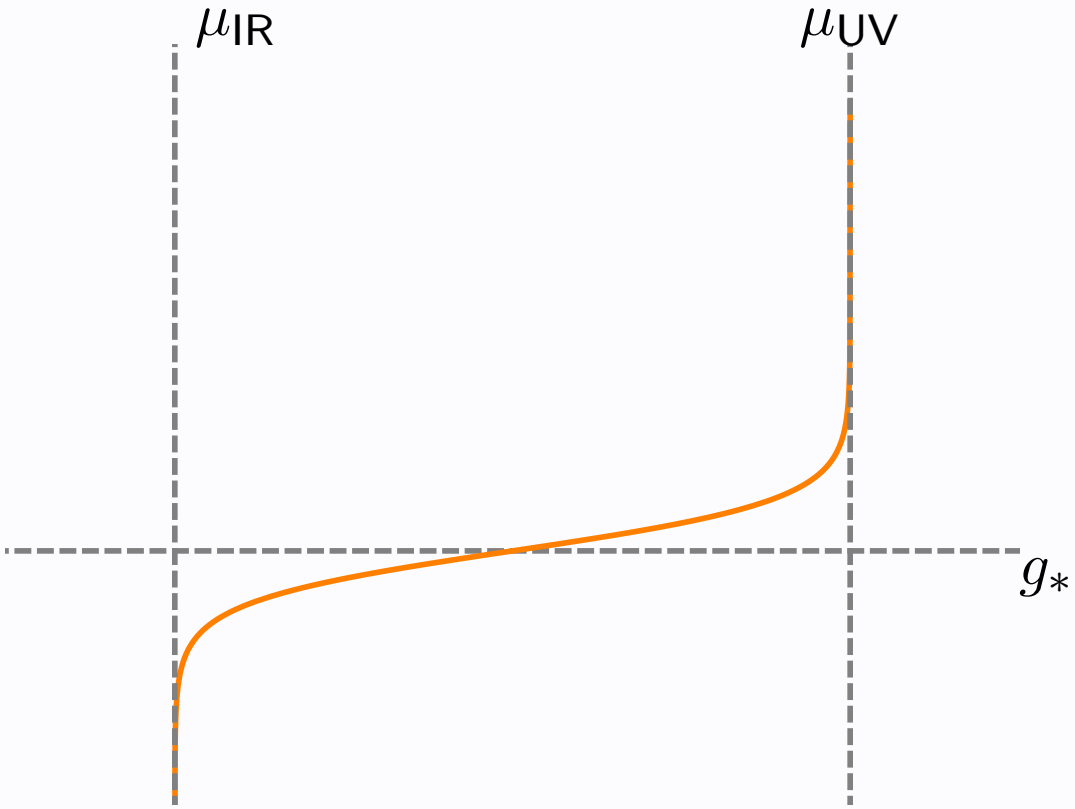


[Kaplan, Lee, Son; '09][Gorbenko, Rychkov, Zan; '18]

Fixed Point Annihilation

$$\beta = \frac{\partial g}{\partial \log \mu} = (\alpha - \alpha_*) - (g - g_*)^2 \quad = 0$$

$$\frac{\mu_{\mathsf{IR}}}{\mu_{\mathsf{UV}}} = \exp\left(\int_{g_{\mathsf{UV}}}^{g_{\mathsf{IR}}} \frac{\mathrm{d}g}{\beta(g)}\right) \approx e^{-\pi/\sqrt{\alpha_* - \alpha}}$$



[Kaplan, Lee, Son; '09]

Holographic Realisation

$$S = \frac{1}{2\kappa_5^2}\int \mathrm{d}^5x\,\sqrt{-g}\left(R - \frac{1}{2}\partial_\mu\phi\partial^\mu\phi - V(\phi)\right)$$

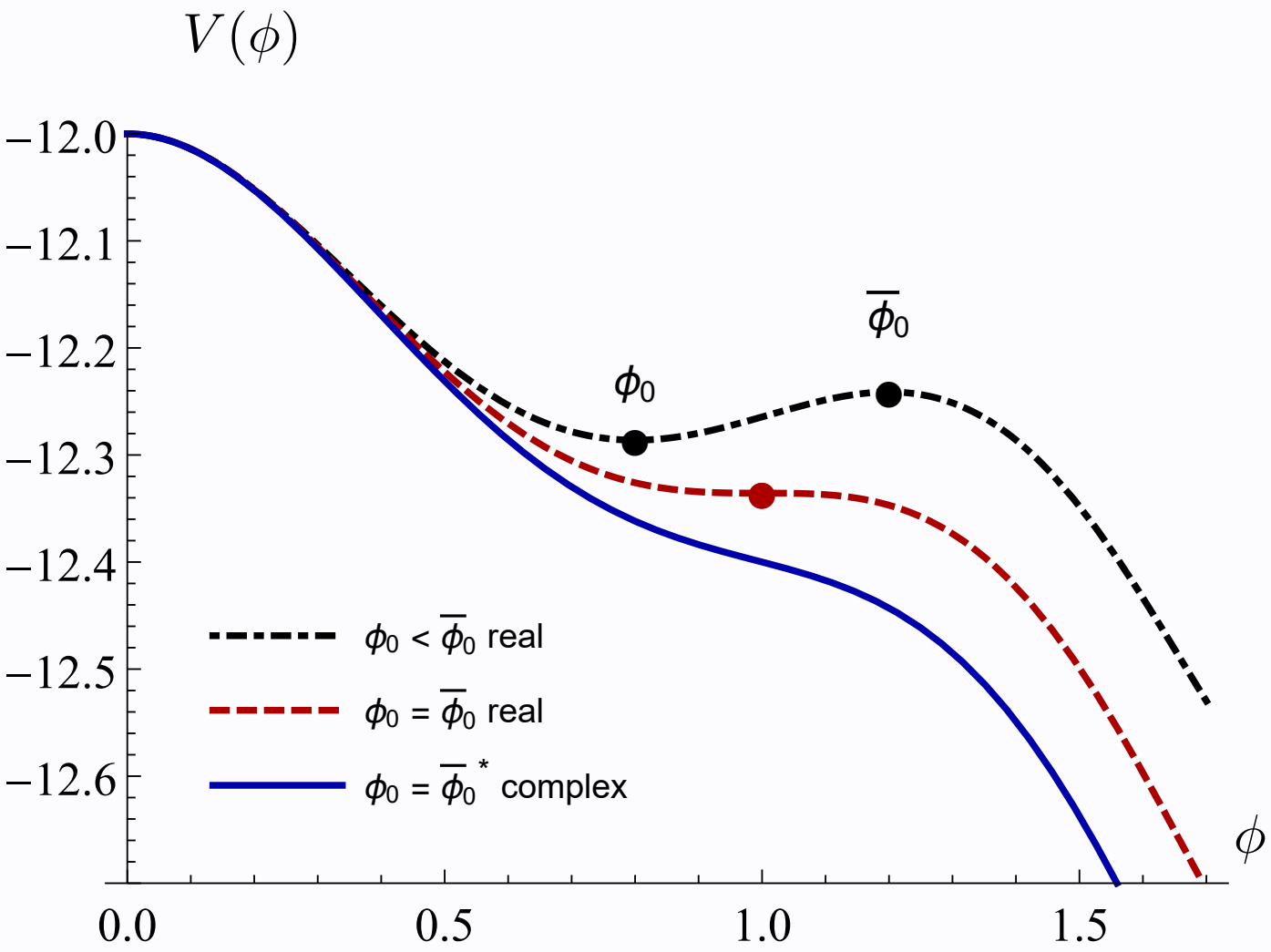
$$V = 3\left(6\,\left(\frac{\mathrm{d}W}{\mathrm{d}\phi}\right)^2 - 4W^2\right)$$

$$\beta(\phi) = -6\,\frac{\mathrm{d}\log W}{\mathrm{d}\phi}$$

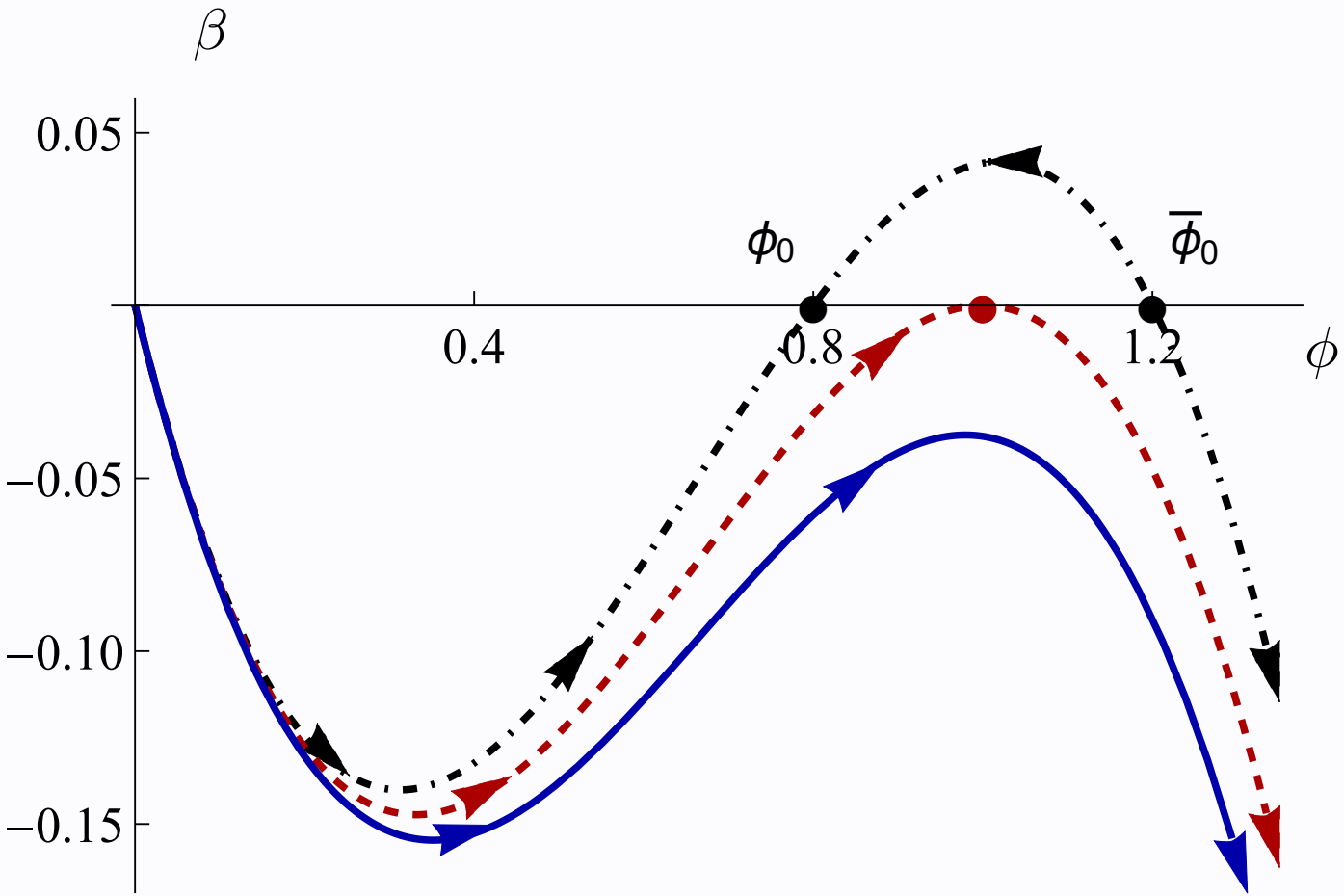
$$\frac{\mathrm{d}W}{\mathrm{d}\phi} = \frac{W_0}{L}\,\phi\,(\phi-\phi_0)\,(\phi-\bar{\phi}_0)$$

[Faedo, Hoyos, Mateos, JGS; '19]

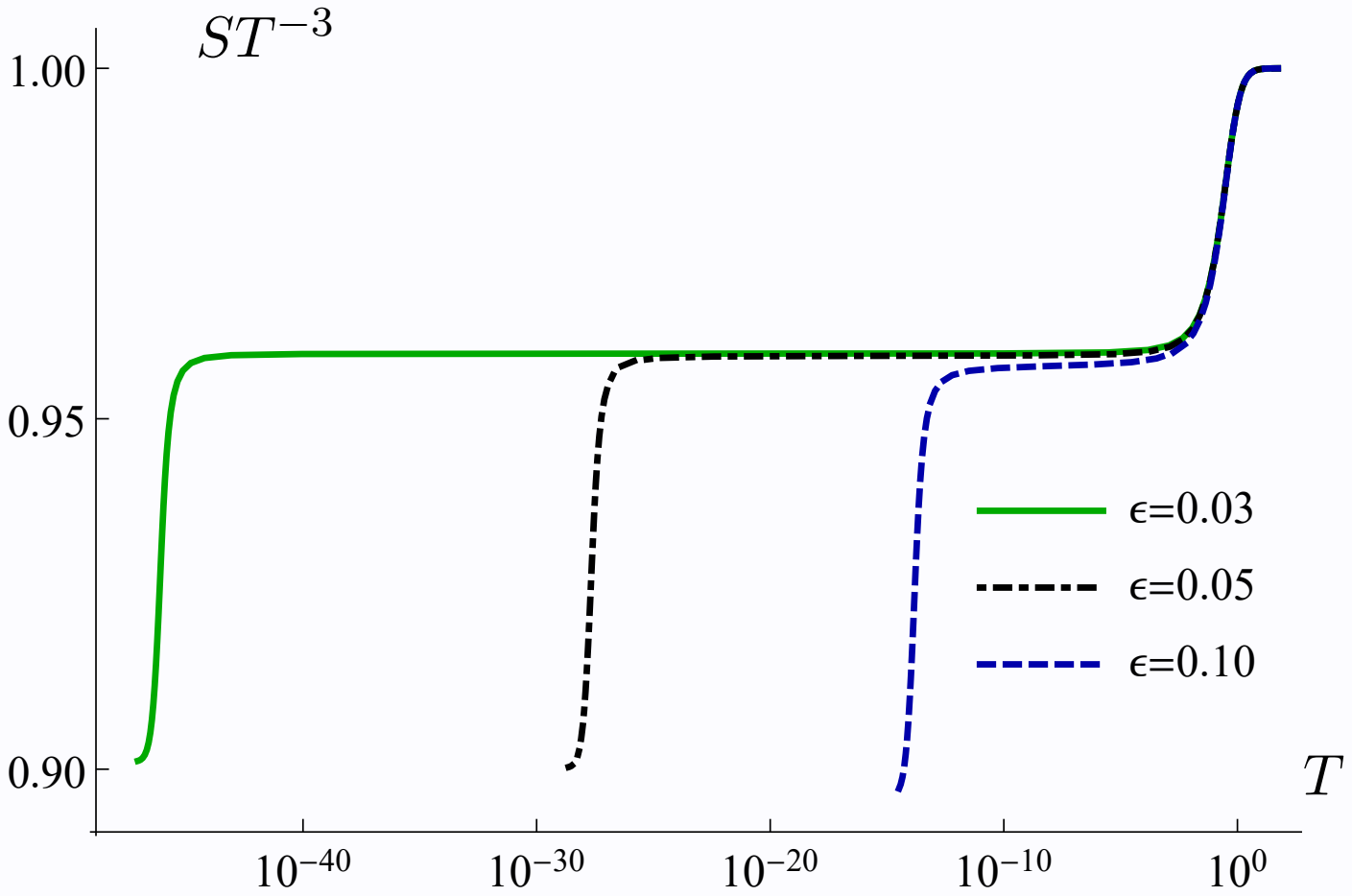
Holographic Realisation



Holographic Realisation



Holographic Realisation



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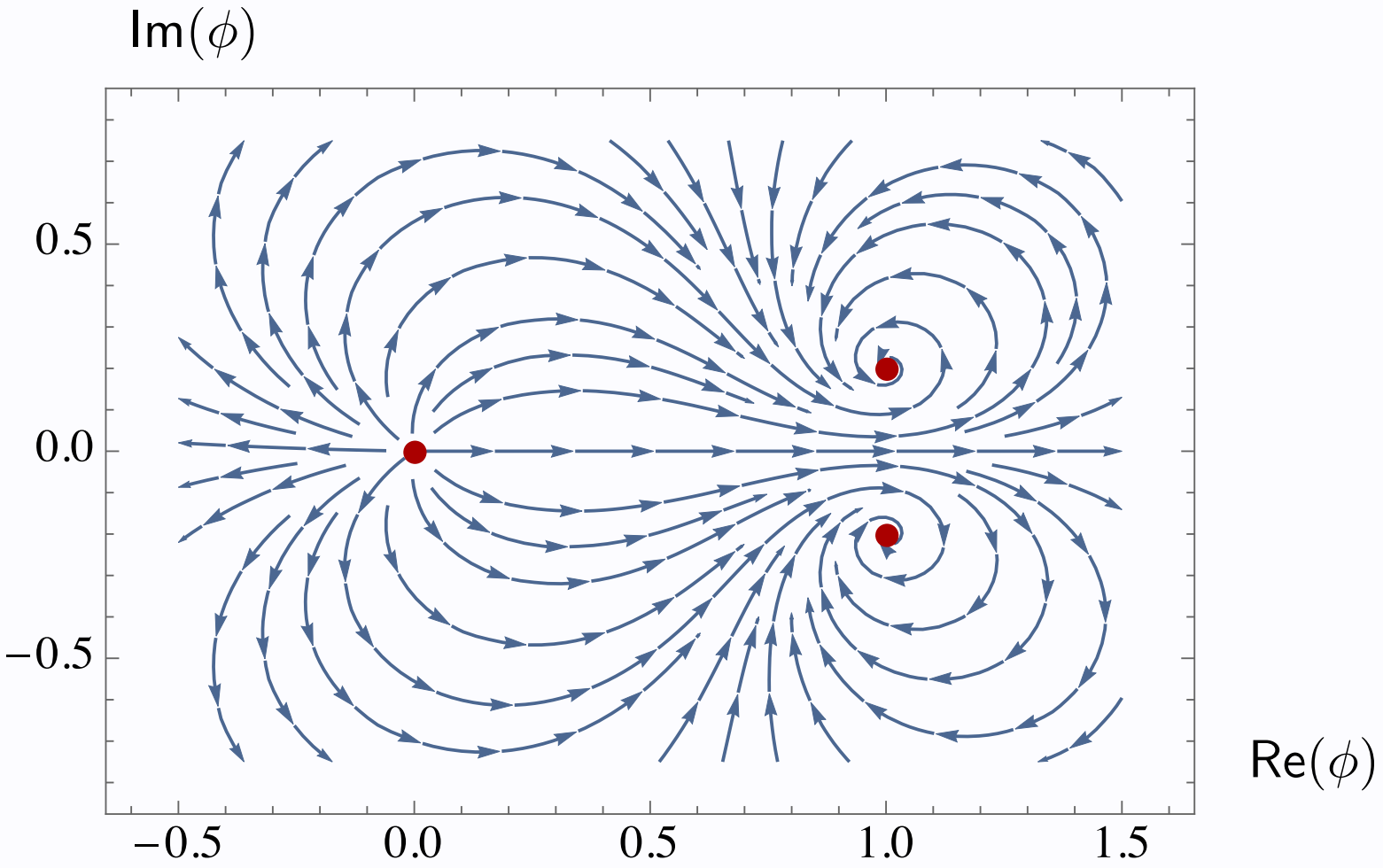

Conclusion

We provided a holographic realization of fixed point annihilation at strong coupling and discussed the existence of complex CFTs at the fixed points.